MAINVIEW® for IMS Online Analyzers

Reference Manual

Version 3.3

March 2002

bmcsoftware

Copyright © 1998–2002 BMC Software, Inc., as an unpublished work. All rights reserved.

BMC Software, the BMC Software logos, and all other BMC Software product or service names are registered trademarks or trademarks of BMC Software, Inc. IBM and DB2 are registered trademarks of International Business Machines Corp. All other registered trademarks or trademarks belong to their respective companies.

Restricted Rights Legend

U.S. GOVERNMENT RESTRICTED RIGHTS. UNPUBLISHED–RIGHTS RESERVED UNDER THE COPYRIGHT LAWS OF THE UNITED STATES. Use, duplication, or disclosure by the U.S. Government is subject to restrictions set forth in FAR Section 52.227-14 Alt. III (g)(3), FAR Section 52.227-19, DFARS 252.227-7014 (b), or DFARS 227.7202, as amended from time to time. Send any contract notices to Contractor/Manufacturer:

BMC Software, Inc.
2101 CityWest Blvd.
Houston TX 77042-2827
USA

Contacting BMC Software

You can access the BMC Software Web site at **http://www.bmc.com**. From this Web site, you can obtain general information about the company, its products, special events, and career opportunities. For a complete list of all BMC Software offices and locations, go to **http://www.bmc.com/corporate/offices.html**.

USA and Canada

Address	BMC Software, Inc. 2101 CityWest Blvd. Houston TX 77042-2827
Telephone	713 918 8800 or 800 841 2031
Fax	713 918 8000

Outside USA and Canada

Telephone	(01) 713 918 8800
Fax	(01) 713 918 8000

Customer Support

You can obtain technical support by using the Support page on the BMC Software Web site or by contacting Customer Support by telephone or e-mail. To expedite your inquiry, please see "Before Contacting BMC Software," below.

Support Web Site

You can obtain technical support from BMC Software 24 hours a day, seven days a week by accessing the technical support Web site at **http://www.bmc.com/support.html**. From this site, you can

- read overviews about support services and programs that BMC Software offers
- find the most current information about BMC Software products
- search a database for problems similar to yours and possible solutions
- order or download product documentation
- report a problem or ask a question
- subscribe to receive e-mail notices when new product versions are released
- find worldwide BMC Software support center locations and contact information, including e-mail addresses, fax numbers, and telephone numbers

Support via Telephone or E-mail

In the USA and Canada, if you need technical support and do not have access to the Web, call 800 537 1813. Outside the USA and Canada, please contact your local support center for assistance. To find telephone and e-mail contact information for the BMC Software support center that services your location, refer to the Contact Customer Support section of the Support page on the BMC Software Web site at **www.bmc.com/support.html**.

Before Contacting BMC Software

Before you contact BMC Software, have the following information available so that a technical support analyst can begin working on your problem immediately:

- product information
  - product name
  - product version (release number)
  - license number and password (trial or permanent)
- operating-system and environment information
  - machine type
  - operating system type, version, and service pack or program temporary fix (PTF)
  - system hardware configuration
  - serial numbers
  - related software (database, application, and communication) including type, version, and service pack or PTF
- sequence of events leading to the problem
- commands and options that you used
- messages received (and the time and date that you received them)
  - product error messages
  - messages from the operating system, such as `file system full`
  - messages from related software

Contents

How to Use This Book xv

Part 1. Performance Analysis and Monitoring Techniques 1

Chapter 1. Optimizing System Workflow 3
MVIMS Usage Modes 3
Message Format Service (MFS) 4
Analyzing MFS 4
Monitoring MFS 5
Suggestions 6
Queuing 6
Analyzing Queuing 6
Monitoring Queuing 8
Scheduling 8
Analyzing Scheduling 8
Class Queuing 8
Balancing Group (BALG) Queuing 9
Scheduling Activity 9
Monitoring Scheduling 10
Pool Utilization 10
PSB and DMB Pools 10
Pool Utilization for LSO=S 11
Monitoring Pool Utilization 11
Suggestions 11
Analyzing Operational Displays 12
Total System Monitoring 12
Dependent Region Monitoring 14
Analyzing Databases 16
OSAM Buffer Pool 16
VSAM Buffer Pool 17
Hit Ratios 17
VSAM Hiperspace 18
Fast Path Buffer Pool 18
Points Common to All Buffer Pools 19
Suggestions: 19
Analyzing IMS Internals 21
Latches 21
Suggestions for Relieving Latch Conflicts: 21
Logs 21
Online Log Data Set (OLDS) 21
Write-ahead Data Set (WADS) 22
System Log Data Set (SLDS) 22
Log Performance Suggestions 22
Program Isolation Analysis 23
Pools 24
CBT Pools 24
Non-CBT Pools 24

Analyzing the System 27
Dispatching 27
Real Storage 28

Chapter 2. User Techniques for Monitors 29
Master Terminal Operator (MTO) 30
BLKMTO Example 30
IMS Manager 32
BLKMGR Example 32
IMS Performance Analyst and System Programmer 33
BLKPERF Example 33
Database Administrator 35
BLKDBA2 Example 35

Part 2. Using MVIMS 37

Chapter 3. The MAINVIEW Product Family 39

Chapter 4. Measuring IMS Activities and Resources 41

Chapter 5. Types of Services 49
Requests 50
Analyzers 51
Monitors 52
Starting and Stopping Monitors 52
Monitor Response to Target IMS Shutdown and Startup 52
Data Collection 52
Historical Data Stored 53
Data Types Measured 54
Warning Conditions 55
Monitor Request Title 56
Warning Message Format 56
IMS Monitor Data Display Services 58
Workload Wait Events 59
Workload Trace 59
Logging a Display 60
Automatic BBI-SS PAS Image Logging of Analyzer Displays 60
Automatic BBI-SS PAS Image Logging of PLOT Display 60
Automatic BBI-SS PAS Image Logging of Monitor Summary Displays 61
Request Status 62
Grouping Requests 62

Part 3. Analyzers 63

Chapter 6. Displaying a List of Analyzer Services (Menu Option 1) 67
SORT Primary Command 68
AREA Primary Command 69
Line Commands 69
Start Image Log Request (I Line Command) 71

Chapter 7. Requesting an Analyzer Display 73
Selecting a Service(s) for Display 73
Logging an Analyzer Service Display 74
Stopping an Analyzer Image Log Request 75
Qualifying an Analyzer Request 75

Chapter 8. Resource Analyzer Services (Quick Reference) 77

Chapter 9. Message Format Service Displays 83
MFSST - MFS Statistics 83
MFSUT - MFS Pool Utilization 87

Chapter 10. Queuing Displays 89
QUEST - Queue Statistics 89

Chapter 11. Scheduling Displays 95
BALGQ - BALG Queuing 96
CLASQ - Class Queuing 103
PSBUT, DMBUT - PSB and DMB Pool Utilization 110
SCHED - Scheduling Statistics 113

Chapter 12. Region Displays 117
DLIST - DL/I Call Status 120
DREGN - Region Detail (Event Collector Data) 127
DREGN - Region Detail (No Event Collector Data) 147
REGNS - IMS Regions (Event Collector Data) 166
REGNS - IMS Regions (No Event Collector Data) 190
STAT/STATR - System Status 211

Chapter 13. Database Displays 221
DBST - OSAM Global Pool Statistics 221
DBST - OSAM Subpool Statistics 225
FPBST - Fast Path Buffer Pool Statistics 229
VSST - VSAM Global Pool Statistics 232
VSST - VSAM Subpool Statistics 235

Chapter 14. IMS Internals Displays 239
APPCA - APPC Activity Summary 239
APPCL - APPC LU Status 248
DAPPC - Input Allocation Direction 255
DAPPC - Output Allocation Direction 260
DLTCH - Latch Detail 264
DPOOL - Detail Pool (Non-CBT Fixed Pool) 268
DPOOL - Detail Pool (Non-CBT Variable Pool) 274
LATCH - Latch Summary 278
LOGST - Log Statistics 285
PI - Program Isolation 290
POOLC - Pool Summary (CBT) 294
POOLS - Pool Summary (Non-CBT Variable and Fixed Pools) 297

Chapter 15. OS/390 System Displays 305
DSPST - Dispatcher Statistics 305
RS - Real Storage 309

Chapter 16. IRLM Displays 313
IRLM - IRLM IMS Status (IRLM 1.5) 313
IRLMG - IRLM GLOBAL STATUS (IRLM 1.5) 319
LCRES - IRLM Lock Contention by Resource (IRLM 1.5) 328
LCUSR - IRLM Lock Contention by User (IRLM 1.5) 335
LHRES - IRLM Locks Held by Resources (IRLM 1.5) 337
LHUSR - IRLM Locks Held by User (IRLM 1.5) 344
LUSRD - IRLM Lock User Detail (IRLM 1.5) 346
IRLM - IRLM IMS Status (IRLM 2.1 and Later) 354
IRLMG - IRLM GLOBAL STATUS (IRLM 2.1 and Later) 361
LCRES - IRLM Lock Contention by Resource (IRLM 2.1) 371
LCUSR - IRLM Lock Contention by User (IRLM 2.1) 379
LHRES - IRLM Locks Held by Resources (IRLM 2.1) 381
LHUSR - IRLM Locks Held by User (IRLM 2.1) 388
LUSRD - IRLM Lock User Detail (IRLM 2.1) 391

Chapter 17. WORKLOAD ANALYZER Displays (Quick Reference) 399

Chapter 18. ISTAT - Terminal Input Status Display 401
Input LTERM Status 404

Chapter 19. OSTAT - Terminal Output Status Display 413
Output LTERM Status 418

Chapter 20. TRANQ - Transaction Queue Status Display 425
Transaction Status 429

Chapter 21. USER - User Status Summary 433

Chapter 22. Requesting Workload Wait Data Collection (MWAIT) 439
Starting MWAIT 439
Using the Workload Wait Data Entry Panel 441
Stopping MWAIT 446
Storage Requirements 446
Defining a Sampling Interval 447
Qualifying a Workload MWAIT Request 447

Chapter 23. Requesting Workload Wait Data Display (DWAIT) 449

Chapter 24. DWAIT - Workload Wait Display 451
Excluding Queued Events 456
DWAIT Event Definitions 456
Application Program (AP) Events 457
Input Communications (IC) Events 474
Input Queue (IQ) Events 483
Output Communications (OC) Events 486
Output Queue (OQ) Events 487
Scheduling (SC) Events 490
Synchronization Point (SP) Events 504

Part 4. Appendixes 515

Appendix A. IMS Dump Analysis 517
AO Exit 517
MAINVIEW AutoOPERATOR for IMS Routines in IMS 517
Event Collector 517

Appendix B. How Product Libraries Should Be Used 519

Part 5. Index 521

Glossary 523

Index 535

Figures

1. BMC Software MAINVIEW Selection Menu 39
2. List Analyzer Display Services Application 67
3. Image Log Request Application. Analyzer Display Services List I Line Command . . 71
4. Start Workload Wait Request 441

Tables

1. Services Supporting Hit Ratios 17
2. IMS Activities and Resources Measured. 42
3. Resource Analyzer Service Select Codes 77
4. Workload Analyzer Display Service Select Codes 399
5. SET Keywords to Activate a Workload Wait (MWAIT) Service 442
6. Latch Locks 467
7. Latch Locks 475
8. Latch Locks 495
9. Product Libraries 519

How to Use This Book

This manual documents the features and functions of the MAINVIEW® for IMS (MVIMS) Online Resource Analyzer and Workload Analyzer display services.

The features, and functions of the MVIMS Online Resource Monitor, Workload Monitor, and trace services are documented in the *MAINVIEW for IMS Online – Monitors and Traces Reference Manual*.

The features, and functions of the IMSPlex System Manager (IPSM) component are documented in the *MAINVIEW for IMS Online – IPSM Reference Manual*.

For information about what's new in the current release of MAINVIEW for IMS Online, see the product Release Notes, which are available on the BMC Software Support Web pages.

This manual is intended for use by the IMS master terminal operator (MTO), system programmer, database administrator, or performance analyst who monitors the status, activity, and performance of IMS and its resources.

MVIMS Product Library

MVIMS is integrated with the BMC Software MAINVIEW® architecture. MAINVIEW is a base architecture that allows authorized users to use a single terminal to interrogate any OS/390, CICS, IMS, DB2, or MQSeries subsystem in a sysplex.

The MVIMS product library includes the following documents.

MAINVIEW for IMS Online:

MAINVIEW for IMS Online – Customization Guide

MAINVIEW for IMS Online – IPSM Reference Manual

MAINVIEW for IMS Online – Analyzers Reference Manual

MAINVIEW for IMS Online – Monitors and Traces Reference Manual

MAINVIEW for IMS Online – Release Notes

MAINVIEW for IMS Offline:

MAINVIEW for IMS Offline – Customization and Utilities Guide

MAINVIEW for IMS Offline – Performance Reporter Reference Manual

MAINVIEW for IMS Offline – Transaction Accountant Reference Manual

MAINVIEW for IMS Offline – Release Notes

How This Book Is Organized

This manual is divided into the following parts:

- Part 1 describes techniques to help you use MVIMS to optimize IMS performance. It contains references to specific services.
- Part 2 describes how to use MVIMS. It includes descriptions of
  - Analyzers and monitors and how they are used
  - The online functions that can be used with MVIMS in a terminal session (TS)
  - The Primary Option Menu and applications that provide easy access to product service applications
- Part 3 describes how to use each of the analyzer display services.
- Part 4 has appendixes that provide information about how to analyze IMS dumps and how to use the MAINVIEW distributed product libraries.
- Part 5 contains the glossary and the index.

To help you find information about a service quickly:

- Service descriptions are arranged alphabetically by name and grouped by sections that correspond to a major IMS transaction processing event.
- Service parameters, display fields, and DWAIT display events are described in alphabetical order.
- All of the service names are in alphabetical order together as indexed entries to “Service Select Code” in the index.

Related MAINVIEW Products

The related MAINVIEW-based products include the following:

- MAINVIEW® AutoOPERATOR™
- MAINVIEW® for CICS
- MAINVIEW® for DB2®
- MAINVIEW® for DBCTL
- MAINVIEW® FOCAL POINT
- MAINVIEW® for MQSeries
- MAINVIEW® for OS/390
- MAINVIEW® VistaPoint™

Customization and administration instructions for the MAINVIEW-based functions are provided in the *MAINVIEW Common Customization Guide*. The following manuals document product-specific customization instructions:

- *MAINVIEW AutoOPERATOR Customization Guide*
- *MAINVIEW for CICS Customization Guide*
- *MAINVIEW for DB2 Customization Guide*
- *MAINVIEW for DBCTL Customization Guide*
- *MAINVIEW for IMS Online – Customization Guide*
- *MAINVIEW for IMS Offline – Customization and Utilities Guide*
- *MAINVIEW for OS/390 Customization Guide*

The following books document the use of general services common to MAINVIEW for IMS and related products:

- *MAINVIEW AutoOPERATOR Basic Automation Guide*
- *MAINVIEW AutoOPERATOR Advanced Automation Guide for CLIST EXECS*
- *MAINVIEW AutoOPERATOR Advanced Automation Guide for REXX EXECS*
- *MAINVIEW for CICS PERFORMANCE REPORTER User Guide*
- *MAINVIEW for DB2 User Guide* (Volumes 1, 2, and 3)
- *MAINVIEW for DBCTL Analyzers, Monitors, and Traces Reference Manual*

Related IBM Publications

OS/390 Initialization and Tuning Guide
IMS Operator Reference
System Administration Guide

Conventions Used in This Manual

The following symbols are used to define command syntax, are ***not*** part of the command, and should never be typed as part of the command:

- Brackets [ ] enclose optional parameters or keywords.
- Braces { } enclose a list of parameters; one must be chosen.
- A line | separates alternative options; one can be chosen.
- An <u>underlined</u> parameter is the default.

The following command syntax conventions apply:

- An ITEM IN CAPITAL LETTERS must be typed exactly as shown.
- Items in *italicized, lowercase* letters are values that you supply.
- When a command is shown in uppercase and lowercase letters, such as **HSplit**, the uppercase letters show the command abbreviation that you can use (**HS**, for example). The lowercase letters complete the entire command name. Typing the entire command name is an optional, alternative way of entering the command.
- Commands without an abbreviation (**END**, for example) appear in all uppercase letters.

Part 1. Performance Analysis and Monitoring Techniques

This section describes techniques to help you use MVIMS to optimize system performance.

Chapter 1. Optimizing System Workflow . . . 3
MVIMS Usage Modes . . . 3
Message Format Service (MFS) . . . 4
Analyzing MFS . . . 4
Monitoring MFS . . . 5
Suggestions . . . 6
Queuing . . . 6
Analyzing Queuing . . . 6
Monitoring Queuing . . . 8
Scheduling . . . 8
Analyzing Scheduling . . . 8
Class Queuing . . . 8
Balancing Group (BALG) Queuing . . . 9
Scheduling Activity . . . 9
Monitoring Scheduling . . . 10
Pool Utilization . . . 10
PSB and DMB Pools . . . 10
Pool Utilization for LSO=S . . . 11
Monitoring Pool Utilization . . . 11
Suggestions . . . 11
Analyzing Operational Displays . . . 12
Total System Monitoring . . . 12
Dependent Region Monitoring . . . 14
Analyzing Databases . . . 16
OSAM Buffer Pool . . . 16
VSAM Buffer Pool . . . 17
Hit Ratios . . . 17
VSAM Hiperspace . . . 18
Fast Path Buffer Pool . . . 18
Points Common to All Buffer Pools . . . 19
Suggestions: . . . 19
Analyzing IMS Internals . . . 21
Latches . . . 21
Suggestions for Relieving Latch Conflicts: . . . 21
Logs . . . 21
Online Log Data Set (OLDS) . . . 21
Write-ahead Data Set (WADS) . . . 22
System Log Data Set (SLDS) . . . 22
Log Performance Suggestions . . . 22
Program Isolation Analysis . . . 23
Pools . . . 24
CBT Pools . . . 24
Non-CBT Pools . . . 24
Analyzing the System . . . 27
Dispatching . . . 27
Real Storage . . . 28

Chapter 2. User Techniques for Monitors 29
Master Terminal Operator (MTO) 30
BLKMTO Example 30
IMS Manager 32
BLKMGR Example 32
IMS Performance Analyst and System Programmer 33
BLKPERF Example 33
Database Administrator 35
BLKDBA2 Example 35

Chapter 1. Optimizing System Workflow

This chapter describes how MVIMS can be used to analyze and monitor system operation and performance. It is organized into sections by IMS processing event components: MFS, queuing, scheduling, operations (region activity), database, IMS internal functions, and OS/390 functions. Within each section, a performance problem is presented with the applicable analyzer or monitor solution.

MVIMS Usage Modes

MVIMS can be used in two different modes:

- For ongoing analysis of what is currently happening in IMS.

  This mode provides a realtime picture of the current state of the system. These realtime displays are provided by Resource Analyzer and Workload Analyzer services.

  Analyzer services can be time-driven. In this mode, you can refresh the displays in a time-driven cycle or log them automatically at time-driven intervals to a BBI-SS PAS Image log for later retrieval.

- As a monitor to assist you in tuning the performance of the whole system by investigating the functions and resources over time that may be bottlenecks.

  This mode provides statistics accumulated at user-specified time intervals. Time-driven IMS workload samplings and graphic plot displays of the collected data samplings are provided by Workload Monitor and Resource Monitor services. IMS workload wait event and transaction trace data are collected and displayed by Workload Analyzer.

  Monitor-collected values can be compared to user-specified thresholds and warning messages can be generated. A warning message can invoke automatic corrective action from MAINVIEW AutoOPERATOR or alert a user to take corrective action.

You can set MVIMS services to monitor IMS performance at different times of the day or on different days of the week when processing characteristics may change. Small samples can be taken over time and comparisons made to determine the best performance indicators. Service sampling of IMS performance can help you determine if some changes are caused by application program or system design errors or oversight. Concentration should be directed in the areas where changes have the most effect in system performance.

Often it is valuable to know what has happened in a particular time interval (for example, the last 5-10 minutes). This information can be determined by making two observations and calculating how many events have occurred between the two. By relating these numbers to the length of the time interval chosen, rates such as requests-per-second or I/O-per-second can be calculated. Rates such as I/O-per-request can be found by comparing the number of events to any other counter (possible for a specific time span also). These calculations require more work, but result in more meaningful measurements and numbers that can be compared over time to show changes in the system.

With Resource Monitor, this work is performed automatically for the most important system variables, and the measurement made by each can be displayed with the PLOT service.
If several monitor requests are set up for the same sampling interval, the current measurement values can be viewed easily with the DMON service for comparisons.

In some subsections, suggestions are made for ways to improve performance. These should be considered as a starting point and not as a list of the best, or only, actions to be taken.
A suggestion may not be valid in every situation and must be considered for its value in the particular installation and mode of operation.

Message Format Service (MFS)

This section describes analyzing and monitoring MFS.

Analyzing MFS

Message Format Service (MFS) is the first major IMS function encountered by an incoming request (or the last for an outgoing response). MFS can have a great impact upon the efficiency and productivity of the entire system. As one of the unique features of IMS/TM, the generality and flexibility of MFS processing can result in performance problems if misused. For optimum performance, define only as many MFS formats as will fit in the MFS pool.

The formats reside online as records in a PDS with `RECFM=U`. The MFS data set should be allocated as a single extent by cylinders to an area without alternate tracks. The volume should be mounted private on nonshared DASD.

When a format is requested that is not in the pool, MFS must locate the directory entry for the format. If there is an entry for it in the in-core directory $$IMSDIR, a directory read is not necessary to retrieve this entry from the directory block.

This entry contains the TTR of the first record of the format and a half word of user data that contains the total length of the format block. Using this length, space is obtained in the MFS pool to contain the block. The format is then read into this area, one record at a time. The format block may be split into multiple records if the block size is too small. The block size should be at least as large as the largest format block because additional I/O is required to retrieve these multi-record formats.

The formats are maintained in the pool as long as possible to reduce the amount of I/O. Only when space is required in the pool does MFS free the least-recently-referenced unused format block. This release continues until sufficient contiguous free space has been obtained to satisfy the request. Fragmentation can be a problem in any pool of variable length blocks managed in this manner. The service Message Format Pool Utilization (MFSUT) can be used to study the effect of space release upon the MFS pool, including fragmentation. For more information about MFSUT, see the service description on page 87.

The basic request types that can be made to MFS are

- PRE-FETCH REQUESTS
- IMMEDIATE-REQUESTS
- FREE BLOCK REQUESTS

PRE-FETCH is an anticipated future need for a format block. If the pre-fetch feature is enabled, it informs PRE-FETCH to retrieve the requested format block.

An IMMEDIATE REQUEST is for a block that must be read into the MFS buffer pool before processing can continue. The IMMEDIATE REQUESTs counter is a good indicator of MFS activity, especially in relation to total MFS reads, and is useful in evaluating MFS performance. It is possible to calculate the average physical I/O-per-second to the MFS data set. Depending on the device and contention, this statistic may or may not indicate a problem.

FREE BLOCK REQUESTS inform the MFS pool handler that the format block is no longer actively being referenced and is now a candidate for being washed from the pool if space is needed for another block.

The MFSST service displays these counters in matrix format (for more information about MFSST, see the service description on page 83). Each line represents one of the three request types:

- PRE-FETCH REQUEST
- IMMEDIATE REQUEST
- FREE BLOCK REQUEST

Each column represents one of the three major queues where the FRE could have been located:

- PRE-FETCH QUEUE
- IMMEDIATE QUEUE
- FREE BLOCK QUEUE

Currently, the counter is incremented when the FRE is located in a queue. This does not necessarily mean that the format block itself is already in the pool. The MFS fetch request handler DFSFFRH0 could be modified to check for a loaded format block before incrementing this counter. This can lead to a better understanding of MFS performance. The percent of IMMEDIATE REQUESTs satisfied in the pool (in the IMMEDIATE or FREE BLOCK queues) is a good indicator of how well MFS is performing. The larger the percentage, the fewer synchronous waits for format I/O.

The MFS pool is above the 16Mb line. Because of virtual storage constraint relief (VSCR) above the 16Mb line, the MFS pool can be increased by 400 to 500 percent to further reduce the number of I/Os to the FORMAT data set. If the pool size is increased, be sure to monitor the number of FREs because it may be necessary to increase them to utilize the additional space in the pool. The directory entries are built dynamically in the pool as they are used. The $$IMSDIR is still used, but is not as significant as in previous releases. These dynamic entries are flushed whenever an online change is made to the MFS formats.

Monitoring MFS

MFS performance can be monitored continuously by these Resource Monitor monitors:

MFSIO	MFS input/output requests
MFSIR	MFS immediate requests
MFSFD	Percent of MFS blocks found in pool

If any of these values are considered to be excessive in given time periods, additional investigation is required (see “Suggestions” on page 6). There are no specific values that are good or bad; each system must be evaluated individually.

Suggestions

- Optimize the pool space and FRE allocation as described.
- Use the in-core format directory $$IMSDIR.
- Eliminate any unnecessary or unused format blocks.
- After updating/deleting a format, compress the library.
- Allocate by cylinder (but no more space than necessary) and make certain there are no alternate tracks.
- Watch the placement of the MFS data set and mount private on nonshared DASD.
- Make certain that the block size is at least as large as the largest format.
- Do not allocate any more directory blocks than necessary.
- If the MFS data set is large, consider reordering the formats. You can determine an optimal order with one of these methods:
  - Analyze the IMS log to determine the frequency of use.
  - Analyze the DC Monitor output to calculate the frequency fetched.

  You can then build the MFS data set by generating the formats in order of decreasing use. Use the frequency fetched from the DC Monitor to reorder the individual format blocks.

Queuing

This section discusses analyzing and monitoring queuing.

Analyzing Queuing

The next major IMS function that can be a major system bottleneck is the queuing of input requests and output responses. Like MFS, the queuing routines of IMS attempt to keep as much as possible in the queue pool to reduce I/O. I/O is done only when checkpoints request a pool purge, when space is needed in the pool, or when something previously written out must be retrieved. Thus, the queue pool and data sets can be critical to good performance.

Queuing makes use of preformatted OSAM data sets.

- Each data set should be allocated by cylinder as a single extent on an area without any alternate tracks.
- These data sets should be mounted private on a low-contention, nonshared device.

The optimization of the queue pool parameters is a more difficult problem. Several problem areas are:

- There are constraints that limit the possible values that can be defined. IMS imposes a strict relationship between the block size (BLKSIZE) and logical record length (LRECL) of the three queue data sets (space is wasted unless the block size is a multiple of all three LRECLs).

- The minimum LRECL of the LONG message queue data set frequently is dictated by the applications. The length of segments being queued to and from the applications determines the optimal choice of the three parameters.
- The LRECL for the SHORT message queue data set is especially difficult to determine. If this LRECL is too large, the SHORT message queue data set will be overutilized. If the LRECL is too small, the LONG message queue data set will be overutilized. Both situations waste space.

MVIMS can point to a possible problem in this area, but the solution may require offline analysis to determine the average segment length or the segment length distribution. These online Analyzer displays are helpful:

- Service DREGN (PSB/Transaction area of display) shows the average length of all input messages of the transaction types currently processing (as calculated by the IMS queue manager).
- Service STAT shows the utilization of each of the three queue data sets. By observing these percentages for a period of time, an imbalance between SHORT and LONG can be detected easily.

To maximize the use of the queue pool and reduce I/O, messages that remain queued for a long time should be set up as candidates to wash out. This can be done by setting the record length of the LONG message queue data set equal to the common block size and defining the segment length of such messages long enough to force them into the LONG message queue. This allows a block filled by such a message to be written out immediately, releasing the block. Otherwise, the segment takes up only one record in the block and the block may remain in the pool, but only the remaining records can be used.

The types of messages that should be considered are transactions that normally do not schedule (locked, stopped, or priority zero), and long output messages that are routed to slow remote printers or that use terminal operator paging. Any space wasted on the data set by possible padding is of minor importance in comparison to the better use of the queue buffers in the pool.

The remaining parameter is the determination of the number of queue buffers. Insufficient queue buffers results in unnecessary queue manager I/O. Excessive queue buffers wastes central storage and increases the paging rate on a real-storage constrained system.

Although the TOTAL REQUESTS to the queue manager is the best indication of the amount of queuing activity, the number of ENQUEUES plus CANCELS gives a better idea of the number of messages involved. These messages can be either single/multiple segment input requests or output responses. Using this sum, the amount of queuing activity per message can be calculated (TOTAL REQUESTS/(ENQUEUES + CANCELS)).

It is also possible to calculate the amount of queue manager activity per second. REPOSITIONS is a nonproductive call to the queue manager used to re-examine a previous segment. The number of PCBs UNCHAINED is incremented for each PCB that loses position when a buffer is written out. Finally, the number of WAITS FOR AN AVAILABLE BUFFER is incremented when a request had a wait while a buffer is written out to release space. As with many statistics, they are more meaningful when viewed as events per second or events per unit of work (such as I/O per message).

Monitoring Queuing

There are 15 Resource Monitor services for monitoring queuing data (see Part 3, “Monitors,” in the *MAINVIEW for IMS Online – Monitors and Traces Reference Manual*). Workload Monitor services monitor the input queue time by various selection criteria, such as class, transaction code, LTERM, region, program, and USERID. With well-considered threshold specification, these monitors produce warning messages that can be used to trigger automatic operational changes or alert operations personnel to use analyzer services to investigate further.

Scheduling

This section describes analyzing and monitoring scheduler pool utilization.

Analyzing Scheduling

The scheduling function of IMS (selecting and preparing application programs to run in each dependent region as it completes its previous task) is very complex and critical for good performance of the system. It is dependent on several factors that you can directly influence (for example, pool sizes and transaction class assignments). However, the basis of information for making decisions that have positive results on this process are difficult to obtain when it is needed. MVIMS services such as SCHED, STAT, and DSPST address several of the major problem areas.

Class Queuing

IMS queues and schedules transactions according to class assignments and by priority within class if needed. Each transaction is defined to the system as belonging to one class. Each message region has from one to four specified classes that it can process. This allows you to balance the processing load, give priority to transactions with critical response time requirements, isolate long-running transactions, and so on.

The CLASQ display presents an overview of the current situation: what is queued in each of the classes, what the regions are doing currently, and what classes each region can accept.

By examining the status of the queues at various times of the day, any imbalance caused by the class assignments should be indicated by excessive queue size for some classes or by idle regions waiting for input in other classes. If such imbalances occur often (perhaps only at certain times of the day), performance can be improved either by reassigning transaction classes or by dynamically changing the region processing classes. Because this display shows the status of all the classes at once, the effect of such reassignments can be detected easily and followed through time.

Note: An increasing queue delay caused by load imbalance (check the enqueue time (ENQ TIM) of the current transactions being processed) also impacts the system by increasing the overhead incurred by the queue manager. The longer the queues, the greater the possibility that a transaction will be washed out of the pool to the queue data sets before it is needed, causing extra I/O activity to write it out and to retrieve it. The QUEST service can be used to investigate this occurrence (see “Analyzing Queuing” on page 6). See the information in the REPOSITIONS or PCBs UNCHAINED fields of the QUEST display.

Balancing Group (BALG) Queuing

IMS Fast Path transactions do not use the message queues. Instead of the message queuing mechanism, each physical terminal has an expedited message handler (EMH) buffer associated with it. When an input message is received by IMS and is defined either as Fast Path exclusive or Fast Path potential, control is given to a user exit that can modify the routing code. Assign a different routing code or indicate that the message should be processed as a full function IMS transaction; that is, use normal message queuing.

Once a Fast Path routing code is assigned to an input message, the balancing group (BALG) is determined and the EMH buffer is queued to the BALG for processing.

This queuing takes place only if the BALG is active. The EMH buffers are processed in a FIFO sequence by the Fast Path regions that service the BALG. More than one region can process the same BALG. By observing the data displayed by the BALGQ service, it is possible to determine when there is a delay in processing for a specific BALG by the presence of a queue. This problem can be remedied by increasing the number of regions processing the BALG.

Scheduling Activity

When a region is free and input belonging to one of its classes is available, IMS attempts to schedule a transaction. Many checks are necessary to ensure successful scheduling, and if any of these checks fail, that region may have to wait for some event before it can become active. However, in this case, the attempt is made first to schedule a different transaction.

Monitoring the success of system scheduling over time (by viewing the percentages of schedules and failures on the Resource Analyzer SCHED display or calculating the number of schedulings per minute) can point out possible problems before they become critical or make reduction of hidden overhead possible.

- PROGRAM CONFLICTS can be reduced by allowing parallel processing (load balancing); however, this can cause PI conflicts because of database intent. Care must be taken to minimize both of these items.
- If PRIORITY CUTOFFS are occurring regularly, check these definitions carefully to see if it is actually necessary to bypass available transactions (this can cause a region to be idle) to wait for the higher priority transaction.
- INTENT FAILURES can be caused either by insufficient space in the PSB, PSB work, or DMB pools, or by database intent failures. Excessive intent failures can indicate that too many regions are competing for the available resources, increasing the time needed for each, both in scheduling and in processing. This could be the result of allowing parallel scheduling (see “Program Conflicts” above).

  Note: Currently, database intent failures occur only when a PROCOPT of EXCLUSIVE is used.

- OTHER REASONS for failures include locked or stopped transactions, programs, or databases.

  Note: The associated SMBs are only removed from scheduling queues if the program is bad (BLDL failed) or a checkpoint purge is in progress. Although locked transactions no longer appear as schedulable in the CLASQ display, the SMBs are still examined and this counter is incremented. To prevent this counter from being continuously incremented, assign such transactions to an unassigned processing class.

Suggestions

- Complicated class and priority assignments or the use of many dependent regions increases the contention during scheduling. The simple way is often the best.
- Use the processing limit for key transactions to reduce the number of schedulings. The same program being rescheduled causes a program fetch each time (unless preloaded), and is very expensive.
- Consider Wait for Input (WFI) processing for frequently used transactions. This dedicates a dependent region(s) to a transaction and eliminates program fetch.

Monitoring Scheduling

Several Resource Monitor monitors are available to monitor arrival rates and processing that can affect scheduling. For example, it might be necessary to stop a less important transaction or BMP if the arrival rate of a particular transaction exceeds a user-defined threshold. This can be done either by an MAINVIEW AutoOPERATOR for IMS EXEC or through manual intervention.

Pool Utilization

This section describes PSB and DMB pools and pool utilization for LSO=S.

PSB and DMB Pools

The two main pools concerned in scheduling contain the IMS control blocks that define the application program's logical databases (PSBs) and the physical databases they access (DMBs) for the DL/I (IMS Data Language/I) interface. If not already present, the necessary blocks must be loaded into these pools during scheduling. A pool space failure can cause a region being scheduled to wait until resources are released by the completion of work in another region. Check the intent failure counter in the SCHED display.

If a DMB must be washed from the pool to free space for another, the associated data sets must be closed (a very time-consuming process that should be avoided). If that DMB is ever accessed again, it is necessary to reload it and open the associated data sets. If LSO=Y is coded, all open/close activity occurs in the IMS control region.

The PSBUT and DMBUT displays (see the service descriptions on page 110) are designed to show the free space still available in the pools and fragmentation and its potential impact. The displays show the current status of the pool and simulate the results of applying the least-recently-referenced space release algorithm to the blocks not currently being used. Each line displays successively the number of allocated blocks and the number of free spaces in the pool with minimum, average, maximum, and total lengths.

With these displays, it is possible to see not only the current free space (first line), but also the total free space available if needed (last line). This free space would be gained by freeing allocated but unused blocks. The maximum free space column shows the largest block that could be loaded into the pool (compare this to the maximum defined block size).

Pool Utilization for LSO=S

Open/close activity takes place in the DLISAS region and is still DLISAS time-consuming, but it does not impact IMS work in the control region. If LSO=S is selected, the PSB pool is split into two separate pools. One of these pools resides in CSA and the other resides in the DL/I subordinate address space (DLISAS). The PSBUT service can display utilization of either pool.

The CSA pool contains the TP PCBs and the Fast Path PCBs. The DLISAS private-area pool contains the full function PCBs. This division of pools results in a split of approximately 20 percent in CSA and 80 percent in private storage.

Monitoring Pool Utilization

The following Resource Monitor services can be used to monitor usage thresholds for these pools:

PIPL	Program Isolation
WKAP	General Work Area WKAP pool
DBWP	Database Work Area DBWP pool
PSBW	PSB Pool
DMBP	DMB Pool
MFSP	MFS Pool

If thresholds for these pools are consistently exceeded, consideration should be given to increasing the appropriate pool. Keep in mind that increasing pool sizes may strain another resource such as real storage (paging) or CSA.

Suggestions

- Check the DMBUT display over time to see if the pool is remaining stable. If not, DMBs may be washing out of the pool and incurring large overhead. This can be investigated by using the IMS log tape utility to check for log record types 20 and 21 (database open/close).
- To reduce fragmentation and the possibility of a pool space failure, heavily used DMBs should be made resident. Heavily used PSBs and the intent lists should also be made resident. This causes them to be placed in separate areas, not in the pools.
- Use the DOPT option of the APPLCTN macro only on a test system. It results in a directory search of ACBLIB to locate the PSB every time such a program is scheduled.
- Access to the ACBLIB may affect scheduling and thus system performance. Many of the suggestions made in "Message Format Service (MFS)" on page 4 regarding the MFS format library are applicable.
- The following points should be considered to help reduce program fetch activity:
  - The default number of entries in the BLDL list (dynamic entry count) is 20. This can be increased at region startup with the parameter `DBLDL=nnn` to reduce directory searches. It should be set to zero on a test system to ensure that the newest copy is always fetched.

- Preloading is especially effective for small, frequently used subroutines (for example, COBOL and PL/I subroutines). It is not necessary for these modules to be link edited as re-entrant or reusable, but they must be so logically. Paging probably would adversely affect large application programs that are preloaded.
- The steplibs for each dependent region should be concatenated with the most frequently used application program libraries first and the IMS RESLIB last. The application program libraries should be full-track blocked to reduce reads.
- Consider using the OS/390 VLF feature to manage program loading.

Analyzing Operational Displays

There are six standard operational displays of data concerning the functioning of the IMS dependent regions. The *MAINVIEW for IMS Online – Customization Guide* describes how to modify displays or include others tailored to site requirements. In addition, the system status display (STAT) provides an overview of the status of the total IMS.

These comprehensive region displays show the work that the IMS system is currently performing. They should be used to monitor this activity regularly so that problem areas can be located as they occur (for example, a program loop in a dependent region). These displays also show up to eight regions concurrently so that activity in different regions can be compared.

Total System Monitoring

The system status display (STAT/STATR) is designed to simplify continuous monitoring of the system, pointing out possible problem areas that can be investigated in detail with the other displays, or confirming that all is running as smoothly as it should. If there are standard recognizable problems, warning indicators are set and highlighted. Other problem areas may be recognized only in light of knowledge about specific operating characteristics of a particular system. Therefore, the data displayed should be scanned even when no warnings are shown. If the asynchronous services option is available, many variables can be monitored automatically and warning messages sent when user-defined thresholds are exceeded.

There are two basic parts to this display:

- An overview of the critical resources that allow work to be accomplished
- An overview of work already performed and still to be done (that is, transactions processed)

The dependent regions are also considered to be resources of the system (and the most important). If one or more regions are not performing as they should, many resources probably are being misused (that is, pool space, I/O, CPU time, and the like), and throughput will suffer. The region displays are needed to analyze the actual work being done and the load balance. STAT and STATR are meant to be used only to check status, and the STAT/STATR information is very condensed to show 15 regions at a time.

The warning indicators generally suggest the use of another display. For example, if a region is in a PI wait (WARN=W-PI), the PI display shows what resource is needed and what region is holding it. However, these are warnings only, not necessarily actual problems. It is natural to have waits, so it is only when such a condition continues (through several refreshes of this display) that further analysis is indicated. If it continues, use DREGN (Program Isolation Activity area of display) or the IRLM display service to see if the condition is valid for the program being processed or a real problem. Workload Analyzer service DWAIT is an effective service to use to determine if this is a persistent problem.

The NOBK indicator is of special value when the system is in trouble and one or more regions should be cancelled. If this indicator is on, a cancel causes IMS to come down also. Previously, there was no way to know if regions were in this state.

Although the dependent regions are highly important, other resources also can be critical. If the PI pool has insufficient space, dependent regions can abend with a U775. By checking for the THRESHOLD warning on the percent ALLOCATED field regularly, steps can be taken to reduce the utilization before it causes a problem.

The line showing stopped resources on the STATR service points out unexpected conditions. If any of these values is higher than expected, the /DISPLAY STATUS command allows further analysis.

The lower part of the STAT/STATR display shows the overall performance of the system:

- How many transactions have been processed since restart?
- How many transactions are currently queued for processing?

These two counts are the true indicators of how well all resources are being used and if they are sufficient to handle the load. They can be analyzed only in comparison to what is expected of a particular system. It is possible to calculate the rate at which transactions are being processed by making two observations, calculating the difference, and dividing by the time difference. If this is done regularly at different times of the day, a very valuable system profile can be built. This profile can be used to spot deviations or slow degradation and to monitor how the system is handling a variable or increasing workload. The rate of transaction arrivals can be calculated by tracking the differences over time in the sum of the current queue count (Q'D) and total transactions processed (PROC). The Resource Monitor monitors of transaction arrivals and transactions processed do this automatically.

See Part 3, "Monitors," in the *MAINVIEW for IMS Online – Monitors and Traces Reference Manual* for more information about:

- Monitoring paging (PAGE)
- CSA utilization (CSAUT)
- CSA fragmentation (CSAFR)
- SIO activity (SIO)
- EXCP event (SYSIO and DLIO)
- Logical channel busy (CHBSY)

To obtain a broad perspective of the system workload and to determine where a transaction is spending most of its time, use the Workload Analyzer workload wait services (MWAIT/DWAIT). These services identify possible bottlenecks and can provide sufficient information to make a correction. Otherwise, use one of the Resource Analyzer services to analyze the problem further.

Dependent Region Monitoring

The regions display (REGNS) can be used for regular monitoring of the regions. REGNS (described in Chapter 12 on 117) contains information about the current activity in each IMS dependent region. From this display you can see:

- Which application programs are active
- How much work they have done (message queue and database access)

You can then use the DREGN display to see:

- Approximately how much work the application programs still have to do (how many transactions of this type are still queued)
- The specified processing limit

If you recognize a problem, check the logical terminal name in either the REGNS (Summary View) or DREGN display to identify the user who entered the IMS transaction being processed.

If an application program remains in a region for a suspiciously long time, a loop may be indicated. Use the REGNS Message View, DL/I View, and DB2 View to look at message queue and database activity to help locate the problem area. If the number of input messages queued (QUEUED) or dequeued (M-DEQ) is large, perhaps only the processing limit definition (PRLIM) needs to be changed.

Response time to users can be investigated by using REGNS or DREGN to view transaction elapsed time (TRN-ELAP or ELAPSED). An increase in this time is a danger signal indicating performance degradation.

Often information in a regions display indicates possible problems that can be checked out more thoroughly with other displays. For example:

- If a program loop is suspected and the total database calls (TOT shown by the DL/I view of REGNS) is high, more specific information on the types of calls being made can be seen in the DLIST or DREGN display.
- If a large number of program isolation waits is shown by the Program Isolation Activity area of the DREGN display, look at the PI service display.
- If regions are often idle, the distribution of input transactions in the class queues can be investigated in CLASQ.
- If scheduling problems are suspected, the number of scheduling failures and their causes can be investigated in the scheduling display (SCHED).

Program isolation is an important automatic feature of IMS to avoid interference between programs in database access and updating by enqueuing on database records. The Program Isolation Activity area of DREGN shows the total enqueues, dequeues, PI waits, and the number of current enqueues for each program currently processing. From this display, it is possible to see if one program is using all the resources (excessive total or current enqueues) and impacting other programs by causing PI waits.

The DL/I View of REGNS or the DL/I Call Activity area of DREGNS can be used by the database administrator (DBA) or anyone concerned with application program performance. For example, these services can be used with a test system to monitor the activity performed by a new application program.

The information shown by the System Activity area of the DREGN display applies to dependent region OS/390 data. The data elements describe the region, not just the current IMS application (for example, in a message processing region where many transactions are processed by various programs). This information identifies whether the corresponding IMS task is currently executing in the dependent, DL/I, or control region (some processing, such as database access, usually occurs in the DL/I region). It shows each address space and its OS/390 dispatching priority and position in the dispatch queue.

The System Activity area of DREGN also shows the current swapping status of the region. IMS dependent regions are marked nonswappable when they are started. A small number of swaps can occur before this is completed. In addition, the total elapsed time each region has been up is shown in hours:minutes:seconds, and the total CPU time and SRB time is shown in seconds. These figures show how well the processing load is balanced between the regions.

The Paging Activity area of DREGN indicates the amount of paging DREGN in each of the dependent regions. The number of page-ins, page-outs, and reclaimed pages are displayed for that time interval, for VIO, and for the common area (CSA and LPA - no pages out). You may want to request this display at regular intervals with the CYCLE SETUP option from the Primary Option Menu to calculate the differences in the amount of this activity at various times of day.

The region transaction profile shown by the PSB/Transaction area of the DREGN display provides additional information about current transactions being processed, including the number currently queued and the total already processed since IMS restart. This information shows possible imbalances in region, class, and transaction assignments. The average length of all input messages received with a transaction code (AVG LENG) is calculated by the IMS queue manager. Tracking these average lengths for high-volume transactions can determine the optimal lengths for the short and long queue data sets (see “Analyzing Queuing” on page 6).

For more detailed analysis of transactions, workload trace (MTRAC/DTRAC) can be used to see the number of calls and database I/Os. A detail trace is useful when testing new application programs to see if they conform to specifications in the number and types of calls.

Analyzing Databases

This section describes OSAM, VSAM, and fast path buffer pools. It also includes information about Hit Ratios and VSAM Hiperspace.

OSAM Buffer Pool

A subpool concept similar to VSAM is employed in which the buffers in any subpool are all the same size. A database is assigned at open time to the subpool with the smallest buffer size in which its blocks fit, or for the specific subpool designated in the DFSVSM*xx* member by the database administrator.

To further improve the speed of searches to locate records in a subpool, the buffers are chained off an array with the same number of entries as buffers. The particular anchor point is determined by hashing of the DMB/DCB/RBN. This substantially reduces the number of buffers that must be examined. Because an increase in pool size does not cause a comparable increase in the number of buffers to be examined, this is particularly effective for large subpools. This allows increase of the pool size as long as the paging rate stays down.

Finally, the method of selecting a buffer to be reassigned (buffer steal) has been altered. During the selection process, each buffer in a subpool is considered to be at 1 of 11 levels (0-10), depending on the work necessary to free it. For example, empty buffers are assigned to level 0 or 1, buffers that are not currently available are at level 9 or 10. Then the subpool is divided into limited search groups with the number of buffers in each group being twice the number of scheduled regions (or one during emergency restart).

A complicated progressive search algorithm is then used to select a buffer, if one is available. The factors considered are the buffer level, the previous owner (the requestor's own buffers are preferred), the least-recently-referenced order of the buffers, and the length of the search. The net result is to reduce the search time even in large pools. The BUFFERS STOLEN and TOTAL SEARCHED by level can indicate the success of this algorithm. Levels 0, 2, and 4 show steals of the requestor's own buffers; levels 1, 3, 5 belong to another.

To make optimal use of these features, you may need to modify the database DBDs and an unload/reload. In particular, the block sizes should be as close to the defined buffer sizes as possible without exceeding it.

Once the block sizes of the IMS databases are known, the number of buffers and buffer size of the subpools can be determined. At data set open time, the first subpool whose buffers are large enough to contain the blocks is assigned. It may be possible to use this feature to separate data set blocks into different subpools. In particular, the index blocks can be isolated from data blocks. However, you must closely investigate the desirability of this.

Once you have chosen the buffer lengths of the subpools, determine the number of buffers. MVIMS can be useful in evaluating database performance. The number of OSAM WRITES-STEAL per second is a good indicator for optimizing the number of buffers in a subpool. If it is very low, there probably are too many buffers, which wastes memory and may increase the paging rate. If it is high, the number of buffers probably should be increased. STEAL WRITES are especially expensive because the buffer handler may issue an IMS log tape WRITE AHEAD call to guarantee that database changes have been physically written to the log before actually writing to the data set. This can result in two additional waits before the buffer can even be reassigned.

VSAM Buffer Pool

The IMS VSAM buffer handler/pool consists of 0 to 255 subpools of fixed length buffers. At database open time, the smallest subpool that can contain the control intervals is assigned, unless the database administrator has assigned a specific subpool for that database.

Although this fixed length buffer subpool technique (similar to current IMS OSAM buffering) eliminates pool compactions, the buffers in each subpool are chained in a least-recently-referenced use chain. This causes all buffers to be examined during searching. When a buffer is needed, VSAM selects the least-recently-referenced. If the buffer contains data that has been modified, it is first necessary to write it out. To improve performance, VSAM writes are deferred until space is needed or an explicit request is made to purge a user's buffers.

The number of WRITES (VSAM initiated) per second should be monitored to see if sufficient buffers have been allocated. Such writes are expensive because they may require a log tape WRITE-AHEAD call. This can result in two additional waits before the buffer can be used.

To prevent this condition, IMS employs a BACKGROUND WRITE feature, which can be turned on or off at system initialization (OPTIONS statement). This is a low priority IMS ITASK that runs when VSAM notices that the next buffer to be freed on the use chain has been modified. It forces VSAM to write out a specified percentage of buffers from the least-recently to the most-recently-referenced. The NUMBER OF TIMES BACKGROUND WRITE INVOKED per minute may also give an indication if there are enough buffers.

Note: Various internal traces may introduce overhead to DL/I calls and buffer handling. The status of these traces may be observed in the Resource Analyzer service and may be turned on or off by the IMS /TRACE command.

The fixed length buffers make it possible to separate control intervals by subpool. Of special importance is the separation of index blocks from data blocks.

IMS supports an index-only VSAM buffer pool. This allows separation into separate pools data and index control intervals of the same size.

IMS supports buffer pools that are dedicated to specific databases. This can be used to give preferential treatment to these databases or to isolate high activity databases.

Hit Ratios

Buffer pool hit ratios can be used to evaluate how well the buffer pools are performing. The hit ratio is the percentage of buffers that were found in the pool without needing to access external storage. Generally it is recommended that data buffer pools have a hit ratio of 60 or higher and index buffer pools have a hit ratio of 80 or higher. These hit ratios are available with the following services:

Table 1. Services Supporting Hit Ratios

	Analyzers	**Monitors**
OSAM	DBST	DBHIT
VSAM	VSST	VHIT

VSAM Hiperspace

When defining your VSAM buffers to IMS, you can request that VSAM allocate Hiperspace buffers in expanded storage to augment your virtual storage buffers. Buffers that normally would have been washed out of the pool due to the least-recently-used algorithm will be migrated instead to Hiperspace buffers. This allows you to have more buffers without increasing your virtual storage requirements.

The number of successful reads from Hiperspace is a measure of the number of reads with I/Os that were saved by using Hiperspace. The number of unsuccessful reads represents the number of Hiperspace buffers that were stolen because of a shortage of expanded storage. To get the full benefit of your Hiperspace buffers, the number of successful writes to Hiperspace should be less than the number of successful reads from Hiperspace. If the number of successful writes is greater than the number of successful reads, buffers are being written but never read.

The Hiperspace hit ratio shows the portion of the VSAM hit ratio contributed by Hiperspace. In other words, your VSAM hit ratio would be smaller by the Hiperspace hit ratio amount if you had not defined Hiperspace buffers. This is displayed on VSST and monitored by HPHIT.

Fast Path Buffer Pool

Buffers from the fast path buffer pool are fixed per dependent region that requires buffers. This is determined by the `NBA=` keyword in the dependent region startup JCL. If the buffers are not available in the CICS environment, the region fails to connect to IMS (either DBCTL or IMS DB/TM). Altered buffers are not written to the area data sets until synchronization point.

The keywords that define the buffer pool in the control region JCL are:

- BSIZ, which specifies the size of the largest DEDB Control Interval (CI)
- DBBF, which defines the total number of buffers
- DBFX, which defines how many of these buffers are to be used as reserve buffers

These reserve buffers act as a cushion at synchronization point time to allow the asynchronous output threads some time to complete writing the buffer while the next transaction is processing. If the output threads are being delayed or there are not enough of them (OTHR keyword), a wait occurs. IMS does not keep global statistics on this wait condition and it must be analyzed by examining the IMS PR report TRNFP or the batch fast path log analysis utility (DBFULTA0).

Note: A buffer is fixed in the buffer pool for each active area that has a sequential dependent part defined (SDEP).

Dependent region allocations of buffers are determined by the NBA and OBA keywords. The normal buffer usage (NBA) should be large enough so that overflow buffers (OBA) are seldom used. IMS reserves one set of overflow buffers out of the buffer pool that is equal to the largest OBA specification in all of the dependent regions. This means that only one dependent region can use these buffers at a time causing serialization; for example, contention for overflow buffers. Detailed analysis of the dependent region buffer usage is performed by the IMS PR report TRNFP or the IMS batch utility (DBFULTA0).

The FPBST display assists in online determination of buffer usage. By refreshing this display and monitoring the buffers in use by region, you can detect an NBA specification that is too small; for example, in the region detail display the USED is consistently more than the NBA.

You can tune the OTHR and DBFX values by monitoring the number of IDLE OUTPUT THREADS and FIXED BUFFERS AVAILABLE. If the idle threads are consistently 0, they should be increased. If the fixed buffers available are consistently a small percentage of fixed buffers, there is a strong possibility that waits will occur for buffers. To overcome waits due to insufficient output threads or available fixed buffers, increase the number of pre-fixed buffers (DBFX) and/or the number of output threads (OTHR).

Points Common to All Buffer Pools

In evaluating IMS system performance, you should determine the amount of physical I/O per second. Although it is possible to break the activity down by subpool with Resource Analyzer and Resource Monitor services, the PERFORMANCE REPORTER offline Database I/O report can be used to determine activity by DMB. Using the DC Monitor, it is possible to determine activity by data set; however, even this does not show contention between data sets on the same device or activity to a data set spanning multiple volumes (devices). This information can be obtained by using CMF MONITOR or MAINVIEW for OS/390, both BMC Software products, or the IBM Generalized Trace Facility (GTF). These give a better indication of the actual use or contention of devices and paths. This also can be estimated by analyzing the database change records. However, this method is incomplete because retrieve type calls are not logged and a special analysis program would have to be written.

The number of events per second reported, using the techniques in the previous paragraph, do not take into account the number of transactions that generated the activity. The number of events per second could be re-expressed in terms of events per PURGE by using either the VSST global display or DBST display service. A more detailed investigation can be made with the MVIMS transaction processing report.

These calculations should be made at different times (when the system is busy and when it is not busy). Investigate changes observed over time that show a trend. In particular, an increase in READS/SEARCHES per PURGE shown by the VSST global display or DBST display service may indicate the searching of an overflow chain. This could be an HISAM/HIDAM-INDEX overflow chain or an HDAM synonym chain. If so, the database involved should be determined and reorganized.

Suggestions:

- HDAM is probably the most efficient IMS access method; however, long synonym chains must be watched. If encountered, investigate:
  - Randomizer - the most widely used and efficient randomizer is the WORLD TRADE (DFSHDC40).
  - Insufficient RAPs for the number of records (resulting in long synonym chains).
  - Too many RAPs per block for the record size.
  - Not using the BYTES option. This is especially devastating after a reorganization.
  - The advantage of distributed free space also should be investigated.

HISAM is the best for sequencing small records.

- In VSAM, watch CI/CA splits. It may be possible to use the VSAM KSDS options to reduce these splits.

HIDAM seems to be the most used or abused.

  - The HIDAM INDEX is nothing more than a HISAM database and suffers the same problem of long overflow chains or CI/CA splits.
  - If much sequential processing is done, it should have both forward/backward pointers at the root to reduce index access.
  - If many dependent segments are added to a record, it may help to specify distributed free space.

- IMS data sets should be allocated by cylinder as a single extent. If necessary, they should be reorganized periodically to a single extent. This can be done with IEBGENER for OSAM. EXPORT/IMPORT or REPRO can be used for VSAM (this reorganizes a KSDS also). However, this is not a substitute for a complete IMS database reorganization.
- Watch the placement of data sets to prevent an over- or under-utilization of a device, control unit, or channel. Try to avoid placing two very active data sets on the same device. Also, watch for an excessive number of alternate tracks, especially when these tracks are associated with a high usage data set. This situation tends to reduce seek time.
- Write check should not be specified for IMS databases. There is no integrity exposure because the data sets can be recovered using the IMS utilities and log tapes.
- For VSAM, SPEED should be requested because IMS does not use VSAM recovery. This speeds up initial loads.

Analyzing IMS Internals

This section describes latches, logs, pools, and program isolation analysis.

Latches

IMS latches, like OS/390 locks, are used to protect the integrity of certain resources in a multi-programming environment. A certain number of conflicts are to be expected and show that the latches are performing a needed function. However, excessive conflicts may indicate a malfunction in system performance that you should investigate.

In general, latches are held for only a very short time, which reduces the number of conflicts. If something occurs that increases the time a latch is held, the probability that another task will need the protected service before the task completes also increases. The main causes of such delays are page faulting or faulty dispatch priorities. If a latched routine has to page fault through a pool, the execution of any other task waiting for that service or resource can be blocked, causing a degradation in IMS performance.

Suggestions for Relieving Latch Conflicts:

- Investigate the paging rate of the system and consider page-fixing the affected pools (use the LATCH service to see where conflicts are occurring most frequently).
- If latch conflicts are appearing for DMB user routines, check these routines for waits or possible page faults.
- If the conflicts are frequent for certain OSAM buffer subpools, review the definition of the number of subpools and the number of their buffers to reach a better balance between the allocation of the available space and the actual usage of the buffers.

Logs

Three IMS data sets are used, two online and one offline. Resource Analyzer service LOGST displays utilization information and statistics about the two online data sets and provides certain restart data.

Online Log Data Set (OLDS)

The IMS online log data set (OLDS) can be either single or dual and contains complete log records.

IMS only writes the buffer (padded if necessary) when the buffer is completely full. If OLDS and WADS are allocated by JCL, the number of buffers for the OLDS is specified on the OLDS DD statement. If OLDS and WADS are allocated dynamically, the number of buffers is specified by the BUFNO parameter in PROCLIB member DFSVSMxx.

When an OLDS becomes full, it must be archived. Once the archive batch job is complete, the OLDS can be reused. If dual OLDS are in use, a switch is made when either OLDS becomes full.

Buffer size for the OLDS is taken from the preallocated data set. At least four or five buffers should be assigned because one of the buffers is used to read the OLDS if a dynamic backout is required.

Write-ahead Data Set (WADS)

The IMS write-ahead data set (WADS) is preformatted and is used to write incomplete OLDS buffers. WADS does not have its own buffers; it uses the OLDS buffers. The OLDS buffers are segmented in 2K segments. Any check write requests cause unwritten segments for the current buffer to be written to the WADS. This allows the log write-ahead requirement to be satisfied.

Database log write-ahead is no longer an option; it is compulsory.

Data communications log write-ahead (DCLWA) is a default option. Review it carefully. Response time can be adversely impacted if the default `DCLWA=YES` is allowed or specified. Response time is impacted while the transaction or message is written to the WADS, which delays processing; however, this does give complete DC integrity and should be evaluated.

IMS restart processing accesses the WADS to close the OLDS in the event of a failure.

System Log Data Set (SLDS)

The system log data set (SLDS) is an offline data set and can be either tape or DASD. The SLDS is used for archiving the OLDS.

Log Performance Suggestions

- Prevent DASD contention on all online log data sets; that is, separate paths, strings, devices (no shared DASD), and so on. Consider contention that can occur because of an archive utility that is executing as a batch job.
- Allocate the WADS on a low-usage device because this is most critical.
- Provide for multiple WADS backups.
- Allocate OLDS and WADS with contiguous space.
- Specify approximately 10 buffers in the archive job for both OLDS and SLDS.
- Ensure that the archive job runs at a high priority.

Note: The Resource Analyzer service LOGST produces a warning message if either the last OLDS is in use or the system is waiting for an archive to be performed.

The LOGST service also displays the OLDEST LCRE. This identifies the oldest recovery point that IMS will require in the event of a restart. A very old time in this field could indicate a BMP that is not taking sufficient checkpoints and the record required for restart might already be archived.

Program Isolation Analysis

Program isolation is the IMS function that allows many application programs to access the same databases concurrently without interference. It achieves this by enqueuing on each database record as it is accessed at READ, UPDATE, or EXCLUSIVE level. Normally, each enqueue requires two QCBs (queue control blocks) from the PI pool. To improve performance, an entire record is locked by enqueuing the root segment at UPDATE level when a segment is accessed. When moving from record to record, the new root segment is enqueued at UPDATE level and the old root segment is dequeued. Dependent segments are enqueued only when modified. These enqueues remain until the modifying program reaches a synchronization point. Any other program attempting to access a segment or record that has been so enqueued must wait.

The PI service allows investigation of program isolation problems. Watch the amount of FREE SPACE in the DYNAMIC POOL closely. If more space is required and the MAXIMUM POOL SIZE has not been reached, a GETMAIN is done in subpool 241 (CSA) for the amount specified in INCREMENT. When the pool can no longer be expanded, the requesting program is pseudo-abended with a u775. All changes are backed out and the transaction is put back on the queue for reprocessing. This is an enormous drain on IMS and causes a sharp decline in performance.

However, it is not a good idea to allow the PI pool to grow uncontrollably. Once space is obtained, it is never released. Because of the space management algorithm, the total available space is constantly referenced even after most of it is free. This can increase the page faulting rate for all IMS regions. Because this is also one of the few pools that cannot be page-fixed, page faulting can be reduced only by keeping this pool small. Use the PIMAX monitor to make sure that one region is not using this pool too much. If it is caught early enough, a region can be stopped before it fills up the pool.

The bottom portion of the PI display gives the number of enqueues each dependent region currently holds. This is broken down by level of enqueue:

- READ
- UPDATE
- EXCLUSIVE

More importantly, it is possible to see if a program is in a PI wait, what resource it is waiting for, and which program is holding the resource. If there are frequent PI waits, serious attention should be given to the application system design or database design. This information is especially valuable in determining the checkpoint call frequency needed in BMPs. You can possibly reduce contention by changing the processing option to GO or EXCL to bypass PI. Some cases may require multiple database PCBs with different PROCOPTs. You can use explicit program enqueue/dequeue control using Q command codes to control simultaneous access. In a few cases, the problem may not be solved without a complete system redesign.

In addition to lengthening program execution time, PI waits may lead to deadlocks. Although not fatal, IMS must pseudo-abend one of the programs. All of this transaction's changes are dynamically backed out and the transaction is put back on the queue for reprocessing.

Note: IRLM can be used to control database contention in place of program isolation.

Pools

There are two kinds of pools: CBT and non-CBT. The POOLC service displays CBT pools. The POOLS service displays the status of the non-CBT pools. The DPOOL service displays detailed information about non-CBT pools.

CBT Pools

Although you do not have direct control over most CBT pools, you can control DPST and SAP. You should consider the following:

DPST Pool

The DPST pool holds the dependent region partition specification tables (PSTs). DPST is defined by the Stage 1 system generation, (`IMSCTRL MAXREGN=` or `DFSPRRG0 PST=`); this definition can be overridden by the JCL parameter `PST=`. DPST defines the minimum number of PSTs that IMS should hold available. Always define the average number of regions that you intend to run. Understating the number does not cause a PST shortage because the pool automatically expands and contract. However, the GETMAIN and FREEMAIN processes are an unnecessary overhead and can be avoided by making the correct size definitions.

Additionally, `PST=` defines the number of VSAM strings, which do not change. If there is a shortage of VSAM strings due to an understatement of `PST=`, the dependent region waits.

SAP Pool

The SAP pool is used to hold all the dynamic and other save area prefixes (SAPs). SAP is defined in the Stage 1 system generation macro (`IMSCTRL MAXIO=` or `DFSPRRG0 SAV=`; this definition can be overridden by the JCL parameter `SAV=`. This pool does not expand and its shortage causes IMS to enter selective dispatching which severely degrades performance.

Non-CBT Pools

WKAP Pool

Main pools contain the DFSISMN0 control blocks and a general work pool, WKAP. MVIMS displays only the WKAP portion. IMS creates temporary work pools from WKAP. The size of a temporary work pool is defined by `DFSPRRG0 WKAP=`; this definition can be overridden by IMS control region JCL parameter WKAP.

QBUF Pool

The QBUF pool is the central storage area used as I/O buffers for the three types of message queue data sets: SHMSG, LGMSG, and QBLKS. The IMS storage manager module DFSISMN0 allocates the storage for the QBUF pool during IMS initialization. The IMS message queue buffer manager module DFSQBFM0 manages the QBUF pool during transaction processing. A well-tuned QBUF is essential to fast transaction response time because all inbound and outbound message traffic must pass through QBUF.

QBUF Allocation:

The size of the QBUF pool is defined during Stage 1 system generation by the MSGQUEUE macro. You can use the QBUF parameter in the DFSPB*xxx* parmlib member or in the IMS JCL EXEC statement to override the number of QBUF buffers at execution time. You can use the QBUFSZ parameter in the EXEC statement to override the size of the buffers. To page-fix the QBUF pool, set EXVR=Y in the EXEC statement for the control region JCL.

QBUF Internals and Associated MVIMS Displays:

IMS caches as many messages in the QBUF pool buffers as possible before it attempts a buffer steal, a process that requires I/O to one of the message queue data sets SHMSG, LGMSG, or QBLKS. A buffer steal is not attempted until all the buffers have been used. DFSQBFM0 attempts buffer steals from the stealable buffers first. A buffer is stealable if it is not currently involved in I/O and it has no IWAITs. To steal a buffer for use by a different message, DFSQBFM0 must first write the existing buffer contents to one of the message queue data sets. If a buffer is currently involved in an I/O or otherwise owned by another process (busy, in other words), an IWAIT is always required before the buffer can be written and stolen. For that reason, access time to a stealable buffer is much faster than access time to a busy buffer.

When a buffer is being stolen, the QBSL latch is held. MVIMS displays IWAIT data for the QBSL latch in the LATCH Summary display. The latch may be held without causing an IWAIT. However, if there are no stealable buffers when an attempt to acquire the QBLS is made, an IWAIT for QPWTBFR (wait for an available buffer) is incurred before the latch can be acquired. The number of IWAITS for QPWTBFR is provided in the QUEST Statistics analyzer display in the WAITS FOR AN AVAILABLE BUFFER field. If the value in the field is not zero, all QBUF buffers are busy and none are stealable.

Area 1 of the DPOOL analyzer display for the QBUF pool shows the number of stealable buffers (STEAL) and busy buffers (CURR). The POOLS analyzer display shows the number of busy buffers (CURR), and the value is the same as the CURR value in the DPOOL display. The POOLA monitor monitors the QBUF pool for high contention on its buffers. Contention is defined as buffers that are busy (the CURR value in DPOOL and POOLS) and not stealable (the STEAL value in DPOOL). Using this information, you can see what portion of the QBUF pool is busy (CURR) and what portion is used but not busy (STEAL).

QBUF Tuning:

If your system is not real-storage constrained, your QBUF pool should be set large enough to ensure minimal I/O to the message queues. In general, the RECLENG parameter in the MSGQUEUE macro should be set so that I/O activity to SHMSG and LGMSG is evenly split. The split is determined by message segment lengths and the distribution of message arrival between message segments shorter than LGMSG LRECL and longer than SHMSG LRECL. I/O to the message queues may occur because the mix of arriving message segments uses up one or the other section of the QBUF pool buffer even though the size of the QBUF pool seems large enough. You should carefully balance the path length of buffer searching and I/O to the message queue data sets. If you overallocate the number of buffers, the buffer search path length and CPU cycles will increase. If you underallocate the buffers, I/O will increase. One tuning technique to reduce storage requirements and CPU cycles for QBUF buffer operations is to decrease the number of buffers until the QUEST Statistics analyzer display shows increasing IWAIT instances for message queue I/O.

PSBW, PSB, and DMB Pools

These pools are managed by DFSISMN0. If `LSO=S is specified`, the PSB pool is split into two parts. The POOLS service shows the parts as DLMP/PSBC in CSA and DPSB/PSBD in private for the DLISAS address space. The DMB pool is shown as DLDP/DMBP in CSA. You can use the DPOOL service to get details for each pool. Each pool has associated monitors that can be started (such as PSBP and DMBP).

During transaction scheduling, IMS allocates space from these three pools to accommodate the required PSB and DMB. If space allocation fails in any of these pools, then IMS tries to make space available by purging not-in-use control blocks. If space is still not available, then scheduling fails and IMS tries to schedule the next eligible transaction. The dependent region waits if none can be scheduled. For more information, see "Pool Utilization" on page 10.

DMBW is the DMB work pool. Although it is not used during transaction scheduling, it is used later by the DL/I delete/replace action module (DFSDCDC0).

The resident PSB and DMB are loaded at IMS startup time into storage outside these pools. The resident PSB is copied into the PSB pool when needed. The resident DMB does not need to be copied.

The PSB pool holds the PSBs on a most-recently-referenced basis. It is defined in the Stage 1 system generation (`BUFPOOLS PSB=`, `SASAPSB=` or `DFSPRRG0 PSB=`, `CSAPSB=`, `DLIPSB=`); this can be overridden by the JCL parameters `PSB=`, `CSAPSB=` and `DLIPSB=`. The IMS default for splitting the PSB pool (80/20) is reasonable, so let it default.

The PSB work pool (PSBW) holds various DL/I work areas for the PCBs such as index, SSA, and SPA. It is defined in the Stage 1 system generation (`BUFPOOLS PSBW=` or `DFSPRRG0 PSBW=`); this definition can be overridden by the JCL parameter `PSBW=`.

The DMB pool holds the DMBs on a most-recently-referenced basis. Space shortage causes some DMBs to be closed and flushed. The DMB pool is defined in the Stage 1 system generation (`BUFPOOLS DMB=` or `DFSPRRG0 DMB=`); this definition can be overridden by the JCL parameter `DMB=`. The DMB work pool is defined in `DFSPRRG0 DBWP=`; this definition can be overridden by the JCL parameter `DBWP=`.

CESS Pool

The CESS pool allocates external subsystem communication control blocks, such as the DB2 attach facility.

MFBP Pool

The MFS buffer pool, MFBP, accommodates MFS control blocks. However, MFSTEST control blocks are not taken from this pool; they are taken from the CIOP pool. MFBP size is defined in the Stage 1 system generation, (BUFPOOLS `FORMAT=` and `FRE=` or in `DFSPRRG0 FBP=` and `FRE=`); this definition can be overridden by the JCL parameters `FBP=` and `FRE=`. This pool is allocated from extended CSA.

CIOP, HIOP and RECA Pools

The communications I/O pool, CIOP, is used as message buffers between VTAM/BTAM and the IMS queue manager. RECANY has its own CBT pool, RECA. CIOP contains only the output buffers and EPCB blocks, described below.

A high communications I/O pool, HIOP, is allocated from IMS control region extended private area to expedite the CIOP usage. This pool is defined in the Stage 1 system generation (macro `BUFPOOLS COMM=` and macro `COMM RECANY=` or in `DFSPRRG0 TPDP=`); this can be overridden by the JCL parameter `TPDP=`.

Because the MFSTEST work area is taken from the CIOP pool, consider the sizes of both MFSTEST and the CIOP pool. MFSTEST size is specified in IMS JCL `MFS=`.

EPCB Pool

The EPCB pool holds the Fast Path PCBs. EPCB storage shortage causes the Fast Path transaction scheduling to fail without any indication to you.

Analyzing the System

This section describes dispatching and real storage.

Dispatching

The dispatcher statistics display (DSPST) gives an overview of the status and activity of both OS/390 and IMS dispatching.

In the first section, the IMS control region, the DL/I SAS, and the dependent regions are listed with pertinent OS/390 data. The default dispatch priority is set in the supplied PROCs at 239. The dependent regions should run at a slightly lower priority. To assist IMS in its attempt to balance the activity, the priorities of the dependent regions normally should be equal or quite close. This should be changed only if specific processing characteristics of the installation require special consideration.

The SRM parameters of domain and performance group/period and the current swap status can give an indication of how OS/390 functions are affecting the performance of the IMS regions. As a general rule, only one performance period should be defined for the IMS performance group(s), because the IMS regions should be allowed to do their job without excessive interference from the OS/390 SRM facilities.

The IMS dispatcher is responsible for the IMS internal multi-tasking by creating and dispatching ITASKS. Each ITASK is associated with an ECB (event control block) that is posted when work is to be performed for a particular function and with a SAP (save area prefix) that controls the IMS resources associated with the task (for example, a save area set for the registers of all the invoked IMS routines).

There are pre-assigned SAPs for activity associated with each dependent region, logging, and the like. Dynamic SAPs are used for all terminal I/O activity in IMS/DC. The number available depends on the specification in the MAXIO statement during the generation or the SAV parameter at execution. Because each SAP is associated with a GETMAINed area in CSA of over 1200 bytes for the save area set, this number should be optimized to conserve space. You can accomplish the optimization by reducing the number of dynamic SAPs each time IMS is brought up (but only until a few occurrences of TOTAL ITASKS WAITED FOR A SAP appear). After this point, performance might be affected by further reduction.

ITASKS are created and dispatched for all terminal I/O activity, and destroyed upon completion. By subtracting the number of ITASKS created from those dispatched, an approximation of the number of IWAITS can be found. This is an indication of the total IMS I/O activity. For example, a dependent region must IWAIT for database access. This number also can be calculated per second and used as a standard performance indicator to be checked over time.

Real Storage

Probably the greatest single cause of poor IMS performance is an overcommitment of real storage. This results in a high demand paging/swapping rate. Not only does it waste I/O, but also CPU. These effects are particularly devastating to a lightly loaded IMS system.

On such a system, the IMS modules constantly page in and out. Because of the design of IMS and OS/390, a region is effectively dead during page fault processing. Once it regains control, it usually immediately page faults again because of the very large working set size of IMS.

The IMS latches and commonly referenced database records are of particular concern. The only thing that can be done to reduce such interference is to reduce the page faulting in IMS. While it helps to reduce the non-IMS jobs that run concurrently, there may not be any alternative to page-fixing a portion of IMS.

The RS service allows the investigation of real storage usage. Because IMS is such a heavy user of CSA and LPA, these are also included. It gives a complete breakdown of the status of the usable page frames in the system:

- Total
- Pageable
- Fixed
- Long-term fixed

In an identical form, the status of the page frames used by IMS are given.

Chapter 2. User Techniques for Monitors

This section provides assistance in using the functions available with the data collection monitors. This section is not a step-by-step description of all the uses of these functions, because installations have varied requirements depending on their processing load and available resources (which may vary over time) and because there are so many services available.

The built-in flexibility of the monitor services allows you to determine which items are important to observe, when to observe them, and how long to observe them. This flexibility also allows you to vary these specifications easily when needed.

The monitor services offer continuous monitoring, early warnings, graphics, and rate calculations. They can be used as:

- An operations monitor of current IMS events
- A performance analysis tool to assist in tuning the system to use the available resources better and to plan for the future

With the monitor services and the timer facility that drives them, these tasks can be done automatically and selectively.

The following sections describe uses of the monitor services by different people within the IMS organization. This is not a complete list and many of the services could be of value to other people within the organization. The technique descriptions use sample block requests delivered with the product. The descriptions are grouped by the following users to present the various ways that an organization can use MVIMS:

- Master terminal operator
- IMS manager
- IMS performance analyst and system programmer
- Database administrator

Master Terminal Operator (MTO)

The master terminal operator is responsible for controlling the system and keeping it up and running smoothly. Responsibilities include controlling the resources and solving operating problems. The sooner problems are detected and the causes analyzed, resolving or minimizing the effect, the better service IMS can give to the user. The automatic warning feature of MVIMS can relieve the MTO of the chore of continuously monitoring all the different aspects of the system. A set of standard monitor requests can be defined for the installation that can automatically monitor the system and inform the MTO when a potential problem (as defined for that system) is detected.

Warnings are sent automatically to the BBI-SS PAS Journal log, where they can be browsed. Warnings can also be sent to the MTO console. If MAINVIEW AutoOPERATOR for IMS is installed, warning messages can automatically invoke AO EXECs to take action or put the warning message in the AO STATUS/EXCEPTION panel.

Two types of measurements can be set up; one to monitor specific problem areas (such as the usage of a limited resource) and one to monitor general system performance indicators (such as input queue length or scheduling failures).

BLKMTO Example

```
REQ=INQTR  WMAX=20  WLIM=5  LOG=ATWARN  WMSG=MTO
```

This sample request monitors the total input queue length every minute, automatically issues a warning message to the MTO when the queue length exceeds the specified critical threshold (`WMAX=20`), suspends warning messages after five are issued (`WLIM=5`), and logs a plot of the accumulated history data whenever a warning message is issued (`LOG=ATWARN`).

A long input queue is one of the first indicators that system problems exist. Something may be interfering with normal processing, causing a backlog of transactions and a degradation in response time. The critical queue length varies for each installation and the threshold that defines the warning condition (WMAX) should be adjusted accordingly. If an installation stops transactions in the queue often (perhaps priority 0 transactions waiting for BMPs), the MTO might choose to monitor only the transactions that can be scheduled (`REQ=IQSCL`). In a Fast Path environment where the expedited message handler is used, the monitor INQBG would be used. Other factors may influence the definition of a warning condition; for example, the submission of batched transactions, which causes a quick jump in input queue length. Warning messages for this expected condition can be avoided by setting the WIF option; for example, `WIF=3` specifies that a queue length greater than the threshold must exist for three intervals before the warning message is issued. When the MTO is informed of a long input queue, other MVIMS displays, CLASQ, the history PLOT of INQTR, REGNS, DREGN, or SCHED can be used to detect the cause of the problem.

```
REQ=CSAUT  WMAX=80  WMSG=WTO  I=00:05:00
```

This request monitors CSA for a usage percentage. CSA is a critical resource for IMS systems with high program isolation activity. This percentage is checked every 5 minutes (`I=00:05:00`), and a message is sent to the system console if it exceeds 80 percent (`WMAX=80`).

```
REQ=LGMSG  WMAX=70  WMSG=MTO
```

This sample request monitors the usage of the long message queue data set and informs the MTO if it exceeds 70 percent (`WMAX=70`). This early warning should give the MTO time to determine the cause and take action before a full queue data set causes an IMS ABEND. For example, if an application program is in a loop and is writing invalid messages to the queue, the MTO could cancel the program.

```
REQ=@RSPC,1  WMAX=3.5  WIN=2  WMSG=MTO
```

This Workload Monitor sample request monitors MPP transaction response time for transactions in processing class 1. For the purposes of this example, it is assumed that class 1 comprises short-running transactions which must have a 3.5-second or shorter response time to meet service level objectives. When the average response time in an interval for class 1 transactions exceeds 3.5 seconds, a warning message is issued. To give the MTO time to react, subsequent messages are issued every two intervals (`WIN=2`) while the condition persists.

Transaction response time may increase for many reasons. For example, a sudden increase in the arrival rate of class 1 transactions can exceed the capacity of available message processing regions to process them, or an increase in the overall system real storage demand may cause unacceptable amounts of paging. The former case can be diagnosed by using the STAT/STATR display or the history PLOT of ARVCL. The latter case can be diagnosed by using the DREGN display (Paging Activity area) or the history PLOT of PAGE.

There are many other resources and indicators which can be measured, from system data set usage, internal pool usage, and paging, to the level of PI enqueues. Depending on installation configuration and activity, some or all of these services can be defined to automatically monitor the most critical areas. Because the number of requests and the sampling interval for each can be set and modified as needed, the amount of MVIMS activity (and resulting system overhead) can be controlled and channeled to fulfill real needs.

IMS Manager

The IMS manager can use monitor services for high-level monitoring of the total system and for selectively tracking special areas.

BLKMGR Example

```
REQ=PRCTR      I=00:06:00      LOG=ATPD      WMSG=MTO
```

This sample request monitors at 6-minute intervals the number of transactions processed and automatically sends an entry to the IMS log at the end of each period (10 intervals = one hour). This up-to-date, graphically presented data, with the processing rate-per-second already calculated for short- and long-term time periods, is available for online access at any time while the request is active. The sampling interval can be set to show a different spectrum, from seconds to hours. If this request is started before transaction processing begins, the total count field shows the total number of transactions processed that day.

```
REQ=ARVPR,ACC+      LOG=ATPD      RANGES=0,10,60,300      WMSG=MTO
```

This sample request monitors the pattern of transaction arrivals for a group of programs (ACC is a qualified name), automatically sends a plot display record to the IMS log at the end of each period (10 intervals), and displays the distribution of the number of arrivals per interval in the ranges 0 to 0, 1 to 10, 11 to 60, 61 to 300. In this case, the arrivals are monitored for a program group; however, arrivals may be monitored for a transaction, transaction group (qualified name), processing class, program group (qualified name), or application program name. The form of the request depends on installation naming conventions. The IMS manager can use this information to discuss system usage and performance and have statistics for the period in question, not just totals or averages for a full day.

The frequency distribution produced indicates how often a certain arrival rate was measured: no arrivals in one minute, 10 per minute, 60 per minute, 300 per minute or over. The highest count ever measured is shown.

```
REQ=@RSPT,AR+      LOG=ATPD      RANGES=2.5,5,7.5,10      WMSG=MTO
```

This Workload Monitor sample request monitors the transaction response time for a group of transactions (AR is a qualified name), automatically sends a plot display record to the IMS log at the end of each period (10 intervals), and displays the distribution of transaction response time in the ranges of 0 to 2.5 seconds, 2.51 to 5 seconds, 5.01 to 7.50 seconds, and 7.51 to 10 seconds. In this case, transaction response times are being monitored for a transaction group; however, response times also may be monitored by processing class, LTERM, region, program, or user. Qualified names are allowed for every option except class. The form of the request depends on installation naming conventions. The IMS manager can use this information to discuss system response time and service level objectives with users and can generate statistics for any period in question, not just totals or averages for an entire day.

IMS Performance Analyst and System Programmer

The person in charge of IMS tuning has a very complex task: determining the best use of available resources to maximize user service. The large number of variables to be monitored, the many parameters that can be adjusted, the interaction of the various internal IMS functions such as queueing and scheduling, the effect of operating system constraints, the continual variations in processing load and applications mix, and the number and size of the resources to be controlled all increase the difficulty of understanding and tuning the IMS system. Offline reports of summarized data often do not give the precise information needed to analyze the causes of current problems or to detect potential bottlenecks in resource usage.

With the monitor services, the performance analyst can selectively monitor only the information currently needed. The amount of output produced and the cost of producing it can be controlled.

Many different resources and performance indicators can be measured as needed, such as pool usage, I/O rates, program isolation activity, input and output queues, paging, and CSA. Many of these can be measured either globally or selectively which allows the collection of exact information for specific problem areas.

BLKPERF Example

```
REQ=DBSTL,2     I=00:10:00     WMAX=100    LOG=ATWARN,ATSTOP

START=10:30:00  STOP=11:40:00
```

This sample request monitors the number of buffer steal writes performed between 10:30 and 11:40 a.m. in the OSAM database buffer subpool 2. The graphic history can be inspected online at any time after 10:30 until the request is specifically purged. In addition, the requestor is informed at the terminal whenever the number of steal writes exceeds 100 in any 10-minute interval. The history plot is written automatically to the BBI-SS PAS Image log for later offline analysis whenever the warning threshold is exceeded and also at 11:40 when the measurements for this request are discontinued.

Several different I/O counters can be monitored, either by IMS function, by using the MFSIO service or the DBSTL service, or on a system level, such as start I/Os by unit or paging rates.

```
REQ=PSBP     I=00:00:30     LOG=ATPD
```

This sample request creates a detailed graphic history of PSB pool usage. The percent allocated is measured every 30 seconds and a plot record written to the log every 5 minutes (30 seconds x 10 intervals = one period).

This is just one example of how the performance analyst can use MVIMS to selectively monitor special problem areas whenever needed. Other, more generalized requests can be set up to always be active, but only write BBI-SS PAS Image log records when warning conditions occur. Analysis of these records shows areas that need more detailed study.

The WARNINGS WRITTEN field on the Timer Facility Statistics display (Primary Menu Option 5) shows whether any warning conditions were detected.

```
REQ=SIO,158   RANGES=10,60,300,1500
```

This sample request tracks the number of successful start I/Os issued to unit 158, which is used by IMS (for example, a database). In addition to the graphic display of each minute's activity and the calculation of rates-per-second, a frequency distribution is accumulated. The range limits defined are for the activity count within an interval, in this case one minute. This corresponds to a distribution of rates-per-second of 1 every 6 seconds, 1 per second, 5 per second, and 25 per second. The last range limit shows the highest value measured. If IMS is run with `LSO=S`, DLIO can be used for data sets allocated in DLISAS.

```
REQ=CLASQ        I=00:05:00   LOG=ATINTVL

START=09:00:00   STOPCNT=50
```

This sample request writes an IMS log record of the Class Queuing display every 5 minutes until 50 are created. This automatic logging of an informational display can create an audit trail of detailed data at a regular interval within a certain time period. These records can be printed with IMRPRINT and analyzed at any time.

Database Administrator

The database administrator often is responsible for monitoring and controlling the performance of the application programs. With several of the monitor services, an automatic process can be activated, which checks for adherence to installation standards and good programming practices. The effects of new applications on the total system and the performance and usage patterns of the application itself can be monitored.

BLKDBA2 Example

```
REQ=DBTOT(MSGRGN01)   WMAX=20   I=00:00:01
```

This sample request for service DBTOT checks the level of DL/I activity occurring in a region. For example, if the first region (always started as job MSGRGN01) is only supposed to process fast transactions issuing a small number of DL/I calls, this request checks every second and issues a warning message to the BBI-SS PAS Journal log if the program being executed issues more than 20 database calls per scheduling.

```
REQ=PIENQ BMPRGNXX   WMAX=250   I=00:00:10
```

This sample request checks every 10 seconds and automatically writes a warning message to the BBI-SS PAS Journal log if the BMP in this region (when it is active) ever has more than 250 outstanding PI enqueues. The DBA can look at the PI display whenever a warning is received to see if this level of PI activity is causing conflicts with other regions at that time. The plot of this request gives a full history of the enqueue levels reached between CKPT calls. This information allows fine tuning of the frequency of CKPT calls needed in that BMP.

```
REQ=PIMAX   WMAX=1500   I=00:00:15
```

This sample request checks every 15 seconds and sends a warning message to the BBI-SS PAS Journal log if any region exceeds 1500 PI enqueues. The region name and PST number are included in the warning message. This can be used to check if a program is taking checkpoints frequently enough.

Part 2. Using MVIMS

This section describes how to use MVIMS. It includes:

- A description of analyzers and monitors and how they are used
- The online functions that can be used with MVIMS in a terminal session (TS)
- A description of the Primary Option Menu that provides easy access to product service applications

Chapter 3. The MAINVIEW Product Family 39

Chapter 4. Measuring IMS Activities and Resources 41

Chapter 5. Types of Services 49
Requests 50
Analyzers 51
Monitors 52
Starting and Stopping Monitors 52
Monitor Response to Target IMS Shutdown and Startup 52
Data Collection 52
Historical Data Stored 53
Data Types Measured 54
Warning Conditions 55
Monitor Request Title 56
Warning Message Format 56
IMS Monitor Data Display Services 58
Workload Wait Events 59
Workload Trace 59
Logging a Display 60
Automatic BBI-SS PAS Image Logging of Analyzer Displays 60
Automatic BBI-SS PAS Image Logging of PLOT Display 60
Automatic BBI-SS PAS Image Logging of Monitor Summary Displays 61
Request Status 62
Grouping Requests 62

Chapter 3. The MAINVIEW Product Family

MAINVIEW is an integrated family of performance management and automation products that monitor and control the multivendor enterprise information system. MAINVIEW consists of performance monitors, network integration software, automated operations, and prewritten automation applications.

MAINVIEW product integration allows host and network system monitoring and automation (even in remote locations) through a common user interface, the MAINVIEW Selection Menu shown below.

```
------------------------- MAINVIEW Selection Menu---------------------------
OPTION  ===>                                              DATE   --
                                                          TIME   --
     0  Parameters and Options                            USERID --
     E  Alerts and Alarms                                 MODE   --
     P  PLEX Management (PLEXMGR)
     U  Utilities, Tools, and Messages

  Solutions for:

     A  Automated Operations
     C  CICS
     D  DB2
     I  IMS
     L  Linux
     N  Network Management
     S  Storage Management
     T  Application Management and Performance Tuning
     W  WebSphere and MQSeries
     Z  OS/390, z/OS, and USS

     Enter X to Terminate

                      Copyright BMC Software, Inc., 2001
```

Figure 1. BMC Software MAINVIEW Selection Menu

The integration of MAINVIEW products is provided through BMC Software Intercommunications (BBI) technology. For more information about the BBI architecture, see the *MAINVIEW Common Customization Guide*.

Chapter 4. Measuring IMS Activities and Resources

The MVIMS analyzer and monitor services measure these IMS activities and resources:

- Terminal I/O
- IMS queuing
- Scheduling of application programs (PSB and DMB pools) in the dependent region
- Application program activity in the dependent regions
- Database activity and buffer pool utilization
- IMS internal functions and interactions with OS/390
- IRLM functions
- IMS workload

Table 2 on page 42 groups the analyzer and monitor services by the IMS activity or resource area measured and indicates where in this manual the services are described. The area indicated in the table is shown as it appears in the `AREA` field of the service list applications.

For techniques about how to use the services to tune your system, see Part 1, “Performance Analysis and Monitoring Techniques” on page 1.

Table 2. IMS Activities and Resources Measured

IMS Activity/ Resource Area	**Analyzer Displays (all references in this manual)**	**Monitors and Traces (Monitors and Traces Reference Manual)**
Terminal I/O (MFS area)	"MFSST - MFS Statistics" on page 83 "MFSUT - MFS Pool Utilization" on page 87	"MFSFD - Percentage of MFS Blocks Found in Pool" "MFSIO - MFS I/O" "MFSIR - MFS Immediate Requests"
IMS queuing (QUEUE area)	"QUEST - Queue Statistics" on page 89	"INQBG - Input Queue Length by Balancing Group (BALG)" "INQCL - Input Queue Length by Class" "INQTR - Input Queue Length by Transaction Code" "IQSCL - Schedulable Input Queue by Class" "LGMSG - Long Message Queue Percentage Utilization" "QBLKS - Queue Blocks Percentage of Utilization" "QIO - Queue I/O" "QWAIT - Queuing Waits" "SHMSG - Short Message Queue Percentage Utilization" "INLK - Input Messages by Link" "OQLK - Output Queue by Link" "OUTLK - Output Messages by Link" "DEADQ - Dead Letter Queue Count" "OQLN - Output Queue Length by Line" "OQLT - Output Queue Length by LTERM" "OQND - Output Queue Length by Node" "OUTLN - Messages Output by Line" "OUTLT - Messages Output by LTERM" "OUTND - Messages Output by Node"

Table 2. IMS Activities and Resources Measured (continued)

IMS Activity/ Resource Area	Analyzer Displays (all references in this manual)	Monitors and Traces (Monitors and Traces Reference Manual)
Scheduling of application programs in the dependent region (SCHED area)	"BALGQ - BALG Queuing" on page 96 "CLASQ - Class Queuing" on page 103 "PSBUT, DMBUT - PSB and DMB Pool Utilization" on page 110 "SCHED - Scheduling Statistics" on page 113	"ARVBG - Transactions Arrivals By Balancing Group (BALG)" "ARVCL - Transaction Arrivals by Class" "ARVPR - Transaction Arrivals By Program" "ARVTR - Transaction Arrivals by Transaction Code" "PRCBG - Transactions Processed by Balancing Group (BALG)" "PRCCL - Transactions Processed By Class" "PRCPR - Transactions Processed by Program" "PRCTR - Transactions Processed by Transaction Code" "SCHFL - Scheduling Failures by Type"
Application program activity in the dependent regions (REGN area)	"DLIST - DL/I Call Status" on page 120 "DREGN - Region Detail (Event Collector Data)" on page 127 "DREGN - Region Detail (No Event Collector Data)" on page 147 "REGNS - IMS Regions (Event Collector Data)" on page 166 "REGNS - IMS Regions (No Event Collector Data)" on page 190 "STAT/STATR - System Status" on page 211	"D2CON - IMS Region Connection to DB2 Subsystem" "D2SON - DB2 Sign On by Subsystem" "D2THD - Active IMS Region Threads to DB2 Subsystem" "DBGU - DataBase Calls per Message Get Unique by Region" "DBTOT - DataBase Calls per Scheduling by Region" "MSGGU - Message Calls per Message Get Unique by Region" "MSGT - Message Calls per Scheduling by Region" "WAIT - Region in a Long PI Wait"

Table 2. IMS Activities and Resources Measured (continued)

IMS Activity/ Resource Area	Analyzer Displays (all references in this manual)	Monitors and Traces (Monitors and Traces Reference Manual)
Database activity and buffer pool utilization (DB area)	"DBST - OSAM Global Pool Statistics" on page 221 "DBST - OSAM Subpool Statistics" on page 225 "FPBST - Fast Path Buffer Pool Statistics" on page 229 "VSST - VSAM Global Pool Statistics" on page 232 "VSST - VSAM Subpool Statistics" on page 235	"DBIO - DataBase I/O Count by Subpool" "DBHIT - Hit Ratio for OSAM Buffer Pool" "DBSTL - DataBase Buffer Steals by Subpool" "HPACC - Hiperspace Access by Subpool" "HPHIT - Hiperspace Hit Ratio by Subpool" "HPSTL - Hiperspace Buffer Steals by Subpool" "SBUSE - Sequential Buffering Storage by Region" "VDBIO - VSAM Database I/O by Subpool" "VDBWR - VSAM Writes by Subpool" "VHIT - VSAM Hit Ratio by Subpool"

Table 2. IMS Activities and Resources Measured (continued)

IMS Activity/ Resource Area	Analyzer Displays (all references in this manual)	Monitors and Traces (Monitors and Traces Reference Manual)
IMS internal functions (INTNL area)	"APPCA - APPC Activity Summary" on page 239 "APPCL - APPC LU Status" on page 248 "DAPPC - Input Allocation Direction" on page 255 "DAPPC - Output Allocation Direction" on page 260 "DLTCH - Latch Detail" on page 264 "DPOOL - Detail Pool (Non-CBT Variable Pool)" on page 274 "DPOOL - Detail Pool (Non-CBT Fixed Pool)" on page 268 "LATCH - Latch Summary" on page 278 "LOGST - Log Statistics" on page 285 "PI - Program Isolation" on page 290 "POOLC - Pool Summary (CBT)" on page 294 "POOLS - Pool Summary (Non-CBT Variable and Fixed Pools)" on page 297	"DBWP - Database Work Area Pool Percentage of Utilization" "DMBP - DMB Pool Percentage of Utilization" "DSAP - Dynamic SAP Percentage of Utilization" "EPCB - EPCB Pool Percentage of Utilization" "HIOP - HIOP Pool Percentage of Utilization" "LAWT - Average Latch Wait Time" "LMAWT - Maximum Average Latch Wait Time" "MFSP - MFS Pool Percentage of Utilization" "OBUFW - OLDS Buffer Waits" "OCHKW - OLDS Check Writes" "PIENQ - Program Isolation Enqueues by Region" "PIMAX - Maximum Program Isolation Enqueues by Region" "PIPL - Program Isolation Pool Percentage of Utilization" "POOLA - Pool Allocated Storage" "POOLN - Net Expansion Count" "POOLT - Total Expansion/Compression Count" "PSBP - PSB Pool Percentage of Utilization" "PSBW - PSB Work Area Pool Percentage of Utilization" "RECA - RECA Pool Percentage of Utilization" "WADIO - WADS I/O" "WKAP - General Work Area Pool Percentage of Utilization"
IMS and OS/390 interactions (IMVS area)	"DSPST - Dispatcher Statistics" on page 305 "RS - Real Storage" on page 309	"CSAFR - CSA Fragmentation" "CSAUT - CSA Percentage of Utilization" "DLIO - DL/I EXCP Count by ddname" "DPAGE - Demand Paging by Region" "ECSAU - Extended CSA Percent Utilization" "PAGE - Paging (Region)" "SYSIO - EXCP Count by ddname"

Table 2. IMS Activities and Resources Measured (continued)

IMS Activity/ Resource Area	Analyzer Displays (all references in this manual)	Monitors and Traces (Monitors and Traces Reference Manual)
IRLM functions (`LOCK` area)	"IRLM - IRLM IMS Status (IRLM 1.5)" on page 313 "IRLMG - IRLM GLOBAL STATUS (IRLM 1.5)" on page 319 "LCRES - IRLM Lock Contention by Resource (IRLM 1.5)" on page 328 "LCUSR - IRLM Lock Contention by User (IRLM 1.5)" on page 335 "LHRES - IRLM Locks Held by Resources (IRLM 1.5)" on page 337 "LHUSR - IRLM Locks Held by User (IRLM 1.5)" on page 344 "LUSRD - IRLM Lock User Detail (IRLM 1.5)" on page 346 "IRLM - IRLM IMS Status (IRLM 2.1 and Later)" on page 354 "IRLMG - IRLM GLOBAL STATUS (IRLM 2.1 and Later)" on page 361 "LCRES - IRLM Lock Contention by Resource (IRLM 2.1)" on page 371 "LCUSR - IRLM Lock Contention by User (IRLM 2.1)" on page 379 "LHRES - IRLM Locks Held by Resources (IRLM 2.1)" on page 381 "LHUSR - IRLM Locks Held by User (IRLM 2.1)" on page 388 "LUSRD - IRLM Lock User Detail (IRLM 2.1)" on page 391	"LDLCK - Number of Deadlocks" "LHELD - Number of Locks Held" "LKMAX - Maximum Locks Held by Region" "LKREQ - Number of Lock Requests" "LSUSP - Number of Suspensions" "LWAIT - Region in IRLM Suspend" "LWNUM - Number of Suspended IRLM Requests" "PTBLK - Number of PTB Locks" "VSEND - Number of VTAM Sends"

Table 2. IMS Activities and Resources Measured (continued)

IMS Activity/ Resource Area	Analyzer Displays (all references in this manual)	Monitors and Traces (Monitors and Traces Reference Manual)
IMS Workload (IWKLD area)	Chapter 18, “ISTAT - Terminal Input Status Display” on page 401 Chapter 19, “OSTAT - Terminal Output Status Display” on page 413 Chapter 20, “TRANQ - Transaction Queue Status Display” on page 425 Chapter 21, “USER - User Status Summary” on page 433 Chapter 22, “Requesting Workload Wait Data Collection (MWAIT)” on page 439 Chapter 23, “Requesting Workload Wait Data Display (DWAIT)” on page 449 Chapter 24, “DWAIT - Workload Wait Display” on page 451	Chapter 27, “Requesting Workload Trace Data Collection (MTRAC)” Chapter 34, “LTRAC - List of Trace Entries” Chapter 35, “STRAC - Summary Trace Data Display” Chapter 36, “DTRAC - Detail Trace Data Display”
IMS workload - DB2 activity (IWDB2 area)		“#CDB2 - DB2 Data Access Calls” “#SDB2 - DB2 Nondata Access Calls” “@PDB2 - DB2 CPU Time”
IMS workload - Fast Path activity (IWFP area)		“#CIC - Control Interval Contentions” “#OBAW - OBA Latch Waits” “@OBA - Overflow Buffer Usage”
IMS workload - global IMS region calls (IWGBL area)		“$CBMP - BMP Region Calls” “$CDBT - DBCTL Region DLI Calls” “$CMPP - MPP Region Calls” “$CTOT - All Region Calls”
IMS workload transactions (IWTRN area)		“@ELAP - Average Elapsed Time” “@INPQ - Average Input Queue Time” “@RESP - Average Response Time” “#PROC - Number of Transactions Processed”

Chapter 5. Types of Services

The MVIMS services include:

Analyzers	Show formatted full-screen displays of target system status and activity.
Monitors	Measure and collect data about resource or workload performance over time and detect exception conditions.
Workload Wait	Measures and collects data about IMS workload events over time. Workload wait requires monitor data collection and analyzer display. MWAIT is a monitor service that activates workload wait data collection. DWAIT is an analyzer display of data collected by MWAIT.
Workload Trace	Tracks transaction processing through IMS. A trace requires monitor data collection and analyzer display. MTRAC is a monitor service that activates workload trace data collection. LTRAC, STRAC, and DTRAC are analyzer display services that show different views of data collected by MTRAC from summarized statistics for all transactions to detailed events and data for one transaction.

Except when thresholds are exceeded, monitors execute independently in the background, transparent to the operator. When warnings are issued, the historical data collected by Workload Monitor and other products can be examined to determine problem causes. Workload Analyzer can be used to determine the cause of the IMS workload problem; then Resource Analyzer can be used to determine which resource is affected by the workload problem. MAINVIEW AutoOPERATOR for IMS can be used to automatically take an action when a warning is issued.

Resource Monitor has services that monitor resource usage, such as input queue length. When used together, Workload Monitor and Resource Monitor provide an early warning system for the entire IMS environment.

Requests

Services are activated as user requests.

- Analyzers can be selected from an analyzer service list or requested from a service display panel by overtyping the service name.
- Timer-driven monitors that measure resources, workloads, or wait events or track transaction processing are SET service requests.

  They can be selected from a monitor service list and started from a data entry panel. The collected data can be viewed with monitor display services similar to analyzers.
- Timer-controlled requests that activate transaction tracing can be started from a data entry panel accessed from a list of current traces.
- Timer-controlled requests for automatic analyzer display logging can be started from a data entry panel accessed from an analyzer service list.

SET requests for timer-driven services with options as keyword parameters can be generated automatically from data entry panels. Optional service parameters narrow the scope of a single request and let several requests for the same service be active concurrently. Additional requests can be made at any time, or requests can be modified or purged.

A standard set of timer-controlled monitor, workload wait, workload trace, or logging requests can be started automatically with the BBI-SS PAS.

Analyzers

The IMS analyzers are services that provide a formatted, full-screen display of IMS resource performance at your terminal in response to a request. A request for a display is made with a service select code and optional parameter. You can make the request from a service display panel or by selecting the service from an analyzer service list. The results of the service analysis are shown at your terminal and can be automatically logged to the BBI-SS PAS Image log at time-driven intervals with the SET facility.

Analyzer services that show lists of resources or workloads are scrollable.

Some analyzers display data collected by a previously started data collection service request. For example, timer-driven monitors collect short-term history data that can be displayed with a plot display. The workload wait (MWAIT and DWAIT) and trace services (MTRAC and LTRAC, STRAC, or DTRAC) in IMS Workload Analyzer function similarly. The MWAIT and MTRAC services are started like a monitor to collect data:

- MWAIT data collection can then be displayed by the DWAIT workload wait display.
- MTRAC data collection can then be displayed by:

  LTRAC Shows a list of all traced events for an MTRAC request.

  STRAC Shows summarized trace statistics for one transaction.

  DTRAC Shows a chronological detail trace of events for one transaction and includes associated database I/O data and segment search argument, key feedback, and I/O area data. If a transaction has DB2, CICS, or MQSeries events associated with it, those events are also displayed.

Monitors

The IMS monitors are services that collect data measurements about resource usage or workload performance and detect warning conditions in response to a user request. A request to activate a timer-driven monitor is made by specifying a service select code and optional parameter with the SET facility. You can make a request from a service display panel or from a monitor service list. Selecting a service from a monitor list displays a data entry panel primed with the SET request keywords for the selected service. The request specifies the resource to be measured, the sampling frequency, the time of day to begin the sampling, the sampling duration, the disposition of data when the IMS subsystem is not available, and the threshold that defines a warning condition for the monitor request.

Each monitor service is a timer-driven monitor that:

- Measures resource or workload status, count of activity, or usage percentage.
- Calculates a ratio of resource usage over time. The measurement obtained at each sampling interval is compared to the user-defined threshold for that request. The threshold comparison detects conditions for which user-defined warning messages can be issued. The measurements are stored online so that a plot of the recent history of a monitor request can be viewed at any time. Optional service parameters narrow the scope of a single request and let several requests for the same monitor service be active concurrently.

Starting and Stopping Monitors

With a monitor request, the user selects an IMS variable to be monitored, defines a sampling frequency, and assigns a warning threshold appropriate to the site's environment. A standard set of monitor requests can be started automatically with the BBI-SS PAS. Additional monitor requests can be made at any time or requests can be modified or purged

Monitor Response to Target IMS Shutdown and Startup

Active monitors detect target system shutdown and startup. When a request is made, quiesce and restart options can be defined that specify the monitor action when the target system stops or restarts. Monitors can:

- Be restarted automatically

  Previously collected data can be saved or deleted.
- Be purged when the target IMS stops
- Remain in a quiesced state when the target IMS starts

Data Collection

A monitor service request is activated through a timer facility, which is controlled through SET service requests. A request for a service specifies:

- The monitor to be used (service select code and parameter).

  Note: This defines the IMS resource or activity to be measured.
- When monitoring should begin.

- How long monitoring should continue.
- How often the activity is to be measured (sampling interval).
- Which service functions should be performed.

The active service request automatically measures the corresponding system variable (see "Data Types Measured" on page 54) at the time interval specified on the SET request. This data can be displayed online with a plot service request. The requested plot display can be automatically logged or refreshed.

The workload monitors and resource monitors use the same timer and SET facility to activate and control requests. However, they do not use the same facility for data collection.

- Workload trace and workload monitors use the Event Collector component to collect transaction-level statistics.
- Resource monitors collect data through their own timer-driven services.

Historical Data Stored

To make concise short- and long-term histories available for the graphic plot display, historical data is always stored as:

- Ten detail measurements. These are the latest 10 values, each collected at the expiration of the user-defined interval. For example, if the standard sampling interval of 1 minute is in effect, the measurements of each of the last 10 minutes are available. When a new measurement is made, the oldest value is overwritten (in other words, the values wrap around every 10 intervals).
- Two summary periods, current and previous. Both values are updated at the expiration of 10 intervals (wrap point) when 10 new detail measurements have been collected. The current period value is moved to the previous period and the sum of the 10 detail measurements is moved to the current period. The current period value includes from 1 to 10 of the detail measurements available at any one time. The wrap point is indicated by an arrow in the display provided by the PLOT service.
- Total. This is the total accumulated in the time the request has been active. It is updated at each interval when a new measurement is made.

  Note: Both the summary periods and the total are shown as averages-per-interval in the graphic display so the plotted detail values can be compared.
- A frequency distribution. This distribution is updated at each interval if range limits are defined with the request. From two to five ranges are allowed. The new measurement value is compared to the defined limits to find the range in which it belongs and the number of occurrences for that range is incremented by one.
- The high-water mark. This is the maximum value ever measured at any interval and the time it occurred.

Following is an example of the storage of historical data:

If a request is started at 10:00 a.m. with an interval of one minute, the detail counters wrap around at 10:10, 10:20, and so on. The history available at 10:35 is:

- The detail measurements cover the last 10 minutes, from 10:25 to 10:35.
- The current period is from 10:20 to 10:30.
- The previous period is from 10:10 to 10:20.
- The total is from 10:00 to 10:35.

Data Types Measured

The following four types of automatic service measurements can be taken periodically and shown by the general Performance Management PLOT display request.

COUNT
: An activity count over time; for example, the number of lock requests within a specified time interval.

Note: When COUNT data is plotted, in addition to the counts, rates-per-second are automatically calculated and shown for the displayed time intervals (AVG/SEC).

AVERAGE
: The quantity over time; for example, the average value of transaction response time in the specified interval.

Note: When AVERAGE data is plotted, in addition to the averages, the event counts used to calculate the averages are also shown for the displayed time intervals (EVENTS); for example, for the plotted average response time, the number of transactions measured is shown.

STATUS
: The status level at the moment of measurement; for example, queue lengths or level of PI enqueues.

PERCENT
: Resource usage at the moment of measurement, expressed as a percentage of the maximum; for example, percent pool utilization.

For a sample PLOT display and a complete description of the display contents, see the "Monitor History Display (PLOT)" section of the "Monitor Display Commands" chapter in *Monitors and Traces Reference Manual*.

A fifth type of data measurement, WARNING ONLY, does not collect historical data or produce a plot:

WARNING ONLY
: A condition measurement that can be checked against a warning threshold; for example, the number of DL/I calls performed in a region since the last program scheduling.

Warning Conditions

SET request parameters for a monitor service can be used to define a value that is compared to the measurement taken during the requested sampling interval. The comparison establishes a warning condition when the measurement either exceeds a maximum threshold or is less than a minimum threshold. When the service detects this exception, it automatically sends a message to the BBI-SS PAS Journal and also to the system console upon user request. The message text is:

- A unique message ID
- The title of the service, which can be changed by the user with a TITLE parameter in the service request
- The measured value
- The sampling interval (if applicable)
- The defined threshold

The service sends an exception-cleared message with the service title to the BBI-SS PAS Journal when the service no longer detects a condition greater than the defined threshold value.

The monitor request can be used to:

- Specify a user-defined threshold value (WMAX or WVAL keyword).

  Each new measurement of the system variable made at the expiration of an interval is compared to the threshold value.

  When the measurement either exceeds a maximum threshold or is less than a minimum threshold, a warning condition exists and warning messages are sent automatically to the BBI-SS PAS Journal log.

  Note: The LOG DISPLAY option on the Primary Option Menu can be used to view the BBI-SS PAS Journal log.

- Send warning messages also to the OS/390 console through the write-to-operator (WTO) facility (WMSG keyword).
- Specify the number of warnings to be sent for one exception condition (WLIM keyword), the number of times the exception is detected before the first message (WIF keyword), and the number of times the exception is detected between messages (WIN keyword).

These options can be used to avoid flip-flop situations where a condition often varies just above and below the threshold, triggering many messages. For example, a condition could be checked every 30 seconds with a warning only if that condition persists for 3 minutes (WIF=6), repeated warnings only after another 5 minutes (WIN=10), and a limit of 10 (WLIM=10) warnings (the problem is known and investigated by then).

Monitor Request Title

A monitor request is identified with a title. If a parameter is specified for a requested service, the parameter is shown with the title. The title and applicable parameter for each request are shown in the:

- PLOT graphic display of the data collected by the requested monitor
- Active Timer Requests application (see "Request Status" on page 62)
- DMON or DWARN active monitor summary display
- Warning message issued when the measurement of the resource exceeds a threshold defined for the monitor

If a parameter is not used for the monitor request, the PLOT display and the warning message show the default (TOTAL) for that field.

Each service has a default title that can be customized. This process is described in "Service Table Definition" in the *MVIMS Customization Guide*. The default titles of all the monitor services are in the service descriptions in this manual.

When requesting a monitor service, you can use the TITLE keyword to make the title more meaningful to the installation for that specific request. A user-defined title can be 1 to 24 characters long. The title can be defined in a data entry panel or with a SET request in the Service Display panel. If a title is defined with a SET request, the title must be enclosed in single quotes.

Warning Message Format

Each service has a unique warning message associated with it. A warning message is issued when the condition established by the user is detected by the monitor service, as described in the preceding section. The format of a warning message is:

```
ccnnn0W (nn) hh:mm:ss title(parm) = v [IN x intrvl] [srvdata]
(>thrshld) *****
```

where:

ccnnn0W — Is the warning message ID issued by the requested monitor service.

- cc — Is a two-character code indicating the service type; for example, RM indicates Resource Monitor.
- nnn — Is the numerical message identifier associated with the requested service.
- 0 — Indicates that the detected threshold currently exists.
- W — Represents a warning message.

(nn) — Is the number of times the warning message was issued.

hh:mm:ss — Is a timestamp in hours, minutes, and seconds.

title — Is a default or user-defined title for the service (see "Monitor Request Title" on page 56).

(parm) Is an optional parameter that is part of the reqid (service select code plus parameter) for the SET request, as described previously. (TOTAL) is the default if a parameter is not specified for the service request.

v Is the current measured value.

IN x intrvl Is the time specified for the resource sampling with the INTERVAL keyword of the SET request where:

x Can be nn, nnnn, hh:mm:ss, or mm:ss (n is a numeric value; hh is the number of hours; mm is the number of minutes; and ss is the number of seconds).

intrvl Is units of time measurement which can be SEC or MIN.

Note: Time measurement units are not used for hh:mm:ss.

This measurement is included in the warning message only when a COUNT data type is measured (see "Data Types Measured" on page 54).

(>thrshld) Is the threshold value specified by the WMAX or WVAL keyword of the SET request for the monitor service. A < character indicates the sampled value is less than or equal to the threshold as specified by the request.

***** Is used to emphasize the message in the BBI-SS PAS Journal log.

When a threshold is exceeded, a warning message is sent and a warning condition exists. The DWARN service can be used to show all current warning conditions. When the condition that caused the warning no longer exists, the following message is issued:

```
ccnnn1I hh:mm:ss title(parm) NO LONGER > value
```

where:

ccnnn1I Is the same as the warning message ID number except a 1 replaces the 0 in the last digit and I replaces W. The 1 indicates the detected threshold no longer exists. The I indicates this message is informational.

title Is the same as the warning message title.

(parm) Is the same as the warning message parameter.

value Is the threshold value specified by the WVAL keyword of the SET request for the monitor service.

For example, if the user request is:

```
                    LKREQ - IRLM LOCK REQUESTS

WVAL     ==> 5
WMSG     ==> WTO
INTERVAL ==> 00:01:00
TITLE    ==> IRLM LOCK REQUESTS
```

and the sampled measurement is greater than 5 threads at 1:00 pm, the following RM0840W message is issued:

```
RM0840W(01) 13:00:01 IRLM LOCK REQUESTS(TOTAL) = 7 (>5)
```

When the condition no longer exists, the following RM0841I message is issued:

```
RM0841I(01) 13:31:00 IRLM LOCK REQUESTS(TOTAL) NO LONGER > 5
```

Note: The target system is identified in these messages. In the Journal log, the target name is in the origin identifier field (scroll left to view). WTO messages have both the BBI-SS PAS ID and the target (`TGT=xxxx`) appended at the end of the message text.

IMS Monitor Data Display Services

The data collected by monitor service requests can be displayed online or the displays can be logged for later analysis. They can be requested from an active timer request list (see the chapter "Displaying a List of Active Timer Requests" in *Monitors and Traces Reference Manual*).

The monitor-collected data can be displayed by the following services:

- PLOT

  The PLOT service provides a graphic display of the history data collected for one monitor request. A range distribution of the measured values, the maximum value ever measured, and rates-per-second present effective IMS problem analysis.

- DMON

  The DMON service provides a scrollable display of the most current, active monitor measurements. Each line has a simple graphic representation of how close the measurement is to the defined warning threshold.

  DMON identifies potential problems quickly by showing several measurements together, such as the number of transactions processed, the number of database I/Os, the level of PI enqueues, and average response time. You also can use this service to see how many monitors are close to their warning thresholds.

- DWARN

  The DWARN service provides a scrollable display of current, measured values like DMON, but only for monitors that have a warning condition resulting from measured values exceeding user-defined thresholds.

These displays are described in detail in the chapter called "Monitor Display Commands" in the *MAINVIEW for IMS Online – Monitors and Traces Reference Manual*.

Workload Wait Events

The workload wait services collect and display workload wait events for all or specific IMS workloads.

As described in Chapter 22, “Requesting Workload Wait Data Collection (MWAIT)” on page 439, workload wait events are sampled by a request for the MWAIT monitor. The request can be tailored to select specific components of the IMS workload for accumulated wait time. For example, the only workload components that use an IMS region are scheduling, application program, and sync point. Input and output communication and queuing events are ignored when a REGION parameter is specified.

The wait data accumulated by MWAIT is viewed by a request for the DWAIT workload analyzer. DWAIT shows the workload events that account for the IMS response time. As described in Chapter 24, “DWAIT - Workload Wait Display” on page 451, DWAIT shows wait events by the following transaction processing event components:

- Input Communications
- Input Queue
- Scheduling
- Application Program
- Sync Point
- Output Queue
- Output Communications

All or specific transaction processing event components can be viewed.

Workload Trace

The trace services collect and display trace data about transaction processing and allow traced data to be logged to external VSAM data sets called trace log data sets (TLDS). Active traces can be viewed online with the Current Traces application from the Primary Option Menu. Logged traces can be viewed online with the History Traces application from the Primary Option Menu.

The Event Collector must be active to implement a trace. As described in the MTRAC chapter in *Monitors and Traces Reference Manual*, a trace is implemented by a request for the MTRAC monitor. The request can be tailored so that only the trace data needed to detect and solve problems is collected. The request can specify either a summary or detail trace.

The traced data collected by an MTRAC request can be viewed by requesting the LTRAC, STRAC, or DTRAC services. Display of a summary trace (LTRAC or STRAC) provides high-level quick answers about a transaction as it flows through IMS. Display of a detail trace (DTRAC) provides a chronological replay of the exact sequence of traced transaction events and includes associated database I/O data and segment search argument, key feedback, and I/O area data. If a transaction has DB2, CICS, or MQSeries events associated with it, those events are also displayed.

Logging a Display

A display can be logged in three different data sets by:

- Entering a Y for the yes option in the LOG field of the display, which records the display in the TS Image log.
- Pressing the SCREEN PRINT key (PF4/16) after the display is shown, which records the display to a BBISPRNT data set.
- Requesting automatic logging of an analyzer or monitor display service, which records the display automatically, without user interaction, to the BBI-SS PAS Image log.

DMON and DWARN display logging can also be requested for active monitors as described in "Automatic BBI-SS PAS Image Logging of Monitor Summary Displays" on page 61.

The log records can be printed offline using the IMRPRINT utility (BBSAMP member ILOGJCL), as described in the *MAINVIEW Administration Guide*.

Automatic BBI-SS PAS Image Logging of Analyzer Displays

An Image log request can be made by selecting a data entry panel from an analyzer service list with the I line command. The SET timer facility invokes an IMS analyzer service and logs the display automatically to the BBI-SS PAS Image log at a user-specified interval. `ATINTVL` is the default. For example:

```
SERV ==> SET
PARM ==> REQ=PI,I=00:05:00
```

requests Image logging of the program isolation display every five minutes. For a description of the keywords used to activate an Image log request either with a SET request (see the "SET Timer Request" chapter in *Monitors and Traces Reference Manual*) or from the Image log request data entry panel (see "Start Image Log Request (I Line Command)" on page 71).

Automatic BBI-SS PAS Image Logging of PLOT Display

Logging of a monitor PLOT display to the BBI-SS PAS Image log is coordinated automatically by specifying a LOG parameter with a monitor request as described in the chapter "Requesting a Monitor" in *Monitors and Traces Reference Manual* or with a SET request as follows:

```
SERV ==>SET
PARM ==>REQ=HPSTL,1,I=00:01:00,LOG=ATPD
```

This request invokes the HPSTL data collection monitor to collect the number of unsuccessful Hiperspace reads for VSAM subpool 1 at one minute intervals. At the end of each complete period (`LOG=ATPD`), which is 10 intervals, a plot display of the data is logged to the BBI-SS PAS Image log. For this request, a plot is logged every 10 minutes.

A convenient logging frequency for a complete monitor history is at the end of each period (ATPD). A period is the completion of 10 time intervals. A PLOT display can also be logged at each interval (`LOG=ATINTVL`), only once at the completion of the request (`LOG=ATSTOP`), or only when a warning condition is detected (`LOG=ATWARN`).

Automatic BBI-SS PAS Image Logging of Monitor Summary Displays

A summary of active monitor status can be logged to the Image log with DMON or DWARN, as shown by the following requests which can be made from the SERV field of any display.

For example, this request logs the DMON service display, which shows the current status of the first 15 active monitors, every 10 minutes:

```
SERV ==> SET
PARM ==> REQ=DMON,I=00:10:00
```

The following request logs the DWARN service display, which shows the current status of the first 15 active monitors with a warning condition, every minute:

```
SERV ==> SET
PARM ==> REQ=DWARN,I=00:01:00
```

The table called “SET Keywords Affecting Request Activation” in *Monitors and Traces Reference Manual* describes the keywords used to request Image logging of a DMON or DWARN display.

Note: If a parameter is not specified for a DMON or DWARN Image log request, the first 15 active monitors are logged. To log the next set of 15 active monitors, specify 16 in the PARM field, and so on.

Request Status

The status of timer-driven requests can be displayed by accessing the Active Timer Requests application:

Select Primary Menu Option 2, MONITORS - Early Warnings/Recent History (Active Timer Requests)

The Active Timer Requests application lists standard monitor service requests and any additional timer-driven data collection services and timer-driven Image logging requests. It shows how many requests are active already and provides direct access to the data collected by that request. You can access data entry panels that allow current options to be viewed or modified, purge an active request, or use a request as a model to start a new request.

The Display Statistics and Defaults application, Primary Menu Option 5 from the Primary Option Menu, provides general information about the Timer Facility. It shows status information, some statistics, default parameters in effect, and a summary of the active timer requests for the BBI-SS PAS associated with the specified target `(TGT===>)`.

Grouping Requests

Multiple timer-driven services can be started by defining a series of requests in a member of the BBI-SS PAS BBPARM data set. The member can be started from a TS or automatically when the BBI-SS PAS starts, as described in the “Request Initiation” section of the “SET Timer Request” chapter in *Monitors and Traces Reference Manual*.

BBPARM member, BLKIMFW, contains a sample starter set of IMS Resource Monitor and IMS Workload Monitor requests. Many of the requests have suggested warning thresholds; some only show activity in the IMS target.

This member should be used for automatic monitor startup (see BBPARM member BBIISP00) until a set of monitors can be customized for each IMS target at your site.

Part 3. Analyzers

This section summarizes how to request a service and describes what each service does. The service descriptions are organized into groups that parallel the transaction processing sequence within IMS.

Chapter 6. Displaying a List of Analyzer Services (Menu Option 1) 67
SORT Primary Command. 68
AREA Primary Command 69
Line Commands 69
Start Image Log Request (I Line Command) 71

Chapter 7. Requesting an Analyzer Display 73
Selecting a Service(s) for Display 73
Logging an Analyzer Service Display 74
Stopping an Analyzer Image Log Request 75
Qualifying an Analyzer Request 75

Chapter 8. Resource Analyzer Services (Quick Reference) 77

Chapter 9. Message Format Service Displays 83
MFSST - MFS Statistics. 83
MFSUT - MFS Pool Utilization 87

Chapter 10. Queuing Displays 89
QUEST - Queue Statistics 89

Chapter 11. Scheduling Displays 95
BALGQ - BALG Queuing 96
CLASQ - Class Queuing 103
PSBUT, DMBUT - PSB and DMB Pool Utilization 110
SCHED - Scheduling Statistics 113

Chapter 12. Region Displays 117
DLIST - DL/I Call Status 120
DREGN - Region Detail (Event Collector Data) 127
DREGN - Region Detail (No Event Collector Data) 147
REGNS - IMS Regions (Event Collector Data) 166
REGNS - IMS Regions (No Event Collector Data) 190
STAT/STATR - System Status 211

Chapter 13. Database Displays 221
DBST - OSAM Global Pool Statistics 221
DBST - OSAM Subpool Statistics 225
FPBST - Fast Path Buffer Pool Statistics 229
VSST - VSAM Global Pool Statistics 232
VSST - VSAM Subpool Statistics 235

Chapter 14. IMS Internals Displays 239
APPCA - APPC Activity Summary 239
APPCL - APPC LU Status 248
DAPPC - Input Allocation Direction 255
DAPPC - Output Allocation Direction 260

DLTCH - Latch Detail 264
DPOOL - Detail Pool (Non-CBT Fixed Pool) 268
DPOOL - Detail Pool (Non-CBT Variable Pool) 274
LATCH - Latch Summary 278
LOGST - Log Statistics 285
PI - Program Isolation 290
POOLC - Pool Summary (CBT) 294
POOLS - Pool Summary (Non-CBT Variable and Fixed Pools). 297

Chapter 15. OS/390 System Displays 305
DSPST - Dispatcher Statistics 305
RS - Real Storage. 309

Chapter 16. IRLM Displays. 313
IRLM - IRLM IMS Status (IRLM 1.5) 313
IRLMG - IRLM GLOBAL STATUS (IRLM 1.5) 319
LCRES - IRLM Lock Contention by Resource (IRLM 1.5) 328
LCUSR - IRLM Lock Contention by User (IRLM 1.5) 335
LHRES - IRLM Locks Held by Resources (IRLM 1.5) 337
LHUSR - IRLM Locks Held by User (IRLM 1.5) 344
LUSRD - IRLM Lock User Detail (IRLM 1.5) 346
IRLM - IRLM IMS Status (IRLM 2.1 and Later) 354
IRLMG - IRLM GLOBAL STATUS (IRLM 2.1 and Later) 361
LCRES - IRLM Lock Contention by Resource (IRLM 2.1) 371
LCUSR - IRLM Lock Contention by User (IRLM 2.1) 379
LHRES - IRLM Locks Held by Resources (IRLM 2.1) 381
LHUSR - IRLM Locks Held by User (IRLM 2.1) 388
LUSRD - IRLM Lock User Detail (IRLM 2.1) 391

Chapter 17. WORKLOAD ANALYZER Displays (Quick Reference) 399

Chapter 18. ISTAT - Terminal Input Status Display. 401
Input LTERM Status 404

Chapter 19. OSTAT - Terminal Output Status Display 413
Output LTERM Status 418

Chapter 20. TRANQ - Transaction Queue Status Display 425
Transaction Status 429

Chapter 21. USER - User Status Summary 433

Chapter 22. Requesting Workload Wait Data Collection (MWAIT). 439
Starting MWAIT 439
Using the Workload Wait Data Entry Panel 441
Stopping MWAIT 446
Storage Requirements 446
Defining a Sampling Interval. 447
Qualifying a Workload MWAIT Request 447

Chapter 23. Requesting Workload Wait Data Display (DWAIT). 449

Chapter 24. DWAIT - Workload Wait Display 451
Excluding Queued Events 456
DWAIT Event Definitions 456
Application Program (AP) Events 457
Input Communications (IC) Events 474
Input Queue (IQ) Events. 483
Output Communications (OC) Events 486
Output Queue (OQ) Events 487
Scheduling (SC) Events 490
Synchronization Point (SP) Events 504

Chapter 6. Displaying a List of Analyzer Services (Menu Option 1)

This application is a scrollable list of all the analyzer display services that you are authorized to view.

```
BMC SOFTWARE  ------------ ANALYZER DISPLAY SERVICES --------- PERFORMANCE MGMT
COMMAND ===>                                                     TGT ===> IMSA

COMMANDS: SORT, AREA
LC CMDS: S(SELECT), I(IMAGE LOGGING), H(HELP)
LC   SERV   PARAMETER   TITLE                    PARM TYPE    SEC  AREA   STAT
DWAIT              DISPLAY WORKLOAD WAIT     (IDENTIFIER)  A   IWKLD
DTRAC              DISPLAY WORKLOAD TRACE    (IDENTIFIER)  A   IWKLD
TRANQ              TRANSACTION QUEUE STATUS  (IDENTIFIER)  A   IWKLD
ISTAT              TERMINAL INPUT STATUS     (IDENTIFIER)  A   IWKLD
OSTAT              TERMINAL OUTPUT STATUS    (IDENTIFIER)  A   IWKLD
MFSST              MFS STATISTICS                          A   MFS
MFSUT              MFS POOL UTILIZATION                    A   MFS
QUEST              QUEUE STATISTICS                        A   QUEUE
CLASQ              CLASS QUEUING             (REGION#)     A   SCHED
BALGQ              BALG QUEUING              (REGION#)     A   SCHED
SCHED              SCHEDULING STATISTICS                   A   SCHED
PSBUT              PSB POOL UTILIZATION      (ITERATION#)  A   SCHED
DMBUT              DMB POOL UTILIZATION      (ITERATION#)  A   SCHED
REGNS              IMS REGIONS               (IDENTIFIER)  A   REGN
DREGN              DETAIL REGION SERVICE     (REGION#)     A   REGN
REGND              DETAIL REGION SERVICE     (REGION#)     A   REGN
```

Figure 2. List Analyzer Display Services Application

It allows service selection by line command and shows the allowable parameters for each service, the service security classification, the area of IMS being analyzed, and the service status by:

Field Name	Description
LC	A line command input field. One-character line commands can be entered in this field to execute a service and display the output, display a data entry panel to define and submit a SET timer request for BBI-SS PAS Image logging, or display HELP information for the selected service (see “Line Commands” on page 69).
SERV	A scrollable list of all the analyzer services by service select code.
PARAMETER	An input parameter field.
TITLE	The service title.
PARM TYPE	A short description of the parameters that can be used, if the service allows parameters. Optional parameters are shown in parentheses.
SEC	The security code for user access to the service.

AREA The IMS resource area being analyzed. This field could contain:

Field Data	Description
MFS	Terminal I/O
QUEUE	IMS queuing
SCHED	Scheduling of application programs in the dependent region
REGN	Application program activity in the dependent regions
DB	Database activity and buffer pool utilization
INTNL	IMS internal functions
IMVS	IMS and OS/390 interactions
LOCK	IRLM functions
IWKLD	IMS workload

STAT The service status (LOCK or blank).

SORT Primary Command

When the list of analyzer display services is displayed initially, the list is sorted by an internally defined sequence. SORT can be entered in the COMMAND field of the display to sort the list by any of the following column headings. The first two characters of the column heading are used with SORT as follows:

```
SORT cc
```

where cc can be any of the following two characters:

SE Sorts the list alphabetically by service name (SERV column).
TI Sorts the list alphabetically by service title (TITLE column).
SC Sorts the list alphabetically by security code (SEC column).
AR Sorts the list alphabetically by the resource area (AREA column) and by service name within the area (default).
ST Sorts the list alphabetically by the service status displayed (STATUS column).

SORT with no parameters sorts the columns by area.

AREA Primary Command

You can use the AREA command to list only the services related to a specific area. The possible areas that can be specified are shown in the AREA column. For example, to list only the IMS database services, type in the COMMAND field:

```
AREA DB
```

Type AREA without an area name to return to the list of all the services.

Line Commands

Entering one of the following one-character line commands in the LC field for a service executes the line command function. Multiple line commands can be entered at one time and are processed in sequence. Each display in a series is shown by pressing the END key. Each Image log in a series is submitted by pressing the ENTER key and then the END key to process the next request.

Line Command	Description
S	SELECT. Selects a resource or workload analyzer service for execution and displays the output of the service analysis in the service display panel.

Service Display Panel Input Fields

Additional service requests can be made in the following input fields of the selected service display panel:

Input Field	Description
SERV	The service select code of the selected analyzer is shown in this field. Any of the analyzer service select codes can be entered in this field. Entering a valid service select code requests the specified service and shows the results of its analysis in the display panel's output data lines (see the “Output Fields” description below). Pressing the END key redisplays the Analyzer Display Services list.
PARM	An optional parameter (maximum of 55 characters).
INTVL	The screen refresh interval (3 second default).
LOG	Writes the screen image to the Terminal Session Image log (Y|N).
TGT	The target IMS job name or IMSID.

SCROLL	The scroll amount for lists of data, which can be from the cursor position (CSR), a specified number of lines, half a page (H), a page (P), or the maximum list elements (M). The scroll direction is determined by the use of the UP (PF7/19) or DOWN (PF8/20) key.

Service Display Panel Output Fields:

The output fields of the selected service display panel provide the following information:

Output Field	**Description**
INPUT|RUNNING	INPUT indicates the screen is in input mode. RUNNING indicates the screen is in refresh mode. The GO key (PF6/18) changes input mode to refresh mode. Pressing the ATTN key (SNA terminals) or the PA1 key (non-SNA terminals) changes refresh mode to input mode. For information about the service refresh cycle option, see the *Using MAINVIEW* manual. refresh.
hh:mm:ss	Timestamp.
Service Title	The service description.
data lines	The service analysis output. List data can be scrolled when it fills the screen.

Pressing the END key (PF3/15) redisplays the Analyzer Display Services list.

I — IMAGE LOGGING. Displays the data entry timer request panel to specify when the service is to be invoked and the output is to be automatically recorded in the BBI-SS PAS Image Log (see "Start Image Log Request (I Line Command)" on page 71). A display is logged at the end of each interval.

H — HELP Displays HELP information for this service. This shows the service title, gives a short description, defines any parameters, and describes all fields.

The following commands are for system programmer use and are restricted by a security access code:

L — LOCK. Locks this service. The service cannot be used again until it is unlocked.

U — UNLOCK. Unlocks this service, which could be locked by the use of the LOCK command or a service ABEND.

T — TEST. BMC Software use only.

Start Image Log Request (I Line Command)

This panel shows the options that can be specified to automatically invoke the selected analyzer service and log the output to the BBI-SS PAS Image log. The input fields are prefixed with a highlighted `===>` symbol. Any default values for a field are displayed.

```
BMC SOFTWARE  ------------ START IMAGE LOGGING REQUEST ------- PERFORMANCE MG
COMMAND ===>                                                     TGT ===> IMSA

                        RGNPI - REGION PROGRAM ISOLATION
PARM      ===>                              (REGION#)
INTERVAL  ===> 00:01:00 START ===>          STOP ===>            QIS ===> YES

RST       ===> HOT                          (Restart Option: HOT,COLD,PUR,QIS)
```

Figure 3. Image Log Request Application. Analyzer Display Services List I Line Command

Each request must be unique and is defined by the service select code and an optional parameter (reqid). The parameter is required if the same service is requested more than once. The service field is preset with the code of the selected service.

You can enter:

INTERVAL — Time interval when image logging of this service is to automatically occur.

QIS — What the service is to do when IMS is not active:

- YES — Quiesce.
- NO — Continue running or start.

RST — How service is to restart after quiesce:

- COLD — Restart automatically, deleting collected data.
- HOT — Restart automatically without data loss.
- PUR — Purge automatically when IMS starts.
- QIS — Remain quiesced until purged by authorized user.

START — The time image logging is to start in `hh:mm:ss`.

STOP — The time image logging is to stop in `hh:mm:ss`.

For more information about these keywords, see the “SET Timer Request” chapter in *Monitors and Traces Reference Manual*.

The request is submitted when the ENTER key is pressed. A short message in the upper-right corner of the display shows the result of the request. If an ERROR IN REQUEST message is displayed, a short explanatory message is displayed on the third line. Pressing the END key (PF3/15) redisplays the Analyzer Display Services list.

Chapter 7. Requesting an Analyzer Display

You can issue requests to:

- Access the analyzer displays easily through ISPF-like menus and scrollable lists
- Move quickly from summary displays to detail displays or to related services (EXPAND)
- View displays that are refreshed in a user-defined cycle
- Invoke an analyzer display from an MAINVIEW AutoOPERATOR EXEC
- Invoke a new display from the current display
- Print a screen image automatically to the online BBI-SS PAS Image log, the TS Image log, or your BBISPRNT data set

These display request and logging methods are described in the following sections.

Selecting a Service(s) for Display

You can request an analyzer display by:

- Selecting one or more services from an analyzer service list

  Use the S line command from the Analyzer Display Services list application to select a service (see Chapter 6, “Displaying a List of Analyzer Services (Menu Option 1)” on page 67).

- EXPANDing from another display

  For displays with `<<EXPAND>>`, move the cursor to a row or column in the display and press ENTER to select:

  – A related analyzer display

  – More detailed information about a data row in the display

  For displays with an `EXPAND:` selection line, move the cursor to a field in the selection line and press ENTER to select:

  – A related analyzer display

  – More detailed information for the first data row in the display

- Setting up displays for timed, cyclic refresh

  Select Option C, CYCLE SETUP, from the Primary Option Menu to set up a continuous timed cycle of refreshable displays (see the *Using MAINVIEW* manual for more information).

- Invoking an analyzer display from an MAINVIEW AutoOPERATOR EXEC

  Write an EXEC that invokes a resource analyzer service (MAINVIEW AutoOPERATOR must be installed). Use the IMFEXEC IMFC command followed by the service name, optional parameters, and an identifier for the target system; for example:

  ```
  IMFEXEC IMFC TRANQ TARGET=IMS
  ```

  The display data is returned in the predefined &LINE04 - &LINE43 variables to assist in making informed automation decisions.

- Invoking an analyzer display from a service display

  When viewing any display, you can overtype the values in the SERV and PARM fields to select any other display.

Logging an Analyzer Service Display

Service displays can be written to a data set for later viewing by:

- Logging a screen image to your BBISPRNT data set

  Press the PF4/16 key after the display is presented.

- Logging a display image record to your TS Image log

  Enter a Y in the LOG field of the display.

- Logging a display image record automatically at timer-driven intervals to your BBI-SS PAS Image log

  Use the:

  – I line command in the list of Analyzer Display Services as described in Chapter , “Start Image Log Request (I Line Command)” on page 71

BBSAMP member SLOGJCL can be used to create a hardcopy of BBISPRNT. BBSAMP member ILOGJCL can be used to create a hardcopy of the Image log records.

Note: BBISPRNT contains only screen images, while the Image log records contain the complete data produced by the display request, even when the data has been produced by scrolling through multiple screens.

Stopping an Analyzer Image Log Request

BBI-SS PAS timer-driven Image log requests can be stopped by:

- Purging the request from the Active Timer list application

  Use the P line command from the Active Timer list, as described in the chapter called "Displaying a List of Active Timer Requests" in *Monitors and Traces Reference Manual*.

- Using a SET request as described in *Monitors and Traces Reference Manual*

  – Purge the request

    Issue a purge (PRG) with a SET request from the Service Display panel, BBPARM (see "Grouping Requests" on page 62), or an MAINVIEW AutoOPERATOR EXEC IMFC command (MAINVIEW AutoOPERATOR must be installed); for example:

    ```
    SET
    PRG=reqid|ALL
    ```

  – Stop the request automatically

    Use the STOP or STOPCNT parameter with the SET request from the Service Display panel or an MAINVIEW AutoOPERATOR EXEC; for example:

    ```
    SET
    REQ=TRANQ,I=00:05:00,START=24:00:00,STOP=06:00:00
    ```

Qualifying an Analyzer Request

Requests for multiple transactions or terminals with similar names can be made by using a + or * character as a name qualifier. The * character is used generically and the + character is used positionally. As a generic resource name qualifier, the * cannot be followed by any other character. As a positional qualifier, the + must be repeated for every character to be replaced.

For example, selecting TRANQ (Primary Option Menu 1) and entering the following in the PARM field:

```
PARM ==> START=PAY*,NONZERO
```

Is a request to display transaction codes with one or more messages queued for processing and to start with transaction codes that begin with PAY.

Entering the following in a service display panel:

```
SERV ==> TRANQ
PARM ==> TRAN=PA++T
```

Shows the transaction queue status of all transaction codes that begin with PA and end with T.

Selecting OSTAT (Primary Option Menu 1) and entering the following in the PARM field of the display:

```
PARM ==> LTERM=*,NONZERO
```

Shows all LTERMs with queued messages.

Qualifiers can be used when making workload status display requests with the following parameters:

Parameter	**Status Display Service**
LTERM	ISTAT, OSTAT
TRAN	TRANQ

Chapter 8. Resource Analyzer Services (Quick Reference)

The following table is an alphabetical list of all the Resource Analyzer services and their parameters, with page references to a more detailed description about their use. See Chapter 6, "Displaying a List of Analyzer Services (Menu Option 1)" on page 67 for a complete description of the analyzer display services.

Table 3. Resource Analyzer Service Select Codes

Service Select Code	Parameter	See
APPCA	[,CLS=nnn ,CONVID=hex ,D=I|O ,LU=name ,Q>n ,RGN=nnn ,TR=trancode ,US=id ,XON ,SO=cc]	"APPCA - APPC Activity Summary" on page 239
APPCL	[,D=I|O ,LU=name ,Q>n ,XON ,SO=cc]	"APPCL - APPC LU Status" on page 248
BALGQ	[regionnum]	"BALGQ - BALG Queuing" on page 96
CLASQ	[regionnum]	"CLASQ - Class Queuing" on page 103
DAPPC	[,CONVID=hex]	"DAPPC - Input Allocation Direction" on page 255 "DAPPC - Output Allocation Direction" on page 260
DBST		"DBST - OSAM Global Pool Statistics" on page 221
DBST	subpoolnum	"DBST - OSAM Subpool Statistics" on page 225
DLIST	[regionnum]	"DLIST - DL/I Call Status" on page 120
DLTCH	[genltch-id,H|W]	"DLTCH - Latch Detail" on page 264
DMBUT	[iteratnnum]	"PSBUT, DMBUT - PSB and DMB Pool Utilization" on page 110
DPOOL	{poolname}	"DPOOL - Detail Pool (Non-CBT Fixed Pool)" on page 268 "DPOOL - Detail Pool (Non-CBT Variable Pool)" on page 274

Table 3. Resource Analyzer Service Select Codes (continued)

Service Select Code	Parameter	See
DREGN	`[regionnum]`	"DREGN - Region Detail (Event Collector Data)" on page 127 "DREGN - Region Detail (No Event Collector Data)" on page 147
DSPST	`[regionnum]`	"DSPST - Dispatcher Statistics" on page 305
FPBST		"FPBST - Fast Path Buffer Pool Statistics" on page 229
IRLM		"IRLM - IRLM IMS Status (IRLM 1.5)" on page 313
IRLM		"IRLM - IRLM IMS Status (IRLM 2.1 and Later)" on page 354
IRLMG		"IRLMG - IRLM GLOBAL STATUS (IRLM 1.5)" on page 319
IRLMG		"IRLMG - IRLM GLOBAL STATUS (IRLM 2.1 and Later)" on page 361
LATCH	`[SORT|SO]`	"LATCH - Latch Summary" on page 278
LCRES		"LCRES - IRLM Lock Contention by Resource (IRLM 1.5)" on page 328
LCUSR		"LCUSR - IRLM Lock Contention by User (IRLM 1.5)" on page 335
LHRES		"LHRES - IRLM Locks Held by Resources (IRLM 1.5)" on page 337
LHUSR		"LHUSR - IRLM Locks Held by User (IRLM 1.5)" on page 344
LCRES		"LCRES - IRLM Lock Contention by Resource (IRLM 2.1)" on page 371
LCUSR		"LCUSR - IRLM Lock Contention by User (IRLM 2.1)" on page 379
LHRES		"LHRES - IRLM Locks Held by Resources (IRLM 2.1)" on page 381
LHUSR		"LHUSR - IRLM Locks Held by User (IRLM 2.1)" on page 388
LOGST		"LOGST - Log Statistics" on page 285
LUSRD	`[regionnum]`	"LUSRD - IRLM Lock User Detail (IRLM 1.5)" on page 346
MFSST		"MFSST - MFS Statistics" on page 83

Table 3. Resource Analyzer Service Select Codes (continued)

Service Select Code	Parameter	See
MFSUT	[iteratnnum]	“MFSUT - MFS Pool Utilization” on page 87
PI	[regionnum]	“PI - Program Isolation” on page 290
POOLC	[poolid]	“POOLC - Pool Summary (CBT)” on page 294
POOLS	[TYPE=ALL|VAR|FIX]	“POOLS - Pool Summary (Non-CBT Variable and Fixed Pools)” on page 297
PSBUT	[iteratnnum|CSA]	“PSBUT, DMBUT - PSB and DMB Pool Utilization” on page 110
QUEST		“QUEST - Queue Statistics” on page 89

Table 3. Resource Analyzer Service Select Codes (continued)

Service Select Code	Parameter	See
REGNS	[,#D<nnn|>nnn|=nnn ,AC=nnn|(nnn,..) ,AGN=xxxxxxxx ,CK<nnn|>nnn|=nnn when 'dbctlugr' delete ,C1=nnn ,C2=nnn ,C3=nnn ,C4=nnn ,CLA=nnn|(nnn,..) ,CN<nnn|>nnn|=nnn ,D2<nnn|>nnn|=nnn ,DD<nnn|>nnn|=nnn ,DL<nnn|>nnn|=nnn ,DT<nnn|>nnn|=nnn ,DY<nnn|>nnn|=nnn ,GN<nnn|>nnn|=nnn ,GU<nnn|>nnn|=nnn ,HN<nnn|>nnn|=nnn ,HU<nnn|>nnn|=nnn ,IO<nnn|>nnn|=nnn ,ID<nnn|>nnn|=nnn ,IS<nnn|>nnn|=nnn ,I2<nnn|>nnn|=nnn ,LO<nnnn|>nnnn|=n nnn ,LT=xxxxxxxx ,MD<nnn|>nnn|=nnn ,MG<nnn|>nnn|=nnn ,MI<nnn|>nnn|=nnn ,MP<nnn|>nnn|=nnn ,NA=xxxxxxxx ,NI ,OP<nnn|>nnn|=nnn ,OT<nnn|>nnn|=nnn ,PL<nnnn|>nnnn|=n nnn ,PS=xxxxxxxx ,QU<nnn|>nnn|=nnn ,RE<nnn|>nnn|=nnn ,SE<nnn|>nnn|=nnn ,SO=cc ,SQ<nnnn|>nnnn|=n nnn ,ST=xxxxxxxx ,TO<nnn|>nnn|=nnn ,T2<nnn|>nnn|=nnn ,TR=xxxxxxxx ,TE<nnn|>nnn|=nnn ,TY=xxx ,U2<nnn|>nnn|=nnn ,US=xxxxxxxx ,V=SM|DLI|DB2]	"REGNS - IMS Regions (No Event Collector Data)" on page 190

Table 3. Resource Analyzer Service Select Codes (continued)

Service Select Code	Parameter	See
REGNS	[,AC=nnn|(nnn,..) ,AGN=xxxxxxxx ,C1=nnn ,C2=nnn ,C3=nnn ,C4=nnn ,CLA=nnn|(nnn,..) ,DL<nnn|>nnn|=nnn ,DT<nnn|>nnn|=nnn ,EL<nnn|>nnn|=nnn ,FP<nnn|>nnn|=nnn ,GN<nnn|>nnn|=nnn ,GU<nnn|>nnn|=nnn ,HN<nnn|>nnn|=nnn ,HU<nnn|>nnn|=nnn ,ID<nnn|>nnn|=nnn ,IS<nnn|>nnn|=nnn ,LO<nnnn|>nnnn|=n nnn ,LT=xxxxxxxx ,MD<nnn|>nnn|=nnn ,MG<nnn|>nnn|=nnn ,MI<nnn|>nnn|=nnn ,MP<nnn|>nnn|=nnn ,NA=xxxxxxxx ,NI ,PR<nnnn|>nnnn|=n nnn ,PS=xxxxxxxx ,QU<nnn|>nnn|=nnn ,RE<nnn|>nnn|=nnn ,SO=cc ,ST=xxxxxxxx ,TO<nnn|>nnn|=nnn ,TR=xxxxxxxx ,TY=xxx ,US=xxxxxxxx ,V=SM|DLI|DB2]	"REGNS - IMS Regions (No Event Collector Data)" on page 190
RS	[regionnum]	"RS - Real Storage" on page 309
SCHED	[regionnum]	"SCHED - Scheduling Statistics" on page 113
STAT/ STATR	[regionnum]	"STAT/STATR - System Status" on page 211
VSST		"VSST - VSAM Global Pool Statistics" on page 232
VSST	subpoolnum	"VSST - VSAM Subpool Statistics" on page 235

Chapter 9. Message Format Service Displays

This chapter describes the displays that show resource status, activity, and performance as transactions are entered from user terminals and are mapped to internal message formats by MFS.

MFSST - MFS Statistics

```
BMC SOFTWARE --------------     MFS STATISTICS      -----------PERFORMANCE MGMT
SERV ==> MFSST            INPUT   12:40:46  INTVL=> 3  LOG=> N  TGT==> IMS81X
PARM ==>                                                          SCROLL=> N/A
       MFS POOL SPACE                        MFS DATA SET
   49,152 TOTAL POOL SPACE        DEVICE  VOLUME  USE  RES  SHR   DEVN
   47,696 DYNAMIC POOL SPACE       3390   BAB309  PRI  PRM  SHR   835E

       30 STATIC FRE(S)                  26 STATIC FRE(S) ASSIGNED
        0 BLOCK(S) WASHED FOR FRE         1 STATIC FRE(S) ACTIVE

                            MFS REQUEST STATISTICS
      391 PRE-FETCH REQUEST(S)          234 PRE-FETCH REQUEST(S) IGNORED
      898 IMMEDIATE REQUEST(S)            0 FREE BLOCK REQUEST(S) IGNORED
      652 FREE BLOCK REQUEST(S)

       25 DIRECTORY READ(S)               0 $$IMSDIR ENTRY(IES)
       19 IMMEDIATE BLOCK READ(S)         6 REQUEST(S) WITHOUT DIRECTORY ENTRY
                                          0 I/O ERROR(S) POINT OR READ

- - - REQUESTS - - -                       - - - - - FRE LOCATED ON  - - - - -
  TYPE        NUMBER                      IMMEDIATE QUEUE    FREE BLOCK QUEUE
PRE-FETCH        391                            0    0%           207   53%
IMMEDIATE        898                           64    7%           762   85%
FREE BLOCK       652                          652  100%
```

Description: This display shows the current MFS configuration and MFS activity statistics since IMS restart. These counters are incremented by MFS when measured events occur.

Select Code: MFSST

Parameter: None

Field Descriptions: Each of the fields is shown and described below by display area.

Area 1

```
       MFS POOL SPACE
   49,152 TOTAL POOL SPACE
   47,696 DYNAMIC POOL SPACE
```

This area shows total MFS pool space and the dynamic MFS pool space. The descriptions are arranged in alphabetical order.

DYNAMIC POOL SPACE
: Pool space available for format blocks.

TOTAL POOL SPACE

The DYNAMIC POOL SPACE plus the overhead space required by directory blocks, FREs, statistics counters, in-core directory entries, and the like.

```
Area 2

                                        MFS DATA SET
                                DEVICE  VOLUME  USE  RES  SHR   DEVN
                                 3390   BAB309  PRI  PRM  SHR   835E
```

This area displays information about the first extent of the MFS data set. The descriptions are arranged in alphabetical order.

DEVICE

The device type on which the MFS data set is stored. If `?DEVT?` appears, it indicates an unknown DASD device type. If `?UNIT?` appears, it indicates an unsupported device type. BMC Software should be contacted to include these device types.

DEVN

The address of the volume containing the MFS data set.

RES

The residency status of the volume containing the MFS data set. RES can be SYS (system resident), PRM (permanently resident), RSV (reserved), or RMV (removable).

SHR

Whether the MFS data set is on shared DASD. The column is blank if it is not and SHR if it is.

USE

The USE attribute. USE can be either PRI (private), PUB (public), or STO (storage).

VOLUME

The name of the volume containing the MFS data set.

```
Area 3

       30 STATIC FRE(S)                  26 STATIC FRE(S) ASSIGNED
        0 BLOCK(S) WASHED FOR FRE         1 STATIC FRE(S) ACTIVE
```

This area shows the existing allocation of fetch request elements (FREs). The descriptions are arranged in alphabetical order.

BLOCKS WASHED FOR FRE

The number of times since IMS restart that an MFS block was washed from the dynamic pool to release an FRE.

STATIC FRE(S)

The total number of FREs, defined at IMS restart.

STATIC FRE(S) ACTIVE
The number of assigned FREs being actively used, either prefetch or immediate.

STATIC FRE(S) ASSIGNED
The number of FREs actually assigned to controlling a block.

```
Area 4

                          MFS REQUEST STATISTICS
      391 PRE-FETCH REQUEST(S)          234 PRE-FETCH REQUEST(S) IGNORED
      898 IMMEDIATE REQUEST(S)            0 FREE BLOCK REQUEST(S) IGNORED
      652 FREE BLOCK REQUEST(S)
```

This area shows the MFS request statistics accumulated since IMS restart. The descriptions are arranged in alphabetical order.

FREE BLOCK REQUEST(S)
The number of times that the MFS pool handler is informed that a format block is no longer actively being referenced and is now a candidate for being washed from the pool if space is needed for another request.

FREE BLOCK REQUEST(S) IGNORED
The number of times that a free block request has been ignored because of IMS internal problems.

IMMEDIATE REQUEST(S)
The actual need for a block. If the requested block is in the pool, processing continues. If it is not, space must be obtained in the pool and the block must be located and read into the pool from the MFS data set.

PRE-FETCH REQUEST(S)
Requests that anticipate future needs for particular format blocks.

PRE-FETCH REQUEST(S) IGNORED
Prefetch requests are not required to continue processing and can be ignored by MFS. For example, this counter is incremented when the prefetch request is ignored because no FRE is available. In this case, the prefetch request count is currently not being incremented, causing an apparent imbalance between these two values. This counter is also incremented when PRE-FETCH is turned off.

```
Area 5

       25 DIRECTORY READ(S)               0 $$IMSDIR ENTRY(IES)
       19 IMMEDIATE BLOCK READ(S)         6 REQUEST(S) WITHOUT DIRECTORY ENTRY
                                          0 I/O ERROR(S) POINT OR READ
```

This area shows the physical I/O required for request processing. The descriptions are arranged in alphabetical order.

$$IMSDIR ENTRIES
The number of entries in the MFS in-core format index.

DIRECTORY READS
The number of directory reads.

IMMEDIATE BLOCK READ(S)
The number of immediate block reads.

I/O ERROR(S) POINT OR READ
The number of I/O errors.

REQUEST(S) WITHOUT DIRECTORY ENTRY
The number of invalid format requests.

```
Area 6

- - - REQUESTS - - -                        - - - - - FRE LOCATED ON  - - - - -
  TYPE        NUMBER                        IMMEDIATE QUEUE    FREE BLOCK QUEUE
PRE-FETCH        391                                0    0%           207   53%
IMMEDIATE        898                               64    7%           762   85%
FREE BLOCK       652                              652  100%
```

This area contains counters, in a matrix format, that are incremented when an FRE is found on any of the internal MFS queues. Each row illustrates a different request type and each column represents a different queue on which the FRE was found.

The descriptions are arranged in alphabetical order.

FREE BLOCK
Free block requests.

FREE BLOCK QUEUE
The free block queue consists of blocks still in the pool, but not currently being used. The actual count and the percentage of requests located in this queue for each request type are displayed.

IMMEDIATE
Immediate requests.

IMMEDIATE QUEUE
The immediate queue consists of blocks already in the pool or requests that a block be loaded into the pool immediately. The actual count and the percentage of requests located in this queue for each request type are displayed.

NUMBER
The actual count of the request type.

PRE-FETCH
Pre-fetch requests.

MFSUT - MFS Pool Utilization

```
BMC SOFTWARE  --------------- MFS POOL UTILIZATION ---------- PERFORMANCE MGMT
SERV ==> MFSUT           INPUT   13:21:09  INTVL=> 3  LOG=> N   TGT==>  IMS22X
PARM ==>                                                       SCROLL => N/A
                MFS BLOCK SPACE                     MFS FREE SPACE
BLOCKS MINIMUM AVERAGE MAXIMUM  TOTAL   BLOCKS MINIMUM AVERAGE MAXIMUM  TOTAL
                        -- CURRENT VALUES --
   97       64     621   5,512  60,264     42        8     193   1,336   8,128
                       -- SIMULATED RELEASE --
   95       64     622   5,512  59,160     42        8     219   1,368   9,232
   94       64     622   5,512  58,528     42        8     234   2,000   9,864
   87       64     604   5,512  52,592     41       16     385   3,504  15,800
   82       64     521   3,565  42,752     41       16     625   5,608  25,640
   81       64     520   3,656  42,176     40       16     655   7,520  26,216
   78       64     431   2,752  33,648     39       16     890   7,912  34,744
   64       72     375   2,248  24,056     40       16   1,108  11,464  44,336
   62       72     354   2,248  22,008     41       16   1,131  12,888  46,384
   16      104     464   2,248   7,432     15       64   4,064  14,232  60,960
   13      104     456   2,248   5,936     12       64   5,204  21,528  62,456
    8      104     599   2,248   4,792      8       64   7,950  24,808  63,600
    4      104     652   2,248   2,608      5       64  13,156  49,952  65,784
    2      104   1,176   2,248   2,352      3       64  22,013  58,056  66,040
```

Description: This display shows the current status of the MFS pool: the number of resident blocks, the remaining free space and the fragmentation. The MFS pool is managed by the least-recently-referenced method.

CURRENT VALUES
: This line shows the current status of the pool.

SIMULATED RELEASE
: Each line shows the results of a simulated iteration of the space release algorithm that is used by IMS to free space for a new block. The number of iteration lines displayed depends on the parameter option chosen.

Select Code: MFSUT

Parameter: Enter 0 to display every iteration of the space release algorithm.

Enter 1 or blank (no entry) to display each iteration that causes an increase in the size of the maximum free space.

Enter 2 through 9 to display every second to ninth increase in maximum free space.

Field Descriptions: Following are the field descriptions by “MFS BLOCK SPACE” grouping and “MFS FREE SPACE” grouping. The descriptions are arranged alphabetically within their group:

MFS BLOCK SPACE

AVERAGE	The average block length.
BLOCKS	The number of allocated blocks.
MAXIMUM	The length of the largest allocated block.
MINIMUM	The length of the smallest allocated block.
TOTAL	The total length of all allocated blocks.

MFS FREE SPACE

AVERAGE	The average length of the free spaces in the pool.
BLOCKS	The number of free spaces in the pool.
MAXIMUM	The length of the largest free space in the pool.
MINIMUM	The length of the smallest free space in the pool (indicative of fragmentation).
TOTAL	The total length of all free spaces in the pool.

If less than 18 lines appear, the last line shows the total blocks that are still in use and cannot be released. Therefore, the free space is the maximum available at this point.

Chapter 10. Queuing Displays

This chapter describes the displays that show resource status, activity, and performance as transactions are queued for processing.

QUEST - Queue Statistics

```
BMC SOFTWARE  ---------------- QUEUE STATISTICS ----------- PERFORMANCE MGMT
SERV ==> QUEST           INPUT   13:21:09  INTVL=> 3  LOG=> N   TGT==>  IMSA
PARM ==>                                                        SCROLL => N/A
   QUEUE POOL           NUM              QUEUE DATA SETS
  SIZE  BUFFERS    DD    DS BLKSIZE  LRECL  DEV   VOLUME  USE RES  SHR DEVN
192,512       80  QBLKS   1  2,496      48  3380  BBSYSO  PRI PRM  SHR 01A0
                  SHORT  10  2,496     192  3380  BBSYSO  PRI PRM  SHR 01A0
                  LONG    8  2,496   2,496  3380  BBSYSO  PRI PRM  SHR 01A0

                           QUEUE MANAGER REQUESTS
      101,123 TOTAL REQUESTS           13,340 ENQUEUES
                                        2,940 DEQUEUE/DELETES
          371 REPOSITIONS               1,379 CANCELS

                       QUEUE BUFFER MANAGER REQUESTS
       52,878 LOCATES                  23,114 RELEASES
      140,725 LOCATE & ALTERS               8 PURGES
                                      62,855 TRANSLATIONS

       13,947 READS                         0 WAITS FOR AN AVAILABLE BUFFER
       10,801 WRITES - TOTAL              115 WAITS FOR OTHER DECB TO READ
          349 WRITES - PURGE              130 WAITS FOR OTHER DECB TO WRITE
                                           42 WAITS FOR PURGE
          123 PCBS UNCHAINED                0 WAITS FOR BUFFER ENQ/DEQ
```

Description: Displays the configuration of the queue data sets, the queue pool, and statistics maintained by the IMS queuing routines since restart.

Select Code: QUEST

Parameter: None

Field Descriptions: Each of the fields is shown and described below by display area.

Area 1

```
                                QUEUE DATA SETS
               NUM
          DD    DS BLKSIZE  LRECL  DEV   VOLUME  USE RES  SHR DEVN
        QBLKS   1  2,496      48  3380  BBSYSO  PRI PRM  SHR 01A0
        SHORT  10  2,496     192  3380  BBSYSO  PRI PRM  SHR 01A0
        LONG    8  2,496   2,496  3380  BBSYSO  PRI PRM  SHR 01A0
```

This area describes the placement of the three queue data sets. The descriptions are arranged in alphabetical order.

BLKSIZE
: Block size of the queue data sets.

DD
: Name of the queue type.

LRECL
: Logical record length of the queue data sets.

The following columns in Area 1 represent the information for the first data set of a queue type when more than one data set is defined for that queue type:

DEV
: The device type where the queue data set is stored. If `?DEVT?` appears, it indicates an unknown DASD device type. If `?UNIT?` appears, it indicates an unsupported device type. BMC Software should be contacted to include these device types.

DEVN
: The device number of the volume containing the queue data set.

NUM DS
: Number of data sets defined for this queue type. This number is 1 for a QBLKS data set and can be up to 10 for short or long message queue data sets.

RES
: The residency status of the volume containing the queue data set. RES can be SYS (system resident), PRM (permanently resident), RSV (reserved), or RMV (removable).

SHR
: Whether the queue data set is on shared DASD. The column is blank if it is not and SHR if it is.

VOLUME
: The name of the volume containing the queue data set.

USE
: The USE attribute. USE can be PRI (private), PUB (public), or STO (storage).

Area 2

```
  QUEUE POOL
 SIZE  BUFFERS
 192,512     80
```

This area shows queue buffer size and availability. The descriptions are arranged in alphabetical order.

BUFFERS
: The number of queue buffers available for use by the IMS queuing routines.

SIZE
: The total size of the queue pool.

```
Area 3

                          QUEUE MANAGER REQUESTS
    101,123 TOTAL REQUESTS           13,340 ENQUEUES
                                      2,940 DEQUEUE/DELETES
        371 REPOSITIONS               1,379 CANCELS
```

This area shows the number of queue manager requests and the required action. The descriptions are arranged in alphabetical order.

CANCELS
: Used to complete a series of calls and to inform the queue manager that the message is no longer needed and must be removed without enqueuing.

DEQUEUE/DELETES
: Informs queue manager that one or more enqueued messages are no longer needed and must be removed from the queues.

ENQUEUES
: Completes a series of calls and informs the queue manager that the message is to be enqueued on the destination.

REPOSITIONS
: Requests to relocate a previously examined message segment.

TOTAL REQUESTS
: The total requests to the queue manager and several particular types of calls.

```
Area 4

                       QUEUE BUFFER MANAGER REQUESTS
      52,878 LOCATES                  23,114 RELEASES
     140,725 LOCATE & ALTERS               8 PURGES
                                      62,855 TRANSLATIONS
```

This area shows the number of queue manager calls to the queue buffer manager. The descriptions are arranged in alphabetical order.

LOCATES
: Number of calls to locate a logical record in a queue data set. This is always performed in anticipation of record retrieval.

LOCATE & ALTERS
: Number of calls to locate and alter a record in a queue data set. This is done when a logical record is to be either allocated or modified.

PURGES
: Number of purge requests. This causes all altered buffers to be written to their corresponding data set. This is performed for system checkpoint processing.

RELEASES
: Number of queue data set record releases performed after message dequeue.

TRANSLATIONS
: Number of main storage address to DRRN (data set location) translations.

```
Area 5

   13,947 READS
   10,801 WRITES - TOTAL
      349 WRITES - PURGE

      123 PCBS UNCHAINED
```

This area shows the amount of physical I/O activity generated by queuing. Activity to all three queue manager data sets is represented.

The descriptions are arranged in alphabetical order.

PCBS UNCHAINED
: The number of program (communication queue manager) PCBs that lost position because the queue buffer containing the message segment was written out. A queue manager reposition request must be issued before the transaction can continue.

Tuning Tip

If this number is excessive, performance may be enhanced by increasing the queue pool size.

READS
: Total number of reads.

WRITES-PURGE
: Number of writes for purge processing during checkpointing.

Tuning Tip

The difference between number of total writes and the number of writes for purge processing is the number of writes to make space in the pool. If this number is excessive, performance may be enhanced by increasing the queue pool size.

WRITES-TOTAL
: Total number of writes.

```
Area 6

                                          0 WAITS FOR AN AVAILABLE BUFFER
                                        115 WAITS FOR OTHER DECB TO READ
                                        130 WAITS FOR OTHER DECB TO WRITE
                                         42 WAITS FOR PURGE
                                          0 WAITS FOR BUFFER ENQ/DEQ
```

This area shows an analysis of some of the waits that can occur in queuing. The descriptions are arranged in alphabetical order.

WAITS FOR AN AVAILABLE BUFFER
: Number of waits for an available buffer.

WAITS FOR BUFFER ENQ/DEQ
: Number of waits for buffer enqueues and dequeues.

WAITS FOR OTHER DECB TO READ
: Number of waits for another DECB to read this buffer.

WAITS FOR OTHER DECB TO WRITE
: Number of waits for another DECB to write this buffer.

WAITS FOR PURGE
: Number of waits for purge.

Chapter 11. Scheduling Displays

This chapter describes the displays that show resource status, activity, and performance as programs are scheduled in the dependent regions to process transactions.

BALGQ - BALG Queuing

```
BMC SOFTWARE  ---------------- BALGQ QUEUING --------------- PERFORMANCE MGMT
SERV ==> BALGQ  INPUT   13:21:09  INTVL=> 3  LOG=> N   TGT==>  IMS22X
PARM ==>                                  <<EXPAND>>   SCROLL => N/A
******QUEUING SUMMARY******
   PROGRAM            DBFSAMP3
QUEUED TRANSACTIONS     0
NUMBER OF REGIONS       1




******REGION SUMMARY******
REGION         1        2        3        4        5
TYPE         MPP    M-WFI      MPP      MPP      MDP
STATUS      IDLE     IDLE     IDLE     IDLE     IDLE
PROGRAM          PHDAMINQ                  DBFSAMP3
CLASS
ENQ TIM
LTERM
PSB SIZ             1,464                     1,392
QUEUED                  0                         0
TOT DEQ               264                         0
ELAPSED 00:42:46 00:42:44 00:05:55 00:42:28 00:05:56
```

Description: This display presents an overview of the current status of transaction queuing and processing for Fast Path Balancing Groups (BALGs). Up to 12 BALGs can be displayed. If more than 12 are defined, the totals for all additional BALGs are combined with BALG number 12.

Select Code: BALGQ

Parameter: Region number

The parameter can be specified as:

Single Parameter:

If only one number is entered, it is used as the starting point of a sequential list of regions. If no parameter is entered, it defaults to the first region.

For example, if regions 1, 2, 3, 5, 6, 7, 8, 9 are active in IMS and you enter:

```
BALGQ
6
```

a region summary of the active regions is displayed in this order:

```
6 7 8 9 1 2 3 5
```

Ordered List of Regions:

Regions are listed in the order in which they are to be displayed.

- Individually, separated by commas
- As a range, separated by a dash
- A combination of the two above

For example, if regions 1, 2, 3, 5, 6, 7, 8, 9 are active in IMS and you enter:

```
BALGQ
5,2,8-1
```

a region summary of the active regions is displayed in this order:

```
5 2 8 9 1
```

If the starting and ending range are the same, only one region is displayed.

If the ending range is less than the starting range, the list wraps back to region 1 after displaying the highest active region.

Non-Idle Region Specification:

A zero in the list of regions causes only the non-idle regions to be displayed.

For example, if regions 1, 2, 3, 5, 6, 7, 8, 9 are active in IMS and only regions 4 and 5 are processing transactions, and you enter:

```
BALGQ
0,2-4,1,5
```

a region summary of the active regions is displayed in this order:

```
4 5
```

Expand: The DLIST service showing DL/I call details can be invoked for a particular region through cursor selection. Move the cursor to the column that describes the desired region and press ENTER. If the cursor is not in one of the eight columns that pertains to a region, an error message is returned. Use the END PF key to return to the BALGQ display.

DLIST displays the data from the system at the time it is invoked; it is not synchronized with the BALGQ display.

Field Descriptions: Each of the fields is shown and described below by display area.

```
Area 1

*****QUEUEING SUMMARY*****

   PROGRAM           DBFSAMP3
QUEUED TRANSACTIONS    0 N
UMBER OF REGIONS      1
```

This area shows the status of transaction queuing. The descriptions are arranged in alphabetical order.

NUMBER OF REGIONS
: The number of message-driven Fast Path regions processing that BALG.

PROGRAM
: The program name linked to that BALG.

QUEUED TRANSACTIONS
: The number of transactions queued to that BALG.

```
Area 2

******REGION SUMMARY******
REGION         1        2        3        4        5
TYPE         MPP    M-WFI      MPP      MPP      MDP
STATUS      IDLE     IDLE     IDLE     IDLE     IDLE
PROGRAM          PHDAMINQ                  DBFSAMP3
CLASS                   1
ENQ TIM
LTERM
PSB SIZ             1,464                      1,392
QUEUED                  0                          0
TOT DEQ               264                          0
ELAPSED 00:42:46 00:42:44 00:05:55 00:42:28 00:05:56
```

This area shows which transactions are currently being processed in the message regions and whether more are queued. If the status of a region is IDLE, no input belonging to any of its defined classes or its BALG is available.

The descriptions are arranged in alphabetical order.

CLASS
: The current class for non-Fast Path regions and the transaction routing code for Fast Path regions.

ELAPSED
: The elapsed time the region has been active (current time - region start time) expressed in hours, minutes and seconds (hh:mm:ss).

ENQ TIME
: Time when the transaction currently being processed was submitted in `hh:mm:ss`.

Note: This is the time of the originating terminal input transaction for message switches.

LTERM
: (This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

LTERM name of the terminal where the transaction being processed was submitted.

PROGRAM
: PSB name of the application program currently being processed.

PSB SIZE

The total space in bytes used by this program in the PSB pool. This may include the size of the PSB (if not resident), the intent list (if not resident), and a copy of the PDIR (PSB directory entry) if needed for parallel scheduling. If the PSB is resident and not parallel scheduled, this value is zero.

Note: This value includes the size of the PSB in the CSA pool.

QUEUED

(This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Number of currently queued input messages with this transaction code. For an MDP (Message-driven Program), the number of messages queued on this region's BALG.

REGION

Region identifier assigned to this region by IMS.

STATUS

Region status:

ACTIVE	Active in a nonspecific process.
ACTV-BKO	Region in dynamic backout.
ACTV-DB2	Active in DB2 (the Event Collector must be active).
ACTV-DBR	Region active in DBRC.
ACTV-DLI	Region active in DL/I.
ACTV-SCH	Region active in nonspecific CREATE THREAD process.
ACTV-USR	Region active in the application program.
IDLE	Region waiting for non-WFI input to process.
IDLE-HOT	Pseudo-WFI region waiting for input from the same transaction.
IDLE-WFI	Region waiting for WFI or Fast Path BALG input to process.
INACTIVE	Region defined but not started (not yet signed on).
OPENING	Region in first CREATE THREAD process.
SCH-BLR	Region in scheduling (active in block loader latch).
SCH-BLKM	Region in scheduling (active in block mover).
SCHDULE	Region in scheduling (CREATE THREAD).
TERMINAT	Region in region termination or abend.

WAIT-AOI	Region waiting for an AO message. Await for AO occurs when a region issues a GMSG call with the wait option and DFSAOE00 has no message to return to it at that time.
WAIT-BKO	Region currently in wait, but dynamic backout in progress.
WAIT-BLKM	Region waiting in block mover.
WAIT-BML	Region in scheduling (waiting for block mover latch). **Note:** The block mover latch comprises several smaller latches. To find which BML latch a region is waiting for, use the LATCH service.
WAIT-DLI	Region waiting for DL/I.
WAIT-INT	Region in scheduling (waiting for database intent).
WAITING	Region in nonspecific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see "LATCH - Latch Summary" on page 278.
WT-CMDP	Region waiting for a pending /DBD or /DBR command to complete.
WT-DBRC	Region waiting for DBRC.
WT-DMBP	Region in scheduling (waiting for DMB pool).
WT-EPCB	Region in scheduling (waiting for EPCB pool).
WT-IRLM	Region waiting for IRLM.
WT-ISWCH	Region did ISWITCH and is waiting in IMS dispatcher.
WT-NTFY	Region waiting for asynchronous notify(s) to complete (IRLM must be active). An asynchronous notify could be buffer invalidation, for example.
WT-OSAM	Region waiting for OSAM.
WT-PI	Region waiting for a program isolation lock to be freed.
WT-PSBP	Region waiting for PSB pool.
WT-PSBW	Region waiting for PSBW pool.
WT-SCHD	Region waiting in a nonspecific CREATE THREAD process.
WT-VSAM	Region waiting in VSAM.

WTF-ADSC Region waiting in Fast Path for ADSC directory latch (DEDB area data sets).

WTF-AREA Region waiting in Fast Path for DEDB area lock.

WTF-DEDB Region waiting in Fast Path for DEDB ownership.

WTF-DMSH Region waiting in Fast Path for DMAC share latch (DEDB area).

WTF-DMSY Region waiting in Fast Path for DMAC synchronization latch (DEDB area).

WTF-FBFR Region waiting in Fast Path for FIX buffer (DEDB).

WTF-FCMD Region waiting in Fast Path for FNCB (Fast Path command) latch.

WTF-MSDB Region waiting in Fast Path for MSDB latch.

WTF-OBA Region waiting in Fast Path for overflow buffer interlock.

WTF-OCL Region waiting in Fast Path for open/close latch.

WTF-RSL Region waiting in Fast Path for resource latch.

WTF-SEG Region waiting in Fast Path for MSDB segment.

WTF-SYNC Region waiting in Fast Path for synchronization latch.

Note: A # character in place of the - character in a status indicates activity resulted from an IMS data capture exit (user exit for data propagation and site requirements) instead of the application program. For example, if a data capture exit made a request that is waiting for a program isolation lock, the STATUS field shows WT#PI rather than WT-PI. For more information about data capture exits, see the IBM System Administration Guide publication.

The Event Collector must be active to obtain the data capture exit status when the exit issues a DB2 call.

TOT DEQ

(This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

The total number of messages with this transaction code processed since the last IMS cold start. For MDPs, the number of messages dequeued off this region's BALG.

Note: This counter wraps to zero after reaching 32K.

TYPE

Type of region processing the transaction:

BMI	Batch message processing region currently executing an implicit APPC/IMS transaction.
BMP	Batch message processing region.
BMW	Wait for input BMP.
CON	Conversational MPP region.
DBT	DBCTL (CICS attachment) region.
FPU	Fast Path utility regions.
MDP	Message-driven Fast Path region.
MPI	Message processing region currently executing an implicit APPC/IMS transaction.
MPP	Message processing regions.
MPW	Wait for input MPP.
NDP	Non-message-driven Fast Path region.
TPI	Message processing region currently executing an explicit CPI-C program.

CLASQ - Class Queuing

```
BMC SOFTWARE  ---------------- CLASS QUEUING ------------- PERFORMANCE MGMT
SERV ==> CLASQ           INPUT   13:21:09  INTVL=> 3  LOG=> N   TGT==>  IMS22X
PARM ==>                                              <<EXPAND>>   SCROLL => N/A
******QUEUING SUMMARY******
   CLASS             001  002  003  004  005  006  007  008  009  010
QUEUED TRANSACTIONS    0   75    2    9    1    1    5   23    0    0
SCHEDULABLE            0    0    2    9    1    1    5   15    0    0
TRANSACTION CODES      0    0    1    3    1    1    2    1    0    0
   CLASS             011  012  013  014  015  016  017  018  019  020
QUEUED TRANSACTIONS    0   75    2    9    1    1    5   23    0    0
SCHEDULABLE            0    0    2    9    1    1    5   15    0    0
TRANSACTION CODES      0    0    1    3    1    1    2    1    0    0
******REGION SUMMARY******
REGION         1        2        3        4        5        6
TYPE     BMP-WFI  BMP-WFI      MPP      MPP      MPP      BMP
STATUS   WAITING ACTV-DLI     IDLE ACTV-USR  SCH-BLR ACTV-USR
CLS 1/2 ........ ........ ..1...2< ..1...2< ..5...6. ........
CLS 3/4 ........ ........ ..3...4. ..3...4. ..7...8. ........
TRANCD   GIS      WRM              SM421000 DFK00155 LMZ200XX
ENQ TIM  14:25:44 14:32:40         14:31:48  0:00:00
PRIORTY         0        0                4        6        0
QUEUED          0        1                2        1        0
LIMIT                                    50        1
MSG DEQ        15    1,485               10        0        7
```

Description: This display presents an overview of the current status of transaction queuing and processing.

Select Code: CLASQ

Parameter: Region number. The parameter can be specified as:

Single Parameter:

If only one number is entered, it is used as the starting point of a sequential list of regions. If no parameter is entered, it defaults to the first region.

For example, if regions 1, 2, 3, 5, 6, 7, 8, 9 are active in IMS and you enter:

```
CLASQ
6
```

a region summary of the active regions is displayed in this order:

```
6 7 8 9 1 2 3 5
```

Ordered List of Regions:

Regions are listed in the order that they are to be displayed.

- Individually, separated by commas
- As a range, separated by a dash
- A combination of the two above

For example, if regions 1, 2, 3, 5, 6, 7, 8, 9 are active in IMS and you enter:

```
CLASQ
5,2,8-1
```

a region summary of the active regions is displayed in this order:

```
5 2 8 9 1
```

If the starting and ending range are the same, only one region is displayed.

If the ending range is less than the starting range, the list wraps back to region 1 after displaying the highest active region.

Non-Idle Region Specification:

A zero in the list of regions causes only the non-idle regions to be displayed.

For example, if regions 1, 2, 3, 5, 6, 7, 8, 9 are active in IMS and only regions 4 and 5 are processing transactions, and you enter:

```
CLASQ
0,2-4,1,5
```

a region summary of the active regions is displayed in this order:

```
 4 5
```

EXPAND: The DLIST service showing DL/I call details can be invoked for a particular region through cursor selection. Move the cursor to the column that describes the desired region and press ENTER. If the cursor is not in one of the eight columns that pertains to a region, an error message is returned. Use the END PF key to return to the CLASQ display.

DLIST displays the data from the system at the time it is invoked; it is not synchronized with the CLASQ display.

Field Descriptions: Each of the fields is shown and described below by display area.

Area 1

```
******QUEUING SUMMARY******
   CLASS             001  002  003  004  005  006  007  008  009  010
QUEUED TRANSACTIONS    0   75    2    9    1    1    5   23    0    0
SCHEDULABLE            0    0    2    9    1    1    5   15    0    0
TRANSACTION CODES      0    0    1    3    1    1    2    1    0    0
   CLASS             011  012  013  014  015  016  017  018  019  020
QUEUED TRANSACTIONS    0   75    2    9    1    1    5   23    0    0
SCHEDULABLE            0    0    2    9    1    1    5   15    0    0
TRANSACTION CODES      0    0    1    3    1    1    2    1    0    0
```

This area summarizes transaction queuing. The descriptions are arranged in alphabetical order.

CLASS
: Transaction class.

QUEUED TRANSACTIONS
: The number of transactions queued.

SCHEDULABLE
: The number of transactions available for scheduling. (The transaction is not locked, stopped, or priority zero.)

TRANSACTION CODES
: The number of different transaction codes represented in each class queue (counted only if schedulable).

Note: If more than 20 classes are defined, the counts for the excess classes are included with class 20.

```
Area 2

******REGION SUMMARY******
REGION         1        2        3        4        5        6
TYPE     BMP-WFI  BMP-WFI      MPP      MPP      MPP      BMP
STATUS   WAITING ACTV-DLI     IDLE ACTV-USR  SCH-BLR ACTV-USR
CLS 1/2 ........ ........ ..1...2< ..1...2< ..5...6. ........
CLS 3/4 ........ ........ ..3...4. ..3...4. ..7...8. ........
TRANCD   GIS      WRM             SM421000 DFK00155 LMZ200XX
ENQ TIM  14:25:44 14:32:40        14:31:48  0:00:00
PRIORTY         0        0                4        6        0
QUEUED          0        1                2        1        0
LIMIT                                    50        1
MSG DEQ        15    1,485               10        0        7
```

This area shows which transactions are currently being processed in the message regions and what other classes the regions can accept for processing. If the status of a region is IDLE, no input belonging to any of its defined classes is available.

The descriptions are arranged in alphabetical order.

For the following fields, CL1 through CL4, the current active class is shown by a < character following the class:

CL1
: (This field does not apply for a TYP of DBT and for all Fast Path types, including MDP and NDP.)

The first class this MPP can process.

CL2
: (This field does not apply for a TYP of DBT and for all Fast Path types, including MDP and NDP.)

The second class this MPP can process.

CL3

(This field does not apply for a TYP of DBT and for all Fast Path types, including MDP and NDP.)

The third class this MPP can process.

CL4

(This field does not apply for a TYP of DBT and for all Fast Path types, including MDP and NDP.)

The fourth class this MPP can process.

ENQ TIM

Time when the transaction currently being processed was submitted (`hh:mm:ss`).

Note: This is the time of the originating terminal input transaction for message switches.

LIMIT

(This field does not apply for a TYP of DBT or an IMS DBCTL system.)

Processing limit count (PROCLIM) of the transaction. Number of transactions that can be processed by this program in one scheduling. If it is unlimited, this field is blank.

M-DEQ

(This field does not apply for a TYP of DBT or an IMS DBCTL system.)

The number of messages successfully processed by the application program in this scheduling. For MDPs (message-driven program), this value is 0.

PRIORITY

Priority of the transaction currently being processed.

QUEUED

(This field does not apply for a TYP of DBT or an IMS DBCTL system.)

Number of currently queued input messages with this transaction code. For an MDP, this is the number of messages queued on the regions's BALG.

REGION

Region identifier assigned to this region by IMS.

STATUS

Region status:

ACTIVE	Active in a nonspecific process.
ACTV-BKO	Region in dynamic backout.
ACTV-DB2	Active in DB2 (Event Collector must be active).
ACTV-DBR	Region active in DBRC.
ACTV-DLI	Region active in DL/I.

ACTV-SCH	Region active in nonspecific CREATE THREAD process.
ACTV-USR	Region active in the application program.
IDLE	Region waiting for non-WFI input to process.
IDLE-HOT	Pseudo-WFI region waiting for input from the same transaction.
IDLE-WFI	Region waiting for WFI or Fast Path BALG input to process.
INACTIVE	Region defined but not started (not yet signed on).
OPENING	Region in first CREATE THREAD process.
SCH-BLR	Region in scheduling (active in block loader latch).
SCH-BLKM	Region in scheduling (active in block mover).
SCHDULE	Region in scheduling (CREATE THREAD).
TERMINAT	Region in region termination or abend.
WAIT-AOI	Region waiting for an AO message. Await for AO occurs when a region issues a GMSG call with the wait option and DFSAOE00 has no message to return to it at that time.
WAIT-BKO	Region currently in wait, but dynamic backout in progress.
WAIT-BLKM	Region waiting in block mover.
WAIT-BML	Region in scheduling (waiting for block mover latch). **Note:** The block mover latch comprises several smaller latches. To find which BML latch a region is waiting for, use the LATCH service.
WAIT-DLI	Region waiting for DL/I.
WAIT-INT	Region in scheduling (waiting for database intent).
WAITING	Region in nonspecific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see "LATCH - Latch Summary" on page 278.
WT-CMDP	Region waiting for a pending /DBD or /DBR command to complete.
WT-DBRC	Region waiting for DBRC.
WT-DMBP	Region in scheduling (waiting for DMB pool).
WT-EPCB	Region in scheduling (waiting for EPCB pool).

WT-IRLM	Region waiting for IRLM.
WT-ISWCH	Region did ISWITCH and is waiting in IMS dispatcher.
WT-NTFY	Region waiting for asynchronous notify(s) to complete (IRLM must be active). An asynchronous notify could be buffer invalidation, for example.
WT-OSAM	Region waiting for OSAM.
WT-PI	Region waiting for a program isolation lock to be freed.
WT-PSBP	Region waiting for PSB pool.
WT-PSBW	Region waiting for PSBW pool.
WT-SCHD	Region waiting in a nonspecific CREATE THREAD process.
WT-VSAM	Region waiting in VSAM.
WTF-ADSC	Region waiting in Fast Path for ADSC directory latch (DEDB area data sets).
WTF-AREA	Region waiting in Fast Path for DEDB area lock.
WTF-DEDB	Region waiting in Fast Path for DEDB ownership.
WTF-DMSH	Region waiting in Fast Path for DMAC share latch (DEDB area).
WTF-DMSY	Region waiting in Fast Path for DMAC synchronization latch (DEDB area).
WTF-FBFR	Region waiting in Fast Path for FIX buffer (DEDB).
WTF-FCMD	Region waiting in Fast Path for FNCB (Fast Path command) latch.
WTF-MSDB	Region waiting in Fast Path for MSDB latch.
WTF-OBA	Region waiting in Fast Path for overflow buffer interlock.
WTF-OCL	Region waiting in Fast Path for open/close latch.
WTF-RSL	Region waiting in Fast Path for resource latch.
WTF-SEG	Region waiting in Fast Path for MSDB segment.

WTF-SYNC Region waiting in Fast Path for synchronization latch.

Note: A # character in place of the - character in a status indicates activity resulted from an IMS data capture exit (user exit for data propagation and site requirements) instead of the application program. For example, if a data capture exit made a request that is waiting for a program isolation lock, the STATUS field shows WT#PI rather than WT-PI. For more information about data capture exits, see the IBM System Administration Guide publication.

The Event Collector must be active to obtain the data capture exit status when the exit issues a DB2 call.

TRANCD

Name of transaction currently being processed.

TYP

Type of region processing the transaction:

BMI Batch message processing region currently executing an implicit APPC/IMS transaction.

BMP Batch message processing region.

BMW Wait for input BMP.

CON Conversational MPP region.

DBT DBCTL (CICS attachment) region.

FPU Fast Path utility regions.

MDP Message-driven Fast Path region.

MPI Message processing region currently executing an implicit APPC/IMS transaction.

MPP Message processing regions.

MPW Wait for input MPP.

NDP Non-message-driven Fast Path region.

TPI Message processing region currently executing an explicit CPI-C program.

TPI Message processing region currently executing an explicit CPI-C program.

PSBUT, DMBUT - PSB and DMB Pool Utilization

```
BMC SOFTWARE  -------------- PSB POOL UTILIZATION ------------ PERFORMANCE MGMT
SERV ==> PSBUT  INPUT   13:21:09  INTVL=> 3  LOG=> N   TGT==> IMSA
PARM ==>                      SCROLL=> N/A
PSB BLOCK SPACE                 PSB FREE SPACE
BLOCKS MINIMUM AVERAGE MAXIMUM TOTAL   BLOCKS MINIMUM AVERAGE MAXIMUM TOTAL
                         -- CURRENT VALUES --
17    1,336   5,479   9,544 93,152      7      264   1,321   2,536  9,248
                        -- SIMULATED RELEASE --
16    1,336   5,412   9,544 86,600      7      264   2,257   8,248 15,800
13    1,336   5,097   9,544 66,264      9      336   4,015   9,200 36,136
11    2,984   5,470   9,544 60,176      8    1,416   5,278   9,368 42,224
9     2,984   5,409   9,544 48,688      8    1,416   6,714  20,688 53,712
8     2,984   4,893   6,984 39,144      7    1,416   9,036  27,160 63,256
6     2,984   4,508   6,072 27,048      6    1,416  12,558  35,704 75,352
5     2,984   4,512   6,072 22,560      5    1,552  15,968  41,608 79,840
4     3,120   4,894   6,072 19,576      4    1,552  20,706  51,576 82,824
```

```
BMC SOFTWARE  -------------- DMB POOL UTILIZATION ------------ PERFORMANCE MGMT
SERV ==> DMBUT  INPUT   13:21:09  INTVL=> 3  LOG=> N   TGT==> IMSA
PARM ==>                      SCROLL => N/A
DMB BLOCK SPACE                   DMB FREE SPACE
BLOCKS MINIMUM AVERAGE MAXIMUM TOTAL    BLOCKS MINIMUM AVERAGE MAXIMUM TOTAL
                         -- CURRENT VALUES --
29      368     983   2,312 28,512       1   24,736  24,736  24,736 24,736
                        -- SIMULATED RELEASE --
28      368     997   2,312 27,920       1   25,328  25,328  25,328 25,328
17      576   1,060   2,312 18,032       4      904   8,804  25,696 35,213
15      616   1,122   2,312 16,840       3      904  12,136  34,136 36,408
8       616   1,174   2,312  9,392       2    4,176  21,928  39,680 43,856
7       616   1,077   2,312  7,544       1   45,704  45,704  45,704 45,704
5       616   1,206   2,312  6,032       1   47,216  47,216  47,216 47,216
```

Description: These displays show the current status of the PSB and DMB pools, including the number of resident blocks, the free space remaining, and the fragmentation. Because the two pools are managed by the least-recently-referenced method, the display format is the same for both pools (and for the MFS pool).

Select Code: PSBUT or DMBUT

Parameter: Enter:

0	Displays every iteration of the space release algorithm.
1	Displays each iteration that causes an increase in the size of maximum free space. Blank, no entry, produces the same result as entering 1.
2 to 9	Displays every second to ninth increase in maximum free space.

For PSBUT:

CSA Displays information about the portion of the PSB pool that resides in CSA if the LSO=S option is used in the control region. This parameter is not valid for other LSO options and will be rejected.

For LSO=S:

blank The default of no parameter shows the PSB pool information in the DL/I address space. The other LSO options do not have split PSB pools, and PSBUT always shows the entire PSB pool wherever it resides.

Field Descriptions: Each of the fields is described below. The descriptions are arranged in alphabetical order.

CURRENT VALUES
This line shows the current status of the pool.

PSB BLOCK SPACE/DMB BLOCK SPACE

AVERAGE
The average block length.

BLOCKS
The number of allocated blocks.

MAXIMUM
The length of the largest allocated block.

MINIMUM
The length of the smallest allocated block.

TOTAL
The total length of all allocated blocks.

PSB FREE SPACE/DMB FREE SPACE

AVERAGE
The average length of the free spaces in the pool.

BLOCKS
The number of free spaces in the pool.

MAXIMUM
The maximum length of the largest free space in the pool.

MINIMUM
The length of the smallest free space in the pool.

TOTAL
The total length of all free spaces in the pool.

SIMULATED RELEASE

Each line shows the results of a simulated iteration of the space release algorithm that is used by IMS to free space for a new block. The number of iteration lines displayed depends on the parameter option chosen.

If less than 18 lines appear, the last line shows the total blocks that are still in use and cannot be released. Therefore, the free space is the maximum available at this point.

SCHED - Scheduling Statistics

```
BMC SOFTWARE  -------------- SCHEDULING STATISTICS --------- PERFORMANCE MGMT
SERV ==> SCHED           INPUT   13:21:09  INTVL=> 3  LOG=> N   TGT==>  IMS61X
PARM ==>                                                       SCROLL => N/A

                           SCHEDULING ACTIVITY

61,417 TOTAL SMBS EXAMINED              19 TOTAL PROGRAM CONFLICTS

42,877 TOTAL SCHEDULED  70%             45 TOTAL INTENT FAILURES
18,540 TOTAL FAILURES   30%         18,476 TOTAL OTHER REASONS

                          SCHEDULER SEQUENCE QUEUE

   REASON FOR WAIT           RGN  TYPE  CLASSES    CPRTY  PSBNAME TRANCODE
WAITING FOR MESSAGE (IDLE)    3   MPP   1
WAITING FOR INTENT (DB)       4   MPP   3  4         10
WAITING FOR GU (WFI)          1   BMP                      GISPSB  GIS
```

Description: This display shows the total scheduling activity since IMS restart and the regions currently waiting for scheduling.

Select Code: SCHED

Parameter: Enter a number in the range 1-nnn (where nnn is a valid region number) to indicate the lowest region number to be displayed on the sequence queue. The default is 1.

Field Descriptions: Each of the fields is shown and described below by display area.

```
Area 1

                                SCHEDULING ACTIVITY
61,417 TOTAL SMBS EXAMINED              19 TOTAL PROGRAM CONFLICTS

42,877 TOTAL SCHEDULED  70%             45 TOTAL INTENT FAILURES
18,540 TOTAL FAILURES   30%         18,476 TOTAL OTHER REASONS
```

This area shows total scheduling activity. The descriptions are arranged in alphabetical order.

INTENT FAILURES
: This counter includes actual database intent conflicts and PSB, PSB work, or DMB pool space failures.

OTHER REASONS

Transaction, program, or database is locked, stopped, or bad (BLDL failed at initialization). Parallel scheduling of a program already processing was permitted, but the transaction failed the load balancing check.

Note: Once a stopped transaction is in the message queues, this counter is incremented each time scheduling is attempted for the class; that is, each time another transaction of the same class arrives. This can produce misleading scheduling statistics.

To prevent this counter from being incremented continuously, stopped transactions can be assigned to a processing class that is not associated with an active region.

PRIORITY CUTOFFS

Scheduling stopped because the defined options allowed only equal and higher priority transactions after an intent failure, and none was available.

PROGRAM CONFLICTS

Parallel scheduling of a program already processing was not permitted.

TOTAL FAILURES

The number of unsuccessful attempts at scheduling and the percentage this represents of total activity. The failures are shown by type in the second column of this display area. This is the sum of the halfword counters, with each wrapping to zero if 65,535 is reached.

TOTAL SCHEDULED

The number of successful attempts at scheduling and the percentage this represents of total activity (TOTAL SMBS EXAMINED - TOTAL FAILURES).

TOTAL SMBS EXAMINED

This counter is incremented when input is available for a transaction type (enqueued on the SMB) and an attempt is made to schedule the corresponding program.

```
Area 2
                            SCHEDULER SEQUENCE QUEUE

   REASON FOR WAIT          RGN  TYPE  CLASSES    CPRTY  PSBNAME TRANCODE
WAITING FOR MESSAGE (IDLE)   3   MPP   1
WAITING FOR INTENT (DB)      4   MPP   3  4         10
WAITING FOR GU (WFI)         1   BMP                      GISPSB  GIS
```

This area lists any regions that are currently waiting for scheduling. The reason for the wait, the region number, the region type, such as MPP (Message Processing Program), BMP (Batch Message Processing), MDP (Message-driven Program), or FPU (Fast Path utility), and the assigned class are shown. If it is valid for that wait, the program name, transaction code, or cutoff priority could appear.

The descriptions are arranged in alphabetical order. The possible reasons for a wait are:

WAITING FOR BLOCK MOVER
: The routine that loads the intent lists and the PSB and DMB blocks is only serially reusable.

WAITING FOR GU (BALG)
: A Fast Path MDP (Message-Driven Program) is enqueued on the BALG waiting for an input message to process.

WAITING FOR GU (WFI)
: A wait-for-input program is idle.

WAITING FOR INTENT (DB)
: The region is idle, waiting to update a database exclusively owned by another already scheduled application program.

WAITING FOR INTENT (DMB POOL)
: Not enough space to load the needed DMBs in the pool.

WAITING FOR INTENT (PGM)
: Program conflict has occurred because parallel scheduling limit has been reached or the program is not eligible for parallel scheduling.

WAITING FOR INTENT (PSB POOL)
: Not enough space to load this PSB in the pool or not enough space in the PSB work pool.

WAITING FOR MESSAGE (IDLE)
: No input of the assigned classes is available.

Chapter 12. Region Displays

These displays show application program activity in the IMS dependent region. You can use them to determine which transactions and application programs are active, how much work they are doing by observing message processing and database access, or how much work they still have to do by watching how many of that type are queuing. You can expand the information by:

- Positioning the cursor on a cursor-sensitive field and pressing ENTER to see more details about that field from a related service
- Using the EXPAND field to select the detailed region display to see what a specific transaction is doing

You can also isolate problem regions by using service parameters that allow you to sort and filter any column. For example, you can use SORT to find the highest number of DL/I calls or the longest elapsed time. Or, you can use a filtering parameter that restricts the display only to those regions that are running specific transactions or a class of transactions.

Navigating Regions Data

When you invoke REGNS, all of the information displayed by the REGNS and DREGN services is collected in a buffer. This allows you to analyze information frozen in time. To refresh the information, press ENTER when the cursor is on the SERV or PARM line.

The regions displays include a:

- REGNS service

  There are two versions. If the Event Collector is available, REGNS uses the additional data collected by the Event Collector to provide you with more information about IMS dependent region activity. The Event Collector also allows REGNS to show you IMS dependent region activity for the transactions currently processing rather than just for the duration of a PSB scheduling.

  REGNS presents the data by views as follows:

  With the Event Collector:

  REGNS provides the following views of IMS dependent region activity for the transactions currently processing:

  – Summary View
  – Message View
  – DL/I View
  – DB2 View

Without the Event Collector:

REGNS provides the following views of IMS dependent region activity for the duration of a PSB scheduling:

– Summary View
– Message View
– DL/I View

It can be selected from the list of analyzer services (Primary Menu Option 1).

- DREGN service

  DREGN shows you what a transaction is doing in a specific region. It can be requested by:

  – EXPANDing from the REGNS service to the DREGN service

  – Selecting the DREGN service from the list of analyzer services

  Like REGNS, the amount of data DREGNS can display about a specific region depends upon whether the Event Collector is available and active. If the Event Collector is active, DREGNS uses this additional data to provide more information about that region's activity for the transactions currently processing rather than the duration of a PSB scheduling. For example, DB2 activity or the amount of CPU time remaining for that region can be displayed.

  DREGNS presents:

  With the Event Collector:

  DREGNS provides the following information about activity for a specific IMS dependent region for the transactions currently processing:

  – DC call activity
  – DL/I call activity
  – Fast Path activity
  – DB2 activity
  – PSB/transaction information
  – Program isolation activity
  – System activity
  – Paging activity

  Without the Event Collector:

  DREGNS provides the following information about activity for a specific IMS dependent region for the duration of a PSB scheduling:

  – DC call activity
  – DL/I call activity
  – Fast Path activity
  – PSB/transaction information
  – Program isolation activity
  – System activity
  – Paging activity

In the REGNS and DREGN displays, each CICS thread is shown as a region, identified by the IMS region (PST) number assigned to it, with a region type of DBT. Some of the information shown is related to IMS transaction scheduling and therefore is not valid for DBCTL; these fields are blank or zero.

- STAT/STATR service

  STAT/STATR shows the status of the total IMS system, work performed, and resources consumed, indicating possible problem areas. It can be selected from the list of analyzer services.

- DLIST service

  DLIST is a DL/I call display that shows information about the active DL/I call processed by a specific region. It can be requested by:

  – Cursor selection from the PI, DREGN, CLASQ, BALGQ, or LUSRD service.

  – Its service select code from the SERV field of a display with a region number as a parameter.

DLIST - DL/I Call Status

```
BMC SOFTWARE----------------- DL/I CALL STATUS ---------------PERFORMANCE MGMT
SERV ==> DLIST           INPUT    14:03:01  INTVL=> 3  LOG=> N  TGT==>  IMS22X
PARM ==> 5                                   LINE     1 OF    16 SCROLL => CSR

 RGN:  005        STC: I15XBMP              PSB: PTEST02       TRAN:  TTEST02
 TYPE: BMP     STATUS: ACTV#DLI             PGM: MAXSSA        LTERM:

 DLI CALL: GU   (CURRENT)                   DATA CAPTURE EXIT ACTIVE
 ==============================================================================
 DB PCB:  CUSTHIDM00  AP    Y0HIDAM
          CEEECCCDFF44CD4400EFCCCCD44400000000
          342389440000170004808941400000000004
 ==============================================================================
 IO-AREA:       SBCIR11BMPSB      PTEST02         IN01A01             IN01A01 HI
          090000ECCCDFFCDDEC444444DECEEFF409181506CDFFCFF4444444440000CDFFCFF4CC
          100092223991124722000000735230200 03F36049501101000000000803950110108 9
 ==============================================================================
 SSA-1:   CUSTOMER(CUSTID   >                              )
          CEEEDDCD4CEEECC4446000000000000000000000000005
          34236459D342394000E000000000000000000000000D
 ==============================================================================
 SSA-2:   PRODUCT *-(PRODID   >          )
          DDDCECE4564DDDCCC444600000000005
          79644330C0D796494000E0000000000D
 ******************************** END OF DATA ********************************
```

Description: This service provides details about the parameters on a DL/I call. It can be accessed directly by providing the region number as the parameter, or it can be accessed with cursor selection from the PI, DREGN, CLASQ, BALGQ, or LUSRD service.

The call displayed is for the current DL/I call. If no call is active, DLIST displays the last DL/I call (if any). If the region specified no longer has an active program, only RGN, STC or JOB, TYPE, and STATUS are provided by the display. If the region specified is no longer active, an error message is returned.

CAUTION

You should restrict use of this service if your site is concerned about displaying sensitive data. The service can be secured using the ACCESS and PMACC parameters described in *Implementing Security for MAINVIEW Products*.

Note: If your IMS is performing well, there are times when details about the DL/I call are not available because the data is too transient. In these cases, an informational message is issued in the scrollable area of the display.

Select Code: DLIST

Parameter: Region number

Scrolling: The service is scrollable so that all data for the call can be viewed without data refresh.

Field Descriptions: Each of the fields is shown and described below by display area.

```
Area 1

 RGN:  005        STC: I15XBMP              PSB: PTEST02       TRAN:  TTEST02
 TYPE: BMP     STATUS: ACTV#DLI             PGM: MAXSSA        LTERM:

 DLI CALL: GU   (CURRENT)                   DATA CAPTURE EXIT ACTIVE
```

This area shows the scheduling information, status, and the active DL/I call for a region. The descriptions are arranged in alphabetical order.

DATA CAPTURE EXIT ACTIVE
: This message is displayed if the IMS Data Capture Exit is currently invoked for this region. Otherwise, this field is blank.

DLI CALL
: DL/I function code (such as GU, GN, or GHU). If the region is not active with a program, this entire line is blank.

(CURRENT)
: Indicates that the DL/I call is currently being executed.

(LAST)
: Indicates that this was the last DL/I call made, but it has completed. The status code from DL/I can be found in the PCB area of the display.

LTERM
: Logical terminal that originated the transaction.

PGM
: Program name currently executing in region.

PSB
: PSB name currently active in the region.

RGN
: Region number.

STATUS
: Region status:

ACTIVE	Active in a nonspecific process.
ACTV-BKO	Region in dynamic backout.
ACTV-DB2	Active in DB2 (Event Collector must be active).
ACTV-DBR	Region active in DBRC.
ACTV-DLI	Region active in DL/I.

ACTV-SCH	Region active in nonspecific CREATE THREAD process.
ACTV-USR	Region active in the application program.
IDLE	Region waiting for non-WFI input to process.
IDLE-HOT	Pseudo-WFI region waiting for input from the same transaction.
IDLE-WFI	Region waiting for WFI or Fast Path BALG input to process.
INACTIVE	Region defined but not started (not yet signed on).
OPENING	Region in first CREATE THREAD process.
SCH-BLR	Region in scheduling (active in block loader latch).
SCH-BLKM	Region in scheduling (active in block mover).
SCHDULE	Region in scheduling (CREATE THREAD).
TERMINAT	Region in region termination or abend.
WAIT-AOI	Region waiting for an AO message. Await for AO occurs when a region issues a GMSG call with the wait option and DFSAOE00 has no message to return to it at that time.
WAIT-BKO	Region currently in wait, but dynamic backout in progress.
WAIT-BLKM	Region waiting in block mover.
WAIT-BML	Region in scheduling (waiting for block mover latch). **Note:** The block mover latch comprises several smaller latches. To find which BML latch a region is waiting for, use the LATCH service.
WAIT-DLI	Region waiting for DL/I.
WAIT-INT	Region in scheduling (waiting for database intent).
WAITING	Region in nonspecific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see "LATCH - Latch Summary" on page 278.
WT-CMDP	Region waiting for a pending /DBD or /DBR command to complete.
WT-DBRC	Region waiting for DBRC.
WT-DMBP	Region in scheduling (waiting for DMB pool).
WT-EPCB	Region in scheduling (waiting for EPCB pool).

WT-IRLM	Region waiting for IRLM.
WT-ISWCH	Region did ISWITCH and is waiting in IMS dispatcher.
WT-NTFY	Region waiting for asynchronous notify(s) to complete (IRLM must be active). An asynchronous notify could be buffer invalidation, for example.
WT-OSAM	Region waiting for OSAM.
WT-PI	Region waiting for a program isolation lock to be freed.
WT-PSBP	Region waiting for PSB pool.
WT-PSBW	Region waiting for PSBW pool.
WT-SCHD	Region waiting in a nonspecific CREATE THREAD process.
WT-VSAM	Region waiting in VSAM.
WTF-ADSC	Region waiting in Fast Path for ADSC directory latch (DEDB area data sets).
WTF-AREA	Region waiting in Fast Path for DEDB area lock.
WTF-DEDB	Region waiting in Fast Path for DEDB ownership.
WTF-DMSH	Region waiting in Fast Path for DMAC share latch (DEDB area).
WTF-DMSY	Region waiting in Fast Path for DMAC synchronization latch (DEDB area).
WTF-FBFR	Region waiting in Fast Path for FIX buffer (DEDB).
WTF-FCMD	Region waiting in Fast Path for FNCB (Fast Path command) latch.
WTF-MSDB	Region waiting in Fast Path for MSDB latch.
WTF-OBA	Region waiting in Fast Path for overflow buffer interlock.
WTF-OCL	Region waiting in Fast Path for open/close latch.
WTF-RSL	Region waiting in Fast Path for resource latch.
WTF-SEG	Region waiting in Fast Path for MSDB segment.
WTF-SYNC	Region waiting in Fast Path for synchronization latch.

Note: A # character in place of the - character in a status indicates activity resulted from an IMS data capture exit (user exit for data propagation and site requirements) instead of the application program. For example, if a data capture exit made a request that is waiting for a program isolation lock, the STATUS field shows WT#PI rather than WT-PI. For more information about data capture exits, see the IBM *System Administration Guide* publication.

The Event Collector must be active to obtain the data capture exit status when the exit issues a DB2 call.

STC (JOB)
: Region started task name (job name).

TRAN
: Name of the transaction code currently active in the region.

TYPE
: Region type:

BMI Batch message processing region currently executing an implicit APPC/IMS transaction.

BMP Batch message processing region.

BMW Wait for input BMP.

CON Conversational MPP region.

DBT DBCTL (CICS attachment) region.

FPU Fast Path utility regions.

MDP Message-driven Fast Path region.

MPI Message processing region currently executing an implicit APPC/IMS transaction.

MPP Message processing regions.

MPW Wait for input MPP.

NDP Non-message-driven Fast Path region.

TPI Message processing region currently executing an explicit CPI-C program.

```
Area 2

 ================================================================================
 DB PCB:  CUSTHIDM00  AP    Y0HIDAM
          CEEECCCDFF44CD4400EFCCCCD44400000000
          342389440000170004808941400000000004
 ================================================================================
```

This area shows PCB or AIB-related information if the DL/I call uses a second parameter. The descriptions are arranged in alphabetical order.

The first 70 bytes of the PCB are displayed in hexadecimal dump format with the type of PCB identified as follows:

DB PCB: PCB is for a database.

GSAM PCB: PCB is for a GSAM database.

IO PCB: PCB is the I/O PCB.

TP PCB: PCB is for the message queue, but it is not the I/O PCB.

The first 70 bytes of the AIB are displayed if the call uses an AIB. The PCB used to process the request is shown in a section of this area immediately below the AIB.

```
Area 3

 ================================================================================
 IO-AREA:       SBCIR11BMPSB      PTEST02         IN01A01             IN01A01 HI
          090000ECCCDFFCDDEC444444DECEEFF409181506CDFFCFF4444444440000CDFFCFF4CC
          100092223991124722000000073523020003F36049501101000000000008039501101089
 ================================================================================
```

If the DL/I call uses a third parameter, this area shows destination or I/O area information. The information shown is determined by the type of call. The descriptions are arranged in alphabetical order.

If the call is a CHNG call, the following appears:

DEST:
The 8-character destination name specified on the CHNG call (TP or IO PCB only).

For all other types of calls, you see:

I/O AREA:
First 70 bytes in hexadecimal dump format of the I/O area specified with the call.

```
Area 4

 ================================================================================
 SSA-1:   CUSTOMER(CUSTID   >                          )
          CEEEDDCD4CEEECC4446000000000000000000000000005
          34236459D342394000E00000000000000000000000000D
 ================================================================================
 SSA-2:   PRODUCT *-(PRODID   >          )
          DDDCECE4564DDDCCC444600000000005
          79644330C0D796494000E0000000000D
```

If the DL/I call uses four or more parameters, this area shows database-related information. The information shown is determined by the type of call. The descriptions are arranged in alphabetical order.

If the call is an XRST or CHKP call, the following appears:

AREA-n
: First 70 bytes of the nth AREA in hexadecimal dump format as specified on the XRST or CHKP call.

If the MFS message output descriptor (MOD) name is specified on the call, you will see:

MODNAME:
: The 8-character MOD name (TP or IO PCB only).

If the call is a STAT call, this area shows:

REQ:
: The requested 8-byte statistics function for the STAT call.

For all other types of calls, this area shows:

SSA-n
: First 70 bytes of the nth SSA, in hexadecimal dump format, specified on the call. As many SSAs are displayed as were specified on the call.

If the call is a ROLS or SETS call, you will see:

TOKEN:
: A 4-byte identifier used on the ROLS or SETS call.

DREGN - Region Detail (Event Collector Data)

```
BMC SOFTWARE-------------DETAIL REGION SERVICE----------------PERFORMANCE MGMT
SERV ==> DREGN             INPUT    11:44:25  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> 1                                          LINE 1 OF  56 SCROLL=> CSR
EXPAND:  DLIST PI LUSRD CICS DB2  GOTO( DC DLI OTHR FP DB2 PSB PI SYS PAGING)
*EVENT COLLECTOR*                                  PF10/11 FOR PREV/NEXT REGION
RGNID.....       1         STATUS.... ACTV-DLI         ENQ TIME...11:44:24
JOB NAME.. MPPRGN2         TRANCODE.. SM4              TRN ELAP...   500ms
TYPE......      MPP        PSB....... SM400600         AGN........PAYROLL
MSG SWITCH        0        LTERM..... SNLC0050         CLASS....  >1   2   3   4
SEQ BF USG      25K        USER...... DN002            DB2STAT....DB2D-CON
                           DB2 AUTHID DN002
---------------------------DC CALL ACTIVITY-------------------------------------
MSG GU.....       8        MSG OTHER..       8         PROCLIM....   65535
MSG GN.....       0        MSG PURG...       0         CMD........       0
CHKPT......       0        MSG ISRT...       7         GET CMD....       0
---------------------------DL/I CALL ACTIVITY-----------------------------
DBNAME      GU    GN   GHU   GHN   GNP  GHNP  REPL  ISRT  DLET  TOTAL   I/O
-------- ----- ----- ----- ----- ----- ----- ----- ----- -----  ----- -----
MYPART1      2     1     0     0     0     0     0     0     0      3     3
MYPART2      2     1     0     0     0     0     0     0     0      3     2
** TOTAL     4     2     0     0     0     0     0     0     0      6     5
----------------------------OTHER CALL ACTIVITY----------------------------
CMD.......        1         SETO......        0         APSB......        0
GCMD......        2         SETS......        3         DPSB......        0
ICMD......        0         SETU......        0         INIT......        0
RCMD......        0         ROLB......        0         INQY......        0
GMSG......        0         ROLS......        0         AUTH......        0
CHNG......        0         XRST......        0         DB DEQ....        0
----------------------------FP ACTIVITY------------------------------------
NBA........      10         DATABASE    AREA       RBA      ENQ
OBA........      10         CUSTDB      CUSTDB01   0015BA00 SHR
USED.......       2         CUSTDB      CUSTDB02   00263300 EXE
                            CUSTADD     CUSTADD1   00B19300 SHR
---------------------------DB2 ACTIVITY---------------SQL TOT....       1
DB2NAME....DB2D            CONTROL....       0        INSERTS....       0
PLANNAME...PHDAMINQ        DYNAMIC....       0        DELETES....       0
SEL/FCH....       1        DDL........       0        UPDATES....       0
OPENS......       0        OTHER......       0
---------------------------PSB/TRANSACTION------------------------------
PSB SIZE...     148        MODE.......SNGL            CONVERS....
PSB WA.....    2880        SEGMENT....SNGLSEG         SPA LEN....
PROCLIM....   65535        QUEUED.....       1        PRIORITY...       4
AVG LENG...     200                                   TOT DEQ....       3
PRLIM CPU..      10        CPU REMAIN.       9
---------------------------PROGRAM ISOLATION ACTIVITY--------------------
TEST          Q COMMAND       SHR/UPD       EXCLUSIVE
ENQ           14              0              10               0
DEQ           11              0               7               0
CURQ           3              0               3               0
WAIT           0              0               0               0
---------------------------SYSTEM ACTIVITY-----------RGN ELAPSED 01:30:04
EXEC IN...  DLI-SAS        TCB CPU....   1,740        DOMAIN.....       1
ASID......       11        SRB CPU....     234        PERF GR....      13
PRIORITY..      238        CPU SRV....   10968        PERF PD....       1
SWAP...... NON-SWAP        IO SRV.....    3555                          4
                           MSO SRV....       6
---------------------------PAGING ACTIVITY------------------------------
WRK IN.....       6        INT PGI....   4,040        VIO PGI....       0
WRK OUT....      25        INT PGO....   2,494        VIO PGO....       0
FRAMES.....       6        INT RCL....     405        VIO RCL....       0
SLOTS......      43        SWAPCNT....       0        SLT VIO....   4,440
COM PGI....  11,042        COM RCL....     346        STOLEN.....   4,145
************************ END OF DATA ****************************************
```

Description: This is the Event Collector version of the detailed regions display. This service shows you what a transaction is doing. For example, you can see which databases this transaction accesses and how often, the number of times a transaction accesses a database and with what type of DL/I call, the number of locks held by a BMP between checkpoints, or a summary of the transaction's resource usage.

You access this detailed region display:

- From the REGNS display
  - Move the cursor to a row (region) in the display and press ENTER.

    Detailed information about the region you selected is shown.
  - Move the cursor to DREGN in the EXPAND line of the display and press ENTER.

    Detailed information about the region in the first row of the REGNS display is shown.
- From the Analyzer Service List (Primary Menu Option 1)
  - Select DREGN or REGND and press ENTER.
- From the SERV field of any display
  - Enter DREGN or REGND with a region ID as the parameter.

Color: If you have a color monitor:

Turquoise	Indicates normal values.
Blue	Indicates an EXPAND or GOTO option that cannot be used.
Yellow	Indicates error messages.
Pink	Highlights the following message when a WFI or pseudo-WFI transaction is waiting for input: `[PSEUDO] WFI TRAN WAITING - DATA IS FROM LAST TRANSACTION`

Select Code: DREGN or REGND

Parameter: Enter:

`nnn`

where `nnn` represents a 1- to 3-character numeric region ID.

You can use the PF10 key to display a previous region or the PF11 key to display the next region.

Expand: The display can EXPAND to other services by moving the cursor to the following fields and pressing ENTER:

DLIST	DL/I Call Status display showing DL/I call details for the displayed region.
PI	Program Isolation display showing pool space and enqueue summaries for the displayed region. If PI is not the IMS lock manager, this field cannot be used. It is blue on a color terminal and low intensity on a monochrome terminal, which indicates that it is not available.
LUSRD	The LUSRD Lock User Detail display showing lock information for the displayed region. If IRLM is not the IMS lock manager, this field is blue on a color terminal and low intensity on a monochrome terminal.

Hyperlink: If MAINVIEW for CICS is installed and the transaction is a CICS transaction, you can link to the TASKXPND service in MAINVIEW for CICS by using the CICS field in the EXPAND line.

If MAINVIEW for DB2 is installed and a transaction has an active DB2 thread, you can link to the DUSER service in MAINVIEW for DB2 by using the DB2 field in the EXPAND line.

GOTO: You also can go to a specific area by moving it to the top of the display. Move the cursor to any of the following GOTO fields in the EXPAND line and press ENTER to move that area to the top of the display:

Notes:

- If an area of the display cannot be accessed by this method, the fields are blue on a color terminal and low intensity on a monochrome terminal.
- If there is no activity to be displayed, that area of the display does not appear. For example, if a region does not use Fast Path databases, the FP ACTIVITY area of the display is not shown.

DC	DC CALL ACTIVITY
DLI	DL/I CALL ACTIVITY
FP	FP ACTIVITY
DB2	DB2 ACTIVITY
OTHR	Other types of DL/I calls than those shown by DL/I CALL ACTIVITY
PSB	PSB/TRANSACTION

PI	PROGRAM ISOLATION ACTIVITY
SYS	SYSTEM ACTIVITY
PAGING	PAGING ACTIVITY

Sorting: This display cannot be sorted.

Scrolling: You can scroll the display by:

- Using PF keys to scroll the display up or down.
- Selecting a GOTO field which selects a display area and scrolls it to the top as described in “GOTO:”.

Field Descriptions: Each of the fields is shown and described below by display area.

```
Area 1

RGNID.....       1         STATUS.... ACTV-DLI         ENQ TIME...11:44:24
JOB NAME.. MPPRGN2         TRANCODE.. SM4     TRN ELAP...   500ms

TYPE......      MPP        PSB....... SM400600      AGN........PAYROLL
MSG SWITCH       0         LTERM..... SNLC0050      CLASS....  >1   2   3   4 S
EQ BF USG       25K        USER...... DN002         DB2STAT....DB2D-        CON
                           DB2 AUTHID DN002
```

This area shows general information about the application program activity in the region for the transaction currently processing. The descriptions are arranged in alphabetical order.

AGN
: Name of application group

CLASS
: (This field does not apply for a TYP of DBT and for all Fast Path types, including MDP and NDP.)

  Classes defined for the region. The currently active class is shown by a > character preceding the class.

DB2 AUTHID
: Authorization ID used to access DB2.

DB2STAT
: DB2 connection status for the region. If the region is not connected to DB2, this field is blank. If the region is connected to a DB2 subsystem, the first half of the DB2 status message shows the DB2 subsystem name. The second half of the message shows the connection status:

  -CON — IMS connects this region to DB2 if a connection is available and the EXEC parameter SSM (to establish a DB2 connection) is valid.

  -SON — The application is signed on and a recovery token is assigned by DB2 if the EXEC parameter SSM is valid, the connection is successful, and the application issues a DB2 request.

-THD IMS had a thread with DB2 when it processed the EXEC parameter SSM to establish a connection to DB2.

ENQ TIME
(This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Time when the transaction currently being processed was submitted (hh:mm:ss).

Note: This is the time of the originating terminal input transaction for message switches.

JOB NAME
Job name or started task procedure name of the region.

LTERM
LTERM name of the terminal where this transaction was submitted.

MSG SWITCH
(This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Number of message switches to generate this transaction.

PSB
PSB name of the application program currently being processed.

RGNID
Region identifier assigned to this region by IMS.

SEQ BFR USG
Sequential buffer usage for this region in kilobytes.

STATUS
Region status:

ACTIVE	Active in a nonspecific process.
ACTV-BKO	Region in dynamic backout.
ACTV-DB2	Active in DB2 (Event Collector must be active).
ACTV-DBR	Region active in DBRC.
ACTV-DLI	Region active in DL/I.
ACTV-SCH	Region active in nonspecific CREATE THREAD process.
ACTV-USR	Region active in the application program.
IDLE	Region waiting for non-WFI input to process.
IDLE-HOT	Pseudo-WFI region waiting for input from the same transaction.
IDLE-WFI	Region waiting for WFI or Fast Path BALG input to process.
INACTIVE	Region defined but not started (not yet signed on).

OPENING	Region in first CREATE THREAD process.
SCH-BLR	Region in scheduling (active in block loader latch).
SCH-BLKM	Region in scheduling (active in block mover).
SCHDULE	Region in scheduling (CREATE THREAD).
TERMINAT	Region in region termination or abend.
WAIT-AOI	Region waiting for an AO message. Await for AO occurs when a region issues a GMSG call with the wait option and DFSAOE00 has no message to return to it at that time.
WAIT-BKO	Region currently in wait, but dynamic backout in progress.
WAIT-BLKM	Region waiting in block mover.
WAIT-BML	Region in scheduling (waiting for block mover latch). **Note:** The block mover latch comprises several smaller latches. To find which BML latch a region is waiting for, use the LATCH service.
WAIT-DLI	Region waiting for DL/I.
WAIT-INT	Region in scheduling (waiting for database intent).
WAITING	Region in nonspecific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see "LATCH - Latch Summary" on page 278.
WT-CMDP	Region waiting for a pending /DBD or /DBR command to complete.
WT-DBRC	Region waiting for DBRC.
WT-DMBP	Region in scheduling (waiting for DMB pool).
WT-EPCB	Region in scheduling (waiting for EPCB pool).
WT-IRLM	Region waiting for IRLM.
WT-ISWCH	Region did ISWITCH and is waiting in IMS dispatcher.
WT-NTFY	Region waiting for asynchronous notify(s) to complete (IRLM must be active). An asynchronous notify could be buffer invalidation, for example.
WT-OSAM	Region waiting for OSAM.
WT-PI	Region waiting for a program isolation lock to be freed.

WT-PSBP	Region waiting for PSB pool.
WT-PSBW	Region waiting for PSBW pool.
WT-SCHD	Region waiting in a nonspecific CREATE THREAD process.
WT-VSAM	Region waiting in VSAM.
WTF-ADSC	Region waiting in Fast Path for ADSC directory latch (DEDB area data sets).
WTF-AREA	Region waiting in Fast Path for DEDB area lock.
WTF-DEDB	Region waiting in Fast Path for DEDB ownership.
WTF-DMSH	Region waiting in Fast Path for DMAC share latch (DEDB area).
WTF-DMSY	Region waiting in Fast Path for DMAC synchronization latch (DEDB area).
WTF-FBFR	Region waiting in Fast Path for FIX buffer (DEDB).
WTF-FCMD	Region waiting in Fast Path for FNCB (Fast Path command) latch.
WTF-MSDB	Region waiting in Fast Path for MSDB latch.
WTF-OBA	Region waiting in Fast Path for overflow buffer interlock.
WTF-OCL	Region waiting in Fast Path for open/close latch.
WTF-RSL	Region waiting in Fast Path for resource latch.
WTF-SEG	Region waiting in Fast Path for MSDB segment.
WTF-SYNC	Region waiting in Fast Path for synchronization latch.

Note: A # character in place of the - character in a status indicates activity resulted from an IMS data capture exit (user exit for data propagation and site requirements) instead of the application program. For example, if a data capture exit made a request that is waiting for a program isolation lock, the STATUS field shows WT#PI rather than WT-PI. For more information about data capture exits, see the IBM System Administration Guide publication.

The Event Collector must be active to obtain the data capture exit status when the exit issues a DB2 call.

TRANCODE
Name of the transaction currently being processed.

TRN ELAP

Current time minus the transaction start time.

Note: If you have more than one system clock set, they must be synchronized for TRN ELAP to be accurate.

TYPE

Type of region processing the transaction:

BMI Batch message processing region currently executing an implicit APPC/IMS transaction.

BMP Batch message processing region.

BMW Wait for input BMP.

CON Conversational MPP region.

DBT DBCTL (CICS attachment) region.

FPU Fast Path utility regions.

MDP Message-driven Fast Path region.

MPI Message processing region currently executing an implicit APPC/IMS transaction.

MPP Message processing regions.

MPW Wait for input MPP.

NDP Non-message-driven Fast Path region.

TPI Message processing region currently executing an explicit CPI-C program.

USER

ID of the user who submitted this transaction. For a DBCTL transaction, this is the ID of the CICS user.

```
 Area 2
---------------------------DC CALL ACTIVITY-----------------------------------
MSG GU.....       8        MSG OTHER..       8    PROCLIM....   65535
MSG GN.....       0        MSG PURG...       0    CMD........   0
CHKPT......       0        MSG ISRT...       7    GET CMD....   0
```

This area shows the amount of DC call activity incurred by the transaction currently processing. The descriptions are arranged in alphabetical order.

CHKPT

Number of checkpoint calls issued by this transaction.

CMD

Number of command calls issued by this transaction.

GET CMD

Number of GET command calls issued by this transaction.

MSG GN

(This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Number of MESSAGE GET NEXT calls issued by this transaction. For MDPs, this value is 0.

MSG GU

(This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Number of MESSAGE GET UNIQUE calls issued by this transaction. For MDPs (message-driven program), this value is 0.

MSG ISRT

(This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Number of MESSAGE INSERT calls issued by this transaction. For MDPs, this value does not include I/O PCB ISRTs.

MSG OTHER

(This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Number of DC DL/I calls other than GU, GN, CHKPT, PURG, and ISRT. This includes system service calls, such as SETS and ROLS, and AO application calls, such as CMD and GCMD.

MSG PURG

(This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Number of MESSAGE PURGE calls issued by this transaction.

PROCLIM

(This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Processing limit count (PROCLIM). Number of transactions that can be processed by this program in one scheduling. If there is no processing limit, this field is blank.

Area 3

```
---------------------------DL/I CALL ACTIVITY----------------------------
DBNAME      GU    GN   GHU   GHN   GNP  GHNP  REPL  ISRT  DLET  TOTAL I/O
-------- ----- ----- ----- ----- ----- ----- ----- ----- -----  ----- ---
MYPART1      2     1     0     0     0     0     0     0     0      3   3
MYPART2      2     1     0     0     0     0     0     0     0      3   2
** TOTAL     4     2     0     0     0     0     0     0     0      6   5
```

This area shows the amount of DL/I call activity incurred by the transaction currently processing. The descriptions are arranged in alphabetical order.

**TOTAL

(This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Total number of DL/I database calls and I/Os issued by this transaction.

DBNAME
: DL/I database name.

DLET
: Number of DELETE calls issued by this transaction against the database.

GHN
: Number of GET HOLD NEXT calls issued by this transaction against the database.

GHNP
: Number of GET HOLD NEXT within PARENT calls issued by this transaction against the database.

GHU
: Number of GET HOLD UNIQUE calls issued by this transaction against the database.

GN
: Number of GET NEXT calls issued by this transaction against the database.

GNP
: Number of GET NEXT within PARENT calls issued by this transaction against the database.

GU
: Number of GET UNIQUE calls issued by this transaction against the database.

I/O
: Amount of I/O issued by this transaction against the database.

ISRT
: Number of INSERT calls issued by this transaction against the database.

REPL
: Number of REPLACE calls issued by this transaction against the database.

TOTAL
: (This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Total number of DL/I database calls issued by this transaction against the database:

```
GU + GN + GHU + GHN + GHNP + REPL + ISRT + DLET + OTHER
```

This value includes calls to MSDBs and DEDBs and all other calls that are not database calls.

Area 4

```
----------------------------OTHER CALL ACTIVITY----------------------------
CMD.......        1         SETO......        0         APSB......        0
GCMD......        2         SETS......        3         DPSB......        0
ICMD......        0         SETU......        0         INIT......        0
RCMD......        0         ROLB......        0         INQY......        0
GMSG......        0         ROLS......        0         AUTH......        0
CHNG......        0         XRST......        0         DB DEQ....        0
```

This area shows the amount of IMS call activity, other than the calls shown by the “DL/I CALL ACTIVITY” section, incurred by the transaction currently processing. The descriptions are arranged in alphabetical order.

APSB
: Number of ALLOCATE PSB calls issued by this transaction.

AUTH
: Number of AUTHORIZATION calls issued by this transaction.

CHNG
: (This field does not apply for a TYPE of DBT or an IMS DBCTL system)

  Number of CHANGE DC calls issued by this transaction.

CMD
: Number of AO COMMAND calls issued by this transaction.

DB DEQ
: Number of DATABASE DEQUEUE calls issued by this transaction.

DPSB
: Number of DEALLOCATE PSB calls issued by this transaction.

GCMD
: Number of AO application GET COMMAND calls issued by this transaction.

GMSG
: Number of AO application GET MESSAGE calls issued by this transaction.

ICMD
: Number of AO application ICMD calls issued by this transaction.

INIT
: Number of INIT calls issued by this transaction.

INQY
: Number of INQUIRY calls issued by this transaction.

RCMD
: Number of RETRIEVE COMMAND calls issued by this transaction.

ROLB
: Number of ROLLBACK calls issued by this transaction.

ROLS
: Number of ROLLBACK TO SETS/SETU calls issued by this transaction.

SETO
: Number of SET OPTIONS calls issued by this transaction.

SETS
: Number of SET BACKOUT POINT calls issued by this transaction.

SETU
: Number of SET UNCONDITIONAL calls issued by this transaction.

XRST
: Number of EXTENDED RESTART calls issued by this transaction.

```
 Area 5

---------------------------FP  ACTIVITY--------------------------------
NBA........      10        DATABASE    AREA       RBA      ENQ
OBA........      10        CUSTDB      CUSTDB01   0015BA00 SHR
USED.......       2        CUSTDB      CUSTDB02   00263300 EXE
                           CUSTADD     CUSTADD1   00B19300 SHR
```

This area shows the region Fast Path call activity for the transaction currently processing. The descriptions are arranged in alphabetical order.

NBA
: Number of buffers defined for Normal Buffer Allocation.

OBA
: Number of buffers defined for Overflow Buffer Allocation.

USED
: Total buffers used. If this total is greater than the NBA value, the extra buffers are taken from the overflow buffer allocation.

The following fields display the first 10 Fast Path database locks held by this region. They show the Fast Path database activity occurring for this transaction.

AREA
: Fast Path database area being accessed by this transaction.

DATABASE
: Fast Path database being accessed by this transaction.

ENQ
: ENQ type, which can be either SHR (read) or EXE (update).

RBA
: IMS resource ID being locked. For Fast Path DEDBs, this is the high-order three bytes of the control interval RBA.

```
 Area 6

---------------------------DB2 ACTIVITY---------------SQL TOT....       1
DB2NAME....DB2D            CONTROL....       0        INSERTS....       0
PLANNAME...PHDAMINQ        DYNAMIC....       0        DELETES....       0
SEL/FCH....       1        DDL........       0        UPDATES....       0
OPENS......       0        OTHER......       0
```

This area shows the region DB2 subsystem call activity for the transaction currently processing. The descriptions are arranged in alphabetical order.

For DBCTL, only BMPs are shown. CICS does not use IMS services to access DB2.

CONTROL
: Total number of SQL control type calls issued to DB2 (GRANT or REVOKE, for example) by the transaction currently processing.

DB2NAME
: DB2 subsystem ID.

DDL
: Number of SQL Data Definition Language calls issued to DB2 (CREATE, DROP, ALTER, COMMENT, or LABEL, for example) by the transaction currently processing.

DELETES
: Total number of SQL DELETE calls issued to DB2 by the transaction currently processing.

DYNAMIC
: Total number of SQL dynamic calls issued to DB2 (PREPARE, DESCRIBE, or EXECUTE, for example) by the transaction currently processing.

INSERTS
: Total number of SQL INSERT calls issued to DB2 by the transaction currently processing.

OPENS
: Total number of SQL OPEN cursor calls issued to DB2 by the transaction currently processing.

OTHER
: Number of other SQL calls issued to DB2 by the transaction currently processing that do not fit in any of the other types defined in this display (EXPLAIN, LOCK, LABEL, CLOSE, or table and security manipulation, for example).

PLANNAME
: Plan name used for this transaction.

SEL/FCH
: Total number of SQL SELECT and FETCH calls issued to DB2 by the transaction currently processing.

SQL TOT
: Total number of SQL calls issued to DB2 by the transaction currently processing.

UPDATES
: Total number of SQL UPDATE calls issued to DB2 by the transaction currently processing.

Area 7

```
---------------------------PSB/TRANSACTION-----------------------------------
PSB SIZE...     148        MODE.......SNGL              CONVERS....
PSB WA.....    2880        SEGMENT....SNGLSEG           SPA LEN....
PROCLIM....   65535        QUEUED..... 1                PRIORITY...   4
AVG LENG...     200                                     TOT DEQ....       3
PRLIM CPU..      10        CPU REMAIN.       9
```

This area shows general information about the application program activity and the transaction currently processing. The descriptions are arranged in alphabetical order.

AVG LENG
: (This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

The average length of all input messages received with this transaction code (as calculated by the IMS queue manager). For MDPs, this value is 0.

CONVERS
: Indicates whether this transaction is a conversational transaction (YES) or not (NO). It is blank for Fast Path regions.

CPU REMAIN
: Remaining CPU time in seconds for this transaction before the CPU processing limit (PRLIM CPU) is reached.

MODE
: (This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Transaction mode, which can be SNGL or MULT. An IMS synchronization point occurs at each request for a new message (SNGL) or only at program termination (MULT).

PRIORITY
: Current scheduling priority of this transaction.

PRLIM CPU
: Processing limit CPU time in seconds.

PROCLIM
: Processing limit count. The number of transactions that can be processed by this program in one scheduling. If there is no limit, the field is blank.

PSB SIZE

Total space in bytes used by this program in the PSB pool. This may include the size of the PSB (if not resident), the intent list (if not resident), and a copy of the PDIR (PSB directory entry) if needed for parallel scheduling. If the PSB is resident and not parallel-scheduled, this value is zero.

Note: This value includes the size of the PSB in the CSA pool.

PSB WA

Size of the work area required by this program in the PSB work pool.

QUEUED

(This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Number of currently queued input messages for this transaction code. For MDPs (message-driven program), it is the number of messages queued on this region's BALG.

SEGMENT

(This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

SNGLSEG for single segment or MULTSEG for multiple segment.

SPA LEN

Length of a conversational transaction's SPA (Scratch Pad Area). If the transaction code is not conversational, this field is blank.

TOT DEQ

Total number of messages processed for this transaction code since IMS cold start. For MDPs, the number of messages dequeued from this region's BALG.

Note: This counter wraps to zero after reaching 32K.

Area 8

```
---------------------------PROGRAM ISOLATION ACTIVITY-------------------------
                TEST      Q COMMAND          SHR/UPD         EXCLUSIVE
ENQ             14              0               10               0
DEQ             11              0                7               0
CURQ             3              0                3               0
WAIT             0              0                0               0
```

This area shows IMS program isolation (PI) statistics for the transaction currently running.

These statistics give you the amount of segment-locking activity an application is doing. They are not reset until the transaction terminates. If the application processes multiple transactions in one scheduling, these statistics include the activity of transactions processed earlier in the scheduling.

The columns in this area of the display show the IMS request type. The rows show the type of activity. To interpret the data in this area of the display, look at the row to see the type of activity, then look at the column for the request type. For example, Row 1, Column 1 shows the number of TEST ENQs and Row 2, Column 3 shows the number of SHR or UPD DEQs.

The request types are:

TEST
: Test enqueues are issued by IMS to determine if a resource is currently held by another task. Test enqueues do not result in a lock being acquired. They may optionally request to wait for a resource to become available before control is returned to them.

Q Command
: These are segment reservation requests made by the application program using the Q command code in the segment search argument (SSA).

SHR/UPD
: These are normal enqueue requests to lock a database segment. SHR locks are for reads (with integrity) and UPD locks are for updates, deletes, and inserts. The statistics for SHR and UPD are not reported separately, because lock requests are combined into one number by IMS.

Exclusive
: These are exclusive enqueues. They are issued by IMS administrative tasks that are not related to database segment level requests. Examples of these types of requests are data set opens and extends. They also are used for Fast Path databases whenever two or more regions need a particular control interval or the use of the overflow buffers.

The types of activity reported include:

ENQ
: Number of enqueue requests since transaction code scheduling to acquire a resource lock.

DEQ
: Number of dequeue requests since transaction code scheduling to release a resource lock.

CURQ
: Number of current enqueue requests calculated by subtracting the number of dequeues from the number of enqueues. This only approximates the number of currently held enqueues, because:

- Some dequeue requests only demote a lock from UPD (update) to SHR (share). The request is counted as a dequeue, but the application still holds a lock.
- At synchronization point time, all enqueues are released and are not counted as dequeues. These statistics are not reset until the application program terminates. Thus, the CURQ field may be too high if multiple transactions are processed in the same scheduling.
- The exclusive dequeue count can be larger than the exclusive enqueue count, because the dequeue count at synchronization point may include resources that were not counted as enqueues.

WAIT

Number of times the application had to wait since transaction code scheduling for an enqueue to be granted.

Tuning Tip

To identify an application doing a database scan, look for increasing counts in the ENQ and DEQ rows and no change in count in the CURQ row for the SHR/UPD column.

Area 9

```
---------------------------SYSTEM ACTIVITY-----------RGN ELAPSED 01:30:04
EXEC IN...  DLI-SAS        TCB CPU....   1,740        DOMAIN.....       1
ASID......       11        SRB CPU....     234        PERF GR....      13
PRIORITY..      238        CPU SRV....   10968        PERF PD....       1
SWAP...... NON-SWAP        IO SRV.....    3555                          4
                           MSO SRV....       6
```

This area shows general information about the region in relation to the operating system. The descriptions are arranged in alphabetical order.

ASID

OS/390 address space identification number.

CPU SRV

Total CPU service units for this address space.

DOMAIN

Address space domain used by SRM. `N/A` is shown if WLM is in goal mode.

EXEC IN

Execution is in the control or dependent region:

ALC	Currently executing in a TCB for IMS internal use
ALM	Currently executing in a selective dispatching TCB (application program maintaining LU 6.2 conversation for a long time)
BMP	Currently executing under a Batch Message Processing region TCB
CTL	Currently executing in the control region TCB
CTX	Currently executing under a control region auxiliary TCB
DBT	Currently executing under a DBCTL (CICS attachment) region TCB
DCC	Currently executing under a DCCTL management TCB
DLG	Currently executing in the DASD log TCB
DLI	Currently executing in a TCB in the DL/I address space
DRA	Currently executing under a database resource adapter thread (DBCTL connection) TCB
DRC	Currently executing in a database recovery processing TCB
DTT	Currently executing in a TCB for IMS internal use

DYA	Currently executing in a dynamic allocation TCB
DYD	Currently executing in a TCB for IMS internal use
DYS	Currently executing in a dynamic control services TCB (dynamic allocation service in the DL/I subordinate address space)
ESI	Currently executing in an external subsystem interface TCB
ESS	Currently executing an external subsystem request TCB
IFP	Currently executing under a Fast Path region TCB
LRD	Currently executing in a TCB for IMS internal use
LRM	Currently executing in a TCB for IMS internal use
LSD	Currently executing in a local storage management TCB
LUM	Currently executing in an APPC request management TCB
MOD	Currently executing in an IMS control, MODIFY TCB
MPP	Currently executing under a Message Processing region TCB
RDS	Currently executing in a restart data set processing TCB
RLM	Currently executing in an IRLM request processing TCB
RST	Currently executing in a restart processing TCB
STC	Currently executing in a storage compression TCB
STM	Currently executing in a storage management TCB (job step TCB)
TMC	Currently executing in a time controlled option (TCO) TCB
TRA	Currently executing in an IMS trace processing TCB
XCF	Currently executing in an Extended Communication Facility (LU 6.2) TCB
XFP	Currently executing in a Fast Path common services TCB
`xx=?`	Displayed when an unknown task ID (TCB) is encountered The unknown task ID replaces `xx` (contact BMC Software Customer Support).

IO SRV
: Total I/O service units for this address space.

MSO SRV
: Total main storage service units for this address space.

PERF GR
: Address space performance group used by SRM. `N/A` is shown if WLM is in goal mode.

PERF PD
: Address space current performance period used by SRM. `N/A` is shown if WLM is in goal mode.

PRIORITY
: Current priority of this address space on the dispatch queue. `N/A` is shown if WLM is in goal mode.

RGN ELAPSED
: Elapsed time the region has been active (current time - region start time) expressed in hours, minutes, and seconds (hh:mm:ss).

SRB CPU
: Total region SRB CPU time expressed in seconds.

SWAP
: Current swapping status of the address space:

IN	Swapped in
NON-SWAP	Nonswappable
OUT	Swapped out

TCB CPU
: Total region TCB CPU time expressed in seconds.

Area 10

```
---------------------------PAGING ACTIVITY-------------------------------------
WRK IN.....       6        INT PGI....   4,040        VIO PGI....       0
WRK OUT....      25        INT PGO....   2,494        VIO PGO....       0
FRAMES.....       6        INT RCL....     405        VIO RCL....       0
SLOTS......      43        SWAPCNT....       0        SLT VIO....   4,440
COM PGI....  11,042        COM RCL....     346        STOLEN.....   4,145
************************* END OF DATA ****************************************
```

This area shows a summary of paging activity in the region. The descriptions are arranged in alphabetical order.

Paging counts refer to the current SRM interval (time since last swap-in). These count fields are blank when the corresponding address space is swapped out. When the region is nonswappable, the counts are totals accumulated since the region started.

COM PGI
: Number of page-ins in the common area (CSA/LPA) for this address space during this interval.

COM RCL
: Number of page reclaims in the common area (CSA/LPA) for this address space during this interval.

FRAMES
: Number of page frames of real storage currently allocated to this address space.

INT PGI
: Number of page-ins during this interval.

INT PGO
: Number of page-outs during this interval.

INT RCL
: Number of page reclaims during this interval.

SLOTS
: Number of pages (slots) of direct access storage on the paging device that is allocated to this address space. This includes VIO and non-VIO slots.

SLT VIO
: Number of pages (slots) of direct access storage on the paging devices that are allocated to this address space for VIO.

STOLEN
: Number of pages stolen for this address space during this interval.

SWAPCNT
: Number of times this address space has been swapped out. Even though the regions are marked nonswappable, they may swap during initialization. After this, the count remains the same.

VIO PGI
: Number of page-ins for VIO during this interval.

VIO PGO
: Number of page-outs for VIO during this interval.

VIO RCL
: Number of VIO page reclaims during this interval.

WRK IN
: Number of page frames last swapped in.

WRK OUT
: Number of page frames last swapped out.

DREGN - Region Detail (No Event Collector Data)

```
BMC SOFTWARE---------------   IMS DETAIL REGION     -----------PERFORMANCE MGMT
SERV ==> DREGN   INPUT   10:42:38  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> 002      ROW  1 OF  40 SCROLL=> CSR
EXPAND: DLIST PI LUSRD CICS DB2 GOTO( DC DLI OTHR FP DB2 PSB PI SYS PAGING)
PF10/11 FOR PREV/NEXT REGION
RGNID.....        2         STATUS.... ACTV-USR         ENQ TIME.. 10:42:36
JOB NAME..  MPPRGN2         TRANCODE.. DLZZ             TRN ELAP..    200ms
TYPE......      MPP         PSB....... STBCUSR          AGN....... PAYROLL
MSG SWITCH        0         LTERM..... T002             CLASS.   >1   3   5   2
SEQ BF USG        0         USER...... CIR11            DB2STAT... DB2D-CON
----------------------------DC CALL ACTIVITY------------------------------
MSG GU....        0         MSG OTHER.        0         PROCLIM...        0
MSG GN....        0         MSG PURG..        0         CMD.......        0
CHKPT.....        0         MSG ISRT..        0         GET CMD...        0
----------------------------DL/I CALL ACTIVITY--------- DL/I TOT..       10
DB GU.....        1         DB GNP....        0         TRAN PROC.        0
DB GHU....        0         DB GHNP...        0         DB ISRT...        0
DB GN.....        9         DEDB......        0         DB REPL...        0
DB GHN....        0         MSDB......        0         DB DLET...        0
----------------------------OTHER CALL ACTIVITY---------------------------
CMD.......        1         SETO......        0         APSB......        0
GCMD......        2         SETS......        3         DPSB......        0
ICMD......        0         SETU......        0         INIT......        0
RCMD......        0         ROLB......        0         INQY......        0
GMSG......        0         ROLS......        0         AUTH......        0
CHNG......        0         XRST......        0         DB DEQ....        0
----------------------------FP ACTIVITY-----------------------------------
NBA........      10         DATABASE    AREA       RBA      ENQ
OBA........      10         CUSTDB      CUSTDB01   0015BA00 SHR
USED.......       2         CUSTDB      CUSTDB02   00263300 EXE
                            CUSTADD     CUSTADD1   00B19300 SHR
----------------------------PSB/TRANSACTION-------------------------------
PSB SIZE..     968         MODE...... SNGL             CONVERS...       NO
PSB WA....    2520         SEGMENT... SNGLSEG          SPA LEN...        0
PROCLIM...       0         QUEUED....        0         PRIORITY..        0
AVG LENG...    200                                     TOT DEQ....       0
----------------------------PROGRAM ISOLATION ACTIVITY--------------------
              TEST          Q COMMAND        SHR/UPD         EXCLUSIVE
ENQ              0               0              10                 1
DEQ              0               0               9                 1
CURQ             0               0               1                 0
WAIT             0               0               0                 0
---------------------------SYSTEM ACTIVITY------------RGN ELAPSED 01:30:04
EXEC IN...  DLI-SAS         TCB CPU....   1,740         DOMAIN.....       1
ASID......       11         SRB CPU....     234         PERF GR....      13
PRIORITY..      238         CPU SRV....   10968         PERF PD....       1
SWAP...... NON-SWAP         IO SRV.....    3555
                            MSO SRV....       6
----------------------------PAGING ACTIVITY-------------------------------
WRK IN....        0         INT PGI...        0         VIO PGI...        0
WRK OUT...        0         INT PGO...        0         VIO PGO...        0
FRAMES....        0         INT RCL...        0         VIO RCL...        0
SLOTS.....        0         SWAPCNT...        1         SLT VIO...        0
COM PGI...        5         COM RCL...        0         STOLEN....     5434
******************************** END OF DATA ********************************
```

Description: This version of DREGN shows you what transaction is currently running and the cumulative DL/I statistics and total resource usage since the PSB was scheduled in a dependent region. You can use the statistics to see region activity details about a transaction such as transaction arrival time into the input queue and elapsed time,

total number of DL/I or Fast Path calls issued since PSB scheduling, and a summary of paging and operating system activity for that region.

The DREGN version shown in "DREGN - Region Detail (Event Collector Data)" on page 127 uses the information produced by the Event Collector to provide region activity details about the work being performed by the transaction currently running.
Those details comprise resource usage statistics for that transaction instance rather than cumulative since PSB scheduling.
The statistics from that version are more extensive, including DB2 data, and the version is available only when the Event Collector is active.

You access this detailed region display:

- From the REGNS display
  - Move the cursor to a row (region) in the display and press ENTER.

    Detailed information about the region you selected is shown.
  - Move the cursor to DREGN in the EXPAND line of the display and press ENTER.

    Detailed information about the region in the first row of the REGNS display is shown.
- From the Analyzer Service List (Primary Menu Option 1)
  - Select DREGN or REGND and press ENTER.
- From the SERV field of any display.
  - Enter DREGN or REGND with a region ID as the parameter.

Color: If you have a color monitor:

Turquoise	Indicates normal values.
Blue	Indicates an EXPAND or GOTO option that cannot be used.
Yellow	Indicates error messages.
Pink	Highlights the following message when a WFI or pseudo-WFI transaction is waiting for input: `[PSEUDO] WFI TRAN WAITING - DATA IS FROM LAST TRANSACTION`

Select Code: DREGN or REGND

Parameter: Enter:

nnn

where nnn represents a 1- to 3-character numeric region ID.

You can use the PF10 key to display a previous region or the PF11 key to display the next region.

Expand: The display can EXPAND to other services by moving the cursor to the following fields and pressing ENTER:

DLIST	DL/I Call Status display showing DL/I call details for the displayed region.
PI	Program Isolation display showing pool space and enqueue summaries for the displayed region. If PI is not the IMS lock manager, this field cannot be used. It is blue on a color terminal and low intensity on a monochrome terminal, which indicates that it is not available.
LUSRD	The LUSRD Lock User Detail display showing lock information for the displayed region. If IRLM is not the IMS lock manager, this field is blue on a color terminal and low intensity on a monochrome terminal.

Hyperlink: If MAINVIEW for CICS is installed and the transaction is a CICS transaction, you can link to the TASKXPND service in MAINVIEW for CICS by using the CICS field in the EXPAND line.

If MAINVIEW for DB2 is installed and a transaction has an active DB2 thread, you can link to the DUSER service in MAINVIEW for DB2 by using the DB2 field in the EXPAND line.

GOTO: You also can go to a specific area by moving it to the top of the display. Move the cursor to any of the following GOTO fields in the EXPAND line and press ENTER:

Notes:

- If an area of the display cannot be accessed by this method, the fields are blue on a color terminal and low intensity on a monochrome terminal.
- If there is no activity to be displayed, that area of the display does not appear. For example, if a region does not use Fast Path databases, the FP ACTIVITY area of the display is not shown.

DC	DC CALL ACTIVITY
DLI	DL/I CALL ACTIVITY

FP	FP ACTIVITY
OTHR	Other types of DL/I calls than those shown by DL/I CALL ACTIVITY
PSB	PSB/TRANSACTION
PI	PROGRAM ISOLATION ACTIVITY
SYS	SYSTEM ACTIVITY
PAGING	PAGING ACTIVITY

Sorting: This display cannot be sorted.

Scrolling: You can scroll the display by:

- Using PF keys to scroll the display up or down.
- Selecting a GOTO field which selects a display area and scrolls it to the top as described in “GOTO:”.

Field Descriptions: Each of the fields is shown and described below by display area.

```
Area 1

RGNID.....        2         STATUS.... ACTV-USR         ENQ TIME.. 10:42:36
JOB NAME..  MPPRGN2         TRANCODE.. DLZZ             TRN ELAP..    200ms

TYPE......      MPP         PSB....... STBCUSR          AGN....... PAYROLL
MSG SWITCH        0         LTERM..... T002             CLASS.   >1   3   5   2
SEQ BF USG        0         USER...... CIR11            DB2STAT... DB2D-CON
```

This area shows general information about the application program activity in the region for the transaction currently processing. The descriptions are arranged in alphabetical order.

AGN

Name of the application group assigned to this region (if any).

CLASS

(This field does not apply for a TYP of DBT, for all Fast Path types, including MDP and NDP, and for an IMS DBCTL system.)

Classes defined for the region. The currently active class is shown by a > character preceding the class.

DB2STAT

DB2 connection status for the region. If the region is not connected to DB2, this field is blank. If the region is connected to a DB2 subsystem, the first half of the DB2 status message shows the DB2 subsystem name. The second half of the message shows the connection status:

-CON	IMS connects this region to DB2 if a connection is available and the EXEC parameter SSM (to establish a DB2 connection) is valid.

-SON The application is signed on and a recovery token is assigned by DB2 if the EXEC parameter SSM is valid, the connection is successful, and the application issues a DB2 request.

-THD IMS had a thread with DB2 when it processed the EXEC parameter SSM to establish a connection to DB2.

ENQ TIME

(This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Time when the transaction currently being processed was submitted (hh:mm:ss).

Note: This is the time of the originating terminal input transaction for message switches.

JOB NAME

Job name or started task procedure name of the region.

LTERM

LTERM name of the terminal where this transaction was submitted.

MSG SWITCH

(This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Number of message switches to generate this transaction.

PSB

PSB name of the application program currently being processed.

RGNID

Region identifier assigned to this region by IMS.

SEQ BF USG

Sequential buffer usage for this region in kilobytes.

STATUS

Region status:

ACTIVE Active in a nonspecific process.

ACTV-BKO Region in dynamic backout.

ACTV-DB2 Active in DB2 (Event Collector must be active).

ACTV-DBR Region active in DBRC.

ACTV-DLI Region active in DL/I.

ACTV-SCH Region active in nonspecific CREATE THREAD process.

ACTV-USR Region active in the application program.

IDLE Region waiting for non-WFI input to process.

IDLE-HOT Pseudo-WFI region waiting for input from the same transaction.

IDLE-WFI	Region waiting for WFI or Fast Path BALG input to process.
INACTIVE	Region defined but not started (not yet signed on).
OPENING	Region in first CREATE THREAD process.
SCH-BLR	Region in scheduling (active in block loader latch).
SCH-BLKM	Region in scheduling (active in block mover).
SCHDULE	Region in scheduling (CREATE THREAD).
TERMINAT	Region in region termination or abend.
WAIT-AOI	Region waiting for an AO message. Await for AO occurs when a region issues a GMSG call with the wait option and DFSAOE00 has no message to return to it at that time.
WAIT-BKO	Region currently in wait, but dynamic backout in progress.
WAIT-BLKM	Region waiting in block mover.
WAIT-BML	Region in scheduling (waiting for block mover latch). **Note:** The block mover latch comprises several smaller latches. To find which BML latch a region is waiting for, use the LATCH service.
WAIT-DLI	Region waiting for DL/I.
WAIT-INT	Region in scheduling (waiting for database intent).
WAITING	Region in nonspecific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see "LATCH - Latch Summary" on page 278.
WT-CMDP	Region waiting for a pending /DBD or /DBR command to complete.
WT-DBRC	Region waiting for DBRC.
WT-DMBP	Region in scheduling (waiting for DMB pool).
WT-EPCB	Region in scheduling (waiting for EPCB pool).
WT-IRLM	Region waiting for IRLM.
WT-ISWCH	Region did ISWITCH and is waiting in IMS dispatcher.
WT-NTFY	Region waiting for asynchronous notify(s) to complete (IRLM must be active). An asynchronous notify could be buffer invalidation, for example.

WT-OSAM Region waiting for OSAM.

WT-PI Region waiting for a program isolation lock to be freed.

WT-PSBP Region waiting for PSB pool.

WT-PSBW Region waiting for PSBW pool.

WT-SCHD Region waiting in a nonspecific CREATE THREAD process.

WT-VSAM Region waiting in VSAM.

WTF-ADSC Region waiting in Fast Path for ADSC directory latch (DEDB area data sets).

WTF-AREA Region waiting in Fast Path for DEDB area lock.

WTF-DEDB Region waiting in Fast Path for DEDB ownership.

WTF-DMSH Region waiting in Fast Path for DMAC share latch (DEDB area).

WTF-DMSY Region waiting in Fast Path for DMAC synchronization latch (DEDB area).

WTF-FBFR Region waiting in Fast Path for FIX buffer (DEDB).

WTF-FCMD Region waiting in Fast Path for FNCB (Fast Path command) latch.

WTF-MSDB Region waiting in Fast Path for MSDB latch.

WTF-OBA Region waiting in Fast Path for overflow buffer interlock.

WTF-OCL Region waiting in Fast Path for open/close latch.

WTF-RSL Region waiting in Fast Path for resource latch.

WTF-SEG Region waiting in Fast Path for MSDB segment.

WTF-SYNC Region waiting in Fast Path for synchronization latch.

Note: A # character in place of the - character in a status indicates activity resulted from an IMS data capture exit (user exit for data propagation and site requirements) instead of the application program. For example, if a data capture exit made a request that is waiting for a program isolation lock, the STATUS field shows WT#PI rather than WT-PI. For more information about data capture exits, see the IBM System Administration Guide publication.

The Event Collector must be active to obtain the data capture exit status when the exit issues a DB2 call.

TRANCODE
Name of the transaction currently being processed.

TRN ELAP

Current time minus the transaction start time.

Note: If you have more than one system clock set, they must be synchronized for TRN ELAP to be accurate.

TYPE

Type of region processing the transaction:

BMI Batch message processing region currently executing an implicit APPC/IMS transaction.

BMP Batch message processing region.

BMW Wait for input BMP.

CON Conversational MPP region.

DBT DBCTL (CICS attachment) region.

FPU Fast Path utility regions.

MDP Message-driven Fast Path region.

MPI Message processing region currently executing an implicit APPC/IMS transaction.

MPP Message processing regions.

MPW Wait for input MPP.

NDP Non-message-driven Fast Path region.

TPI Message processing region currently executing an explicit CPI-C program.

USER

ID of the user who submitted this transaction. For a DBCTL transaction, this is the ID of the CICS user.

Area 2

```
----------------------------DC CALL ACTIVITY-------------------------------
MSG GU....        0         MSG OTHER.        0         PROCLIM...        0
MSG GN....        0         MSG PURG..        0         CMD.......        0
CHKPT.....        0         MSG ISRT..        0         GET CMD...        0
```

This area shows the amount of DC call activity incurred by the transaction currently processing. The descriptions are arranged in alphabetical order.

CHKPT

Number of checkpoint calls issued by this transaction.

CMD
: Number of command calls issued by this program since PSB scheduling.

GET CMD
: Number of GET command calls issued by this program since PSB scheduling.

MSG GN
: (This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Number of MESSAGE GET NEXT calls issued by this program since PSB scheduling.

MSG GU
: (This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Number of MESSAGE GET UNIQUE calls issued by this program since PSB scheduling.

MSG ISRT
: (This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Number of MESSAGE INSERT calls issued by this program since PSB scheduling. For MDPs, this value does not include I/O PCB ISRTs.

MSG OTHER
: (This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Number of DC DL/I calls other than GU, GN, CHKPT, PURG, and ISRT. This includes system service calls, such as SETS and ROLS, and AO application calls, such as CMD and GCMD.

MSG PURG
: (This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Number of MESSAGE PURGE calls issued by this program since PSB scheduling.

PROCLIM
: (This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Processing limit count (PROCLIM). Number of transactions that can be processed by this program in one scheduling. If there is no processing limit, this field is blank.

```
 Area 3
----------------------------DL/I CALL ACTIVITY--------- DL/I TOT..       10
DB GU.....        1         DB GNP....        0         TRAN PROC.        0
DB GHU....        0        DB GHNP...        0        DB ISRT...        0
DB GN.....        9         DEDB......        0         DB REPL...        0
DB GHN....        0         MSDB......        0         DB DLET...        0
```

This area shows the amount of DL/I call activity incurred by the transaction currently processing. The descriptions are arranged in alphabetical order.

Note: If the TRAN PROC value is greater than 1, the database (DB) counts are cumulative since the start of this PSB scheduling.

DB DLET

Number of DELETE calls issued by this program against full function databases since PSB scheduling.

DB GHN

Number of GET HOLD NEXT calls issued by this program against full function databases since PSB scheduling.

DB GHNP

Number of GET HOLD NEXT within PARENT calls issued by this program against full function databases since PSB scheduling.

DB GHU

Number of GET HOLD UNIQUE calls issued by this program against full function databases since PSB scheduling.

DB GN

Number of GET NEXT calls issued by this program against full function databases since PSB scheduling.

DB GNP

Number of GET NEXT within PARENT calls issued by this program against full function databases since PSB scheduling.

DB GU

Number of GET UNIQUE calls issued by this program against full function databases since PSB scheduling.

DB ISRT

Number of INSERT calls issued by this program against full function databases since PSB scheduling.

DB REPL

Number of REPLACE calls issued by this program against full function databases since PSB scheduling.

DL/I TOT

Total number of DL/I database calls issued by this program since PSB scheduling.

DEDB

Total calls issued against DEDB databases since PSB scheduling.

MSDB

(This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Total calls issued against MSDB databases since PSB scheduling.

TRAN PROC

Number of transaction code messages this program processed. If this value is greater than 1, the database counts are cumulative since the start of this PSB scheduling.

```
 Area 4


----------------------------OTHER CALL ACTIVITY----------------------------
CMD.......        1         SETO......        0         APSB......
GCMD......        2         SETS......        3         DPSB......        0
ICMD......        0         SETU......        0         INIT......        0
RCMD......        0         ROLB......        0         INQY......
GMSG......        0         ROLS......        0         AUTH......        0
CHNG......        0         XRST......        0         DB DEQ....        0
```

This area shows the amount of IMS call activity, other than the calls shown by the “DL/I CALL ACTIVITY” section, incurred by the transaction currently processing. The descriptions are arranged in alphabetical order.

APSB
: Number of ALLOCATE PSB calls issued by this program.

AUTH
: Number of AUTHORIZATION calls issued by this program since PSB scheduling.

CHNG
: (This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

  Number of CHANGE DC calls issued by this program since PSB scheduling.

CMD
: Number of AO application COMMAND calls issued by this program since PSB scheduling.

DB DEQ
: Number of DATABASE DEQUEUE calls issued by this program since PSB scheduling.

DPSB
: Number of DEALLOCATE PSB calls issued by this program.

GCMD
: Number of AO application GET COMMAND calls issued by this program since PSB scheduling.

GMSG
: Number of AO application GET MESSAGE calls issued by this program since PSB scheduling.

ICMD
: Number of AO application ICMD calls issued by this program since PSB scheduling.

INIT
: Number of INIT calls issued by this program since PSB scheduling.

INQY
: Number of INQUIRY calls issued by this program since PSB scheduling.

RCMD
: Number of RETRIEVE COMMAND calls issued by this program since PSB scheduling.

ROLB
: Number of ROLLBACK calls issued by this program since PSB scheduling.

ROLS
: Number of ROLLBACK TO SETS/SETU calls issued by this program since PSB scheduling.

SETO
: Number of SET OPTIONS calls issued by this program since PSB scheduling.

SETS
: Number of SET BACKOUT POINT calls issued by this program since PSB scheduling.

SETU
: Number of SET UNCONDITIONAL calls issued by this program since PSB scheduling.

XRST
: Number of EXTENDED RESTART calls issued by this program since PSB scheduling.

Area 5

```
----------------------------FP ACTIVITY-----------------------------------
NBA........      10         DATABASE    AREA       RBA      ENQ
OBA........      10         CUSTDB      CUSTDB01   0015BA00 SHR
USED.......       2         CUSTDB      CUSTDB02   00263300 EXE
                            CUSTADD     CUSTADD1   00B19300 SHR
```

This area shows the region Fast Path call activity for the transaction currently processing. The descriptions are arranged in alphabetical order.

NBA
: Number of buffers defined for Normal Buffer Allocation.

OBA
: Number of buffers defined for Overflow Buffer Allocation.

USED
: Total buffers used. If this total is greater than the NBA value, the extra buffers are taken from the overflow buffer allocation.

The following fields display the first 10 Fast Path database locks held by this region. They show the Fast Path database activity that is occurring for this transaction.

AREA
: Fast Path database area being accessed by this transaction.

DATABASE
: Fast Path database being accessed by this transaction.

ENQ
: ENQ type, which can be either SHR (read) or EXE (update).

RBA
: IMS resource ID being locked. For Fast Path DEDBs, this is the high-order three bytes of the control interval RBA.

Area 6

```
----------------------------PSB/TRANSACTION--------------------------------
PSB SIZE..      968         MODE...... SNGL             CONVERS...       NO
PSB WA....     2520         SEGMENT... SNGLSEG          SPA LEN...        0
PROCLIM...        0         QUEUED....       0          PRIORITY..        0
AVG LENG...     200                                     TOT DEQ....       0
```

This area shows general information about the application program activity and the transaction currently processing. The descriptions are arranged in alphabetical order.

AVG LENG
: (This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

  The average length of all input messages received with this transaction code (as calculated by the IMS queue manager). For MDPs, this value is 0.

CONVERS
: Indicates whether this transaction is a conversational transaction (YES) or not (NO). It is blank for Fast Path regions.

MODE
: (This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

  Transaction mode, which can be SNGL or MULT. An IMS synchronization point occurs at each request for a new message (SNGL) or only at program termination (MULT).

PRIORITY
: Current scheduling priority of this transaction.

PROCLIM
: Processing limit count (PROCLIM). Number of transactions that can be processed by this program in one scheduling. If there is no processing limit, this field is blank.

PSB SIZE
: Total space in bytes used by this program in the PSB pool. This may include the size of the PSB (if not resident), the intent list (if not resident), and a copy of the PDIR (PSB directory entry) if needed for parallel scheduling. If the PSB is resident and not parallel-scheduled, this value is zero.

  Note: This value includes the size of the PSB in the CSA pool.

PSB WA
: Size of the work area required by this program in the PSB work pool.

QUEUED

(This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Number of currently queued input messages for this transaction code. For MDPs (message-driven program), it is the number of messages queued on this region's BALG.

SEGMENT

(This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

SNGLSEG for single segment or MULTSEG for multiple segments.

SPA LEN

Length of a conversational transaction's SPA (Scratch Pad Area). If the transaction code is not conversational, this field is blank.

TOT DEQ

Total number of messages processed for this transaction code since IMS cold start. For MDPs, the number of messages dequeued from this region's BALG.

Note: This counter wraps to zero after reaching 32K.

Area 7

```
----------------------------PROGRAM ISOLATION ACTIVITY---------------------
                TEST          Q COMMAND        SHR/UPD         EXCLUSIVE
ENQ              0                0               10                 1
DEQ              0                0                9                 1
CURQ             0                0                1                 0
WAIT             0                0                0                 0
```

This area shows IMS program isolation (PI) statistics for the transaction currently running.

These statistics give you the amount of segment-locking activity an application is doing. They are not reset until the transaction terminates. If the application processes multiple transactions in one scheduling, these statistics include the activity of transactions processed earlier in the scheduling.

The columns in this area of the display show the IMS request type. The rows show the type of activity. To interpret the data in this area of the display, look at the row to see the type of activity, then look at the column for the request type. For example, Row 1, Column 1 shows the number of TEST ENQs and Row 2, Column 3 shows the number of SHR or UPD DEQs.

The request types are:

TEST

Test enqueues are issued by IMS to determine if a resource is currently being held by another task. Test enqueues do not result in a lock being acquired. They may optionally request to wait for a resource to become available before control is returned to them.

Q Command

These are segment reservation requests made by the application program using the Q command code in the segment search argument (SSA).

SHR/UPD

These are normal enqueue requests to lock a database segment. SHR locks are for reads (with integrity) and UPD locks are for updates, deletes, and inserts.
The statistics for SHR and UPD are not reported separately, because lock requests are combined into one number by IMS.

Exclusive

These are exclusive enqueues. They are issued by IMS administrative tasks that are not related to database segment level requests. Examples of these types of requests are data set opens and extends. They also are used for Fast Path databases whenever two or more regions need a particular control interval or the use of the overflow buffers.

The types of activity reported include:

ENQ

Number of enqueue requests since transaction code scheduling to acquire a resource lock.

DEQ

Number of dequeue requests since transaction code scheduling to release a resource lock.

CURQ

Number of current enqueue requests calculated by subtracting the number of dequeues from the number of enqueues. This only approximates the number of currently held enqueues, because:

- Some dequeue requests only demote a lock from UPD (update) to SHR (share). The request is counted as a dequeue, but the application still holds a lock.
- At synchronization point time, all enqueues are released and are not counted as dequeues. These statistics are not reset until the application program terminates. Thus, the CURQ field may be too high if multiple transactions are processed in the same scheduling.
- The exclusive dequeue count can be larger than the exclusive enqueue count, because the dequeue count at synchronization point may include resources that were not counted as enqueues.

WAIT

Number of times the application had to wait since transaction code scheduling for an enqueue to be granted.

Tuning Tip

To identify an application doing a database scan, look for increasing counts in the ENQ and DEQ rows and no change in count in the CURQ row for the SHR/UPD column.

Area 8

```
---------------------------SYSTEM ACTIVITY-----------RGN ELAPSED 01:30:04
EXEC IN...  DLI-SAS        TCB CPU....   1,740        DOMAIN.....       1
ASID......       11        SRB CPU....     234        PERF GR....      13
PRIORITY..      238        CPU SRV....   10968        PERF PD....       1
SWAP...... NON-SWAP        IO SRV.....    3555        4      MSO SRV....  6
```

This area shows general information about the region in relation to the operating system. The descriptions are arranged in alphabetical order.

ASID
: OS/390 address space identification number.

CPU SRV
: Total CPU service units for this address space.

DOMAIN
: Address space domain used by SRM. `N/A` is shown if WLM is in goal mode.

EXEC IN
: Execution is in the control or dependent region:

ALC	Currently executing in a TCB for IMS internal use
ALM	Currently executing in a selective dispatching TCB (application program maintaining LU 6.2 conversation for a long time)
BMP	Currently executing under a Batch Message Processing region TCB
CTL	Currently executing in the control region TCB
CTX	Currently executing under a control region auxiliary TCB
DBT	Currently executing under a DBCTL (CICS attachment) region TCB
DCC	Currently executing under a DCCTL management TCB
DLG	Currently executing in the DASD log TCB
DLI	Currently executing in a TCB in the DL/I address space
DRA	Currently executing under a database resource adapter thread (DBCTL connection) TCB
DRC	Currently executing in a database recovery processing TCB
DTT	Currently executing in a TCB for IMS internal use
DYA	Currently executing in a dynamic allocation TCB
DYD	Currently executing in a TCB for IMS internal use
DYS	Currently executing in a dynamic control services TCB (dynamic allocation service in the DL/I subordinate address space)
ESI	Currently executing in an external subsystem interface TCB
ESS	Currently executing an external subsystem request TCB
IFP	Currently executing under a Fast Path region TCB

LRD	Currently executing in a TCB for IMS internal use
LRM	Currently executing in a TCB for IMS internal use
LSD	Currently executing in a local storage management TCB
LUM	Currently executing in an APPC request management TCB
MOD	Currently executing in an IMS control, MODIFY TCB
MPP	Currently executing under a Message Processing region TCB
RDS	Currently executing in a restart data set processing TCB
RLM	Currently executing in an IRLM request processing TCB
RST	Currently executing in a restart processing TCB
STC	Currently executing in a storage compression TCB
STM	Currently executing in a storage management TCB (job step TCB)
TMC	Currently executing in a time controlled option (TCO) TCB
TRA	Currently executing in an IMS trace processing TCB
XCF	Currently executing in an Extended Communication Facility (LU 6.2) TCB
XFP	Currently executing in a Fast Path common services TCB
`xx=?`	Displayed when an unknown task ID (TCB) is encountered The unknown task ID replaces `xx` (contact BMC Software Customer Support).

IO SRV
: Total I/O service units for this address space.

MSO SRV
: Total main storage service units for this address space.

PERF GR
: Address space performance group used by SRM. `N/A` is shown if WLM is in goal mode.

PERF PD
: Address space current performance period used by SRM. `N/A` is shown if WLM is in goal mode.

PRIORITY
: Current priority of this address space on the dispatch queue. `N/A` is shown if WLM is in goal mode.

RGN ELAPSED
: Elapsed time the region has been active (current time - region start time) expressed in hours, minutes, and seconds (hh:mm:ss).

SRB CPU
: Total region SRB CPU time expressed in seconds.

SWAP

Current swapping status of the address space:

IN	Swapped in
NON-SWAP	Nonswappable
OUT	Swapped out

TCB CPU

Total region TCB CPU time expressed in seconds.

Area 9

```
----------------------------PAGING ACTIVITY--------------------------------
WRK IN....        0         INT PGI...        0         VIO PGI...        0
WRK OUT...        0         INT PGO...        0         VIO PGO...        0
FRAMES....        0         INT RCL...        0         VIO RCL...        0
SLOTS.....        0         SWAPCNT...        1         SLT VIO...        0
COM PGI...        5         COM RCL...        0         STOLEN....     5434
******************************** END OF DATA ********************************
```

This area shows a summary of paging activity in the region. The descriptions are arranged in alphabetical order.

Paging counts refer to the current SRM interval (time since last swap-in). These count fields are blank when the corresponding address space is swapped out. When the region is nonswappable, the counts are totals accumulated since the region started.

COM PGI

Number of page-ins in the common area (CSA/LPA) for this address space during this interval.

COM RCL

Number of page reclaims in the common area (CSA/LPA) for this address space during this interval.

FRAMES

Number of page frames of real storage currently allocated to this address space.

INT PGI

Number of page-ins during this interval.

INT PGO

Number of page-outs during this interval.

INT RCL

Number of page reclaims during this interval.

SLOTS

Number of pages (slots) of direct access storage on the paging device that is allocated to this address space. This includes VIO and non-VIO slots.

SLT VIO

Number of pages (slots) of direct access storage on the paging devices that are allocated to this address space for VIO.

STOLEN
: Number of pages stolen for this address space during this interval.

SWAPCNT
: Number of times this address space has been swapped out. Even though the regions are marked nonswappable, they may swap during initialization. After this, the count remains the same.

VIO PGI
: Number of page-ins for VIO during this interval.

VIO PGO
: Number of page-outs for VIO during this interval.

VIO RCL
: Number of VIO page reclaims during this interval.

WRK IN
: Number of page frames last swapped in.

WRK OUT
: Number of page frames last swapped out.

REGNS - IMS Regions (Event Collector Data)

REGNS
Summary View

(Default view when REGNS is requested)

```
Summary View

BMC SOFTWARE---------------      IMS REGIONS        -----------PERFORMANCE MGMT
SERV ==> REGNS   INPUT   10:38:57  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> V=SM,  SO=NA        ROW    1 OF    4 SCROLL=> CSR
VIEW:    SM, MSG, DLI, DB2   EXPAND: FSEL(+), LINESEL(DREGN), MON(RGN)
PF10/11 FOR PREV/NEXT VIEW                          *EVENT COLLECTOR*
ID NAME     TYP STATUS   PSB      TRANCODE USR/LTRM  DLI  SQL LOCKS TRN-ELAP
--- -------- --- -------- -------- ++++++++ -------- ++++ ++++ +++++ --------
1 CICS3302 DBT IDLE
2 CICS3302 DBT SCHEDULE STBCUSR  DLZZ                 0    0     0    450ms
3 CICS3302 DBT IDLE
4 IMSM17X  MPP IDLE
******************************** END OF DATA ********************************
```

REGNS
Message View

```
BMC SOFTWARE---------------      IMS REGIONS        -----------PERFORMANCE MGMT
SERV ==> REGNS      INPUT     10:40:42    INTVL=> 3    LOG=> N    TGT==> IMSA
PARM ==> V=MSG,  SO=NA       ROW    1 OF                        4 SCROLL=> CSR
VIEW:    SM, MSG, DLI, DB2   EXPAND: FSEL(+), LINESEL(DREGN), MON(RGN)
PF10/11 FOR PREV/NEXT VIEW                                    *EVENT COLLECTOR*
NAME     TYP CL1 CL2 CL3 CL4 TRANCODE PRLIM QUEUED M-DEQ M-GN M-PRG M-ISR
-------- --- --- --- --- --- ++++++++ ----- ++++++ ----- ---- ----- -----
CICS3302 DBT
CICS3302 DBT                 DLZZ         0      0     0    0     0     0
CICS3302 DBT
IMSM17X  MPP   1   2   3   4
******************************** END OF DATA ********************************
```

REGNS
DLI View

```
BMC SOFTWARE--------------       IMS REGIONS        -----------PERFORMANCE MGMT
SERV ==> REGNS  INPUT    11:44:25  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> V=DLI, SO=ID       ROW    1 OF   4 SCROLL=>  CSR
VIEW: SM, MSG, DLI, DB2   EXPAND: FSEL(+), LINESEL(DREGN), MON(RGN)
PF10/11 FOR PREV/NEXT VIEW                                  *EVENT COLLECTOR*
NAME     TRANCODE #DB    GU    GN  GHU  GHN REPL ISRT DLET   TOT CHKP  I/O
-------- ++++++++ --- ----- ----- ---- ---- ---- ---- ---- +++++ ---- ----
MPPRGN2  SM4        2     4     2    0    0    0    0    0     6    0    0
MPPRGN3  LMZ200XX   1     1     2    0    0    0    0    0     3    0    1
CICSRGN1 DZ33       1     5     4    0    0    0    0    0     9    0    2
MPPRGN9  APPCPGM1   2     2     1    0    0    0    0    0     3    0    1
***************************** END OF DATA ************************************
```

```
BMC SOFTWARE--------------       IMS REGIONS        -----------PERFORMANCE MGMT
SERV ==> REGNS  INPUT    11:44:25  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> V=DB2, SO=ID       ROW    1 OF   4 SCROLL=>  CSR
VIEW: SM, MSG, DLI, DB2  EXPAND: FSEL(+),  LINESEL(DREGN), MON(RGN)
PF10/PF11 FOR PREV/NEXT VIEW                              *EVENT COLLECTOR*
NAME     TRANCODE FETCH  OPEN ISRT2 DLET2 UPDT2   DDL   DYN  CNTL OTHER  TOT2
-------- ++++++++ ----- ----- ----- ----- ----- ----- ----- ----- ----- +++++
MPPRGN2  SM4          1     0     0     0     0     0     0     0     0     1
MPPRGN3  LMZ200XX     4     1     0     0     0     0     0     0     0     5
CICSRGN1 DZ33
MPPRGN9  APPCPGM1     0     0     0     0     0     0     0     0     0
**************************** END OF DATA ***************************************
```

Description:

This is the Event Collector version of the REGNS display. If the Event Collector is not active, only the data shown by "REGNS - IMS Regions (No Event Collector Data)" on page 190 is displayed.

This version of REGNS takes advantage of additional data collected by the Event Collector. It shows IMS dependent region activity and the work currently being performed by IMS for the transaction currently processing. REGNS arranges this information by views. For example, there is a DL/I view that shows number of databases accessed, counts for number of checkpoints, and the number of I/Os incurred by a transaction.

The following views of dependent region activity for a transaction are available when the Event Collector is active:

SM (summary)	Shows status information about your active regions and the transactions that are currently executing. This is the default display.
MSG (message)	Shows information related to scheduling and the message queue.
DLI	Shows information by region about transaction DL/I database activity.
DB2	Shows information about a transaction's DB2 activity.

When the Event Collector is active, `*EVENT COLLECTOR*` is shown in the fifth line of the REGNS display.

When the Event Collector is not active, REGNS is limited to the amount of data it can display as shown by "REGNS - IMS Regions (No Event Collector Data)" on page 190. Also, REGNS without the Event Collector shows the data for the duration of a PSB scheduling rather than for the transactions currently processing.

Color: If you have a color monitor:

Blue	Indicates the current view.
Red	Highlights regions (rows) that are in a wait state.
Turquoise	Indicates normal values.
Yellow	Indicates an error message.
Pink	Indicates a WFI or pseudo-WFI transaction is waiting for input. This affects the STATUS, PSB, and TRANCODE columns.

Select Code: REGNS

Parameter: All the REGNS parameters, except for SORT and VIEW, act as filters that restrict the information shown according to the criteria specified by the parameter(s). SORT sorts the columns in the display by specified characters. VIEW shows the requested view of REGNS data. The REGNS parameters can be used as follows:

- The filtering parameters apply across all views. All views are restricted by the specified parameter.

  For example, if you enter:

  ```
  TYPE=DBT
  ```

  in the DLI view, only the rows for DBCTL threads are displayed. A filtering parameter can be used with any view even though that view does not display the applicable field.

  Tuning Tip

  Use the NI or NOTIDLE parameter to see only those regions that are currently processing transactions.

- Multiple parameters must be separated by commas.
- A blank indicates the end of a parameter string.
- Multiple resources with similar names can be requested by using an * character as a generic qualifier and a + character as a positional qualifier. The positional qualifier is repeated for every character to be replaced. The generic qualifier replaces all characters at the end of the parameter.

  For example, a parameter of `NAME=MP*` shows all region names that start with MP and have any character in the rest of the name.

- If multiple filtering parameters are entered, the regions displayed must meet all the restrictions.

- If one parameter invalidates another, an error message is issued without further processing.

The following parameter descriptions are arranged alphabetically. The descriptions begin with parameters that start with a special character. Parameters containing a numeric character are first in their alphabetical group.

#D|#DB<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents the number of different DL/I databases accessed. It displays in each view only those regions with transactions that have a DL/I database access count less than (<), greater than (>), or equal to (=) the specified number.

AC|ACTCLASS=nnn|(nnn,...)

Where nnn represents a transaction class number. It displays in each view only those regions that are currently running a transaction in the specified class(es). A maximum of four classes can be specified.

AGN=xxxxxxxx

Where xxxxxxxxx represents the name of an application group. It displays in each view only those regions with a name that matches the specified application group name. The application group name for a region is shown in the AGN field of the DREGN display.

CK|CHKP<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a checkpoint count. It displays in each view only those regions with transactions that have a total checkpoint call count less than (<), greater than (>), or equal to (=) the specified number.

C1|CL1=nnn

Where nnn represents a transaction class number. It displays in each view only those regions with the first class equal to the specified number.

C2|CL2=nnn

Where nnn represents a transaction class number. It displays in each view only those regions with the second class equal to the specified number.

C3|CL3=nnn

Where nnn represents a transaction class number. It displays in each view only those regions with the third class equal to the specified number.

C4|CL4=nnn

Where nnn represents a transaction class number. It displays in each view only those regions with the fourth class equal to the specified number.

CL|CLASS=nnn|(nnn,..)

Where nnn represents a transaction class number. It displays in each view only those regions that can process this class(es) of transaction. A maximum of four classes can be specified.

CN|CNTL<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a DB2 control-type SQL call count (GRANT, for example). It displays in each view only those regions with transactions that have a total DB2 control SQL count less than (<), greater than (>), or equal to (=) the specified number.

DD|DDL<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a DB2 Data Definition Language (DDL) count. It displays in each view only those regions with transactions that have a total DB2 DDL count less than (<), greater than (>), or equal to (=) the specified number.

DT|DLET<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a DL/I database delete count. It displays in each view only those regions with transactions that have a database delete count less than (<), greater than (>), or equal to (=) the specified number.

D2|DLET2<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a DB2 database delete count. It displays in each view only those regions with transactions that have a total DB2 delete count less than (<), greater than (>), or equal to (=) the specified number.

DL|DLI<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnn represents the total DL/I call count. It displays in each view only those regions currently executing transactions with a total DL/I call count less than (<), greater than (>), or equal to (=) the specified number.

DY|DYN<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a DB2 dynamic call count. It displays in each view only those regions with transactions that have a total DB2 dynamic call count less than (<), greater than (>), or equal to (=) the specified number.

GN<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a GET NEXT and GET NEXT within PARENT count. It displays in each view only those regions with transactions that have a database GN and GNP count less than (<), greater than (>), or equal to (=) the specified number.

GU<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a GET UNIQUE count. It displays in each view only those regions with transactions that have a database GU count less than (<), greater than (>), or equal to (=) the specified number.

HN|GHN<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a GET HOLD NEXT and GET HOLD NEXT within PARENT count. It displays in each view only those regions with transactions that have a database GHN and GHNP count less than (<), greater than (>), or equal to (=) the specified number.

HU|GHU<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a GET HOLD UNIQUE count. It displays in each view only those regions with transactions that have a database GHU count less than (<), greater than (>), or equal to (=) the specified number.

IO<nnnnnnnn|>nnnnnnnn|=nnnnnnnn

Where nnnnnnnn represents a DL/I I/O count. It displays in each view only those regions with transactions that have a total Dl/I I/O count less than (<), greater than (>), or equal to (=) the specified number.

ID<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a region number. It displays in each view only those regions with a region number less than (<), greater than (>), or equal to (=) the specified number.

IS|ISRT<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents an INSERT count. It displays in each view only those regions with transactions that have a database ISRT count less than (<), greater than (>), or equal to (=) the specified number.

I2|ISRT2<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a DB2 INSERT count. It displays in each view only those regions with transactions that have a total DB2 ISRT count less than (<), greater than (>), or equal to (=) the specified number.

LO|LOCKS<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a PI or IRLM enqueue count. It displays in each view only those regions currently executing transactions with either outstanding PI enqueues or IRLM locks (if IMS IRLM is active) less than (<), greater than (>), or equal to (=) the specified number.

LT=xxxxxxxx

Where xxxxxxxx represents an LTERM name. It displays in each view only those regions processing transactions originating from an LTERM that matches the specified LTERM name. Multiple regions can be displayed by using an * or + qualifier; for example, `LT=SNL++060`.

MD|M-DEQ<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a message dequeue count. It displays in each view only those regions with transactions that have a message dequeue count less than (<), greater than (>), or equal to (=) the specified number.

MG|M-GN<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a message GET NEXT count. It displays in each view only those regions with transactions with message GN counts less than (<), greater than (>), or equal to (=) the specified number.

MI|M-ISR<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a message INSERT count. It displays in each view only those regions with transactions that have a message ISRT count less than (<), greater than (>), or equal to (=) the specified number.

MP|M-PRG<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a message PURGE count. It displays in each view only those regions with transactions that have a message PURG count less than (<), greater than (>), or equal to (=) the specified number.

NA|NAME=xxxxxxxx

Where xxxxxxxxx represents a region name. It displays in each view only those regions with a name that matches the specified region name. Multiple regions can be displayed by using an * or + qualifier; for example, NAME=*RGN1.

NI|NOTIDLE

It displays in each view only those regions that are not idle (active).

OP|OPEN<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a DB2 OPEN cursor count. It displays in each view only those regions with transactions that have a total DB2 OPEN cursor count less than (<), greater than (>), or equal to (=) the specified number.

OT|OTHER<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a count of other DB2 SQL calls. It displays in each view only those regions with transactions that have a count for DB2 SQL calls other than those defined for this display that is less than (<), greater than (>), or equal to (=) the specified number.

PL|PRLIM<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a region processing limit count. It displays in each view only those regions with transactions that have a processing limit count less than (<), greater than (>), or equal to (=) the specified number.

PS|PSB=xxxxxxxx

Where xxxxxxxxx represents a PSB name. It displays in each view only those regions with PSB names that match the specified name. Multiple regions can be displayed by using an * or + qualifier; for example, PSB=SM++0+00.

QU|QUEUED<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a transaction message input queue count. It displays in each view only those regions with transactions that have a message input queue count that is less than (<), greater than (>), or equal to (=) the specified number.

RE|REPL<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a database REPLACE count. It displays in each view only those regions with transactions that have a database REPL count less than (<), greater than (>), or equal to (=) the specified number.

SE|SEL<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a count of DB2 SQL SELECT and FETCH calls. It displays in each view only those regions with transactions that have a total SELECT and FETCH call count less than (<), greater than (>), or equal to (=) the specified number.

SO|SORT=cc

Where cc represents any of the following two-character view columns. The display is sorted by NAME by default. The sort sequence is ascending for alphanumeric characters and descending for numeric characters except for ID. The numeric region ID is sorted in ascending sequence.

Tip

An easy way to sort is to move the cursor to the column heading and press ENTER.

The following SORT parameter descriptions are arranged alphabetically. SORT keywords that start with a special character are described first. Keywords containing a numeric character are first in their alphabetical group. All views are sorted as requested by the specified parameter.

Any of these keywords can be used in any view.

#D Sorts the list by #DB (descending).

CK Sorts the list by CHKPT (descending).

C1 Sorts the list by CL1 (descending).

C2 Sorts the list by CL2 (descending).

C3 Sorts the list by CL3 (descending).

C4 Sorts the list by CL4 (descending).

CN Sorts the list by CNTL (descending).

D2 Sorts the list by DLET2 (descending).

DD Sorts the list by DDL (descending).

DL Sorts the list by DLI (descending).

DT Sorts the list by DLET (DL/I database; descending).

DY Sorts the list by DYN (descending).

GN Sorts the list by GN (DL/I database; descending).

GU	Sorts the list by GU (DL/I database; descending).
HN	Sorts the list by GHN (DL/I database; descending).
HU	Sorts the list by GHU (DL/I database; descending).
I2	Sorts the list by ISRT2 (descending).
ID	Sorts the list by ID (numeric region ID; ascending).
IO	Sorts the list by I/O (descending).
IS	Sorts the list by ISRT (DL/I database; descending).
LO	Sorts the list by LOCKS (descending).
LT	Sorts the list by USR/LTRM (ascending).
MD	Sorts the list by M-DEQ (descending).
MG	Sorts the list by M-GN (descending).
MI	Sorts the list by M-ISRT (descending).
MP	Sorts the list by M-PRG (descending).
NA	Sorts the list by NAME (default; ascending).
OP	Sorts the list by OPEN (descending).
OT	Sorts the list by OTHER (descending).
PL	Sorts the list by PRLIM (descending).
PS	Sorts the list by PSB name (ascending).
QU	Sorts the list by QUEUED (descending).
RE	Sorts the list by REPL (DL/I database; descending).
SE	Sorts the list by SEL/FETCH (descending).
SQ	Sorts the list by SQL (descending).
ST	Sorts the list by STATUS (ascending).
T2	Sorts the list by TOT2 (descending).
TE	Sorts the list by TRN-ELAP (descending).
TO	Sorts the list by TOT (DL/I database; descending).
TR	Sorts the list by TRANCODE (ascending).

TY Sorts the list by TYP (ascending).

U2 Sorts the list by UPDT2 (descending).

US Sorts the list by USR/LTRM (ascending).

SQ|SQL<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents an SQL call count. It displays in each view only those regions currently executing transactions with SQL call counts less than (<), greater than (>), or equal to (=) the specified number. Specify SQL>0 for any transaction that accesses DB2.

ST|STATUS=

It displays in each view only those regions that meet the specified criteria. Multiple regions can be displayed by using an * or + qualifier. For example, you can select all:

- Active regions by specifying `ST=A*`
- Idle regions by specifying `ST=ID*`
- Waiting regions by specifying `ST=W*`

Any of the region statuses described on page 121 can be specified with the STATUS parameter.

TO|TOT<nnn|>nnn|=nnn

Where nnn represents a total DL/I database call count. It displays in each view only those regions with transactions that have a total DL/I database call count less than (<), greater than (>), or equal to (=) the specified number.

T2|TOT2<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a total DB2 SQL call count. It displays regions with transactions that have a total DB2 SQL count less than (<), greater than (>), or equal to (=) the specified number.

TR|TRANCODE=xxxxxxxx

Where xxxxxxxx represents a transaction code. It displays in each view only those regions that have transaction codes that match the specified code. Multiple regions can be displayed by using an * or + qualifier; for example, `TR=+MZ200XX`.

TE|TRN-EL<nnn|>nnn|=nnn

Where nnn represents elapsed time in seconds. It displays regions currently executing transactions that have an elapsed time less than (<), greater than (>), or equal to (=) the specified time in seconds.

TY|TYP=xxx

Where xxx represents a region type. Multiple regions can be displayed by using an * or + qualifier; for example, TYP=M*.

The following type descriptions are arranged alphabetically:

BMI Displays batch message processing regions currently executing an implicit APPC/IMS transaction.

BMP Displays batch message processing regions.

BMW Displays wait for input BMP.

DBT Displays DBCTL (CICS attachment) regions.

FPU Displays Fast Path utility regions.

MDP Displays message-driven Fast Path regions.

MPI Displays message processing regions currently executing an implicit APPC/IMS transaction.

MPP Displays message processing regions.

MPW Displays wait for input MPP.

NDP Displays nonmessage-driven Fast Path regions.

TPI Displays message regions currently executing explicit CPI-C programs.

U2|UPDT2<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a DB2 update count. It displays in each view only those regions with transactions that have a total DB2 update count less than (<), greater than (>), or equal to (=) the specified number.

US|USR=xxxxxxxx

Where xxxxxxxx represents a user ID. It displays in each view only those regions with user IDs that match the specified ID. Multiple regions can be displayed by using an * or + qualifier; for example, USR=CICS*.

V|VIEW=SM|MSG|DLI|DB2

Displays the specified view:

SM Displays the REGNS summary status view (default).

MSG Displays the IMS/DC message view.

DLI Displays the DL/I database view.

DB2 Displays the DB2 database activity view.

View Selection: You can:

- Enter the VIEW parameter in the PARM field.
- Move the cursor to the view you want in the VIEW line and press ENTER.
- Use one of the following PF keys:

  PF10 Displays the previous view.

  PF11 Displays the next view.

Expand: The REGNS display can be EXPANDed by using the following fields as indicated:

FSEL(+)

Indicates that at least one column has cursor-sensitive fields. A string of + characters underneath a column name means this column contains cursor-sensitive fields. Moving the cursor to a field in that column and pressing the ENTER key invokes a related display for that field. For example, if the cursor is at a field value under the DLI column, pressing the ENTER key displays the DLIST service with the correct region number as the parameter. Columns with cursor-sensitive fields include:

DLI

The DLIST service showing DL/I call details can be displayed with the region number as a parameter.

TRANCODE

The TRANQ service showing transaction status details can be displayed with the transaction code as a parameter.

You can also hyperlink from this field to MAINVIEW for CICS as described on page 179.

SQL

You can hyperlink from this field to MAINVIEW for DB2 as described on page 179.

TOT2

You can hyperlink from this field to MAINVIEW for DB2 as described on page 179.

LOCKS
If IMS IRLM is active, the LUSRD service showing IRLM lock user details can be displayed with the region number as a parameter. If IRLM is not active, the PI service showing program isolation information can be displayed with the region number as a parameter.

QUEUED
The CLASQ service showing transaction queuing and processing can be displayed with the region number as a parameter.

TOT
The DLIST service showing DL/I call details can be displayed with the region number as a parameter.

When a display service is cursor-selected from a REGNS field, that service shows system data at the time it is invoked. It is not synchronized with the REGNS display.

Use the END PF key to return to the REGNS display.

LINESEL(DREGN)
Move the cursor to a region in one of the rows of a REGNS view and press ENTER to invoke the DREGN service. DREGN shows region details for the selected region.

Selecting DREGN with the cursor from the EXPAND line invokes the DREGN service for the region in the first row of the REGNS display.

MON(RGN)
Move the cursor to this field in the EXPAND line to display the Active Timer Request service for all active region monitors.

Hyperlink:

If MAINVIEW for CICS is installed and a transaction is a CICS transaction, you can link to the TASKXPND service in MAINVIEW for CICS by using the TRANCODE column in any view to cursor-select that transaction.

If MAINVIEW for DB2 is installed and a transaction has an active DB2 thread, you can link to the DUSER service in MAINVIEW for DB2 by using the SQL column in the summary view or the TOT2 column in the DB2 view to cursor-select that transaction.

Sorting:

The display list can be sorted by:

- Using the SORT parameter
- Positioning the cursor with the TAB key to the column heading to be sorted and pressing ENTER

This overrides any SORT parameter in the PARM field and primes that field with the action taken. The integrity of any other parameters entered in the PARM field is preserved.

The display list is sorted by NAME by default. Alphanumeric fields and the ID field are sorted in ascending order. Numeric fields are sorted in descending order. Fields with no values are sorted to the bottom of the list.

Scrolling: The display is scrollable.

Field Descriptions: Each of the fields is shown and described below by view.

```
Summary View

BMC SOFTWARE---------------      IMS REGIONS        -----------PERFORMANCE MGMT
SERV ==> REGNS   INPUT   10:38:57  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> V=SM,  SO=NA        ROW    1 OF    4 SCROLL=> CSR
VIEW:    SM, MSG, DLI, DB2   EXPAND: FSEL(+), LINESEL(DREGN), MON(RGN)
PF10/11 FOR PREV/NEXT VIEW                           *EVENT COLLECTOR*
ID NAME     TYP STATUS   PSB      TRANCODE USR/LTRM  DLI  SQL LOCKS TRN-ELAP
--- -------- --- -------- -------- ++++++++ -------- ++++ ++++ +++++ --------
1 CICS3302 DBT IDLE
2 CICS3302 DBT SCHEDULE STBCUSR  DLZZ                 0    0     0    450ms
3 CICS3302 DBT IDLE
4 IMSM17X  MPP IDLE
******************************** END OF DATA ********************************
```

This view shows the status of active regions and transactions. The descriptions are arranged in alphabetical order.

DLI

Total DL/I database call count for this transaction.

You can expand from this column to the DLIST service.

ID

Region identifier assigned to this region by IMS.

LOCKS

Either total outstanding PI enqueue counts or IRLM locks if IMS IRLM is active. An * character following the count indicates that this transaction is waiting for a PI or IRLM lock if IMS IRLM is active.

You can expand from this column to the LUSRD service if IRLM is active. Otherwise, you can expand to the PI service.

NAME

Job name or started task procedure name of the region.

PSB

PSB name of the application program currently being processed.

SQL

(This field does not apply for a TYP of DBT or an IMS DBCTL system.)

Total SQL count.

You can hyperlink from this column to the DUSER service in MAINVIEW for DB2 if it is installed and there is an active DB2 thread.

STATUS

Region status:

ACTIVE	Active in a nonspecific process.
ACTV-BKO	Region in dynamic backout.
ACTV-DB2	Active in DB2 (the Event Collector must be active).
ACTV-DBR	Region active in DBRC.
ACTV-DLI	Region active in DL/I.
ACTV-SCH	Region active in nonspecific CREATE THREAD process.
ACTV-USR	Region active in the application program.
IDLE	Region waiting for non-WFI input to process.
IDLE-HOT	Pseudo-WFI region waiting for input from the same transaction.
IDLE-WFI	Region waiting for WFI or Fast Path BALG input to process.
INACTIVE	Region defined but not started (not yet signed on).
OPENING	Region in first CREATE THREAD process.
SCH-BLR	Region in scheduling (active in block loader latch).
SCH-BLKM	Region in scheduling (active in block mover).
SCHDULE	Region in scheduling (CREATE THREAD).
TERMINAT	Region in region termination or abend.
WAIT-AOI	Region waiting for an AO message. Await for AO occurs when a region issues a GMSG call with the wait option and DFSAOE00 has no message to return to it at that time.
WAIT-BKO	Region currently in wait, but dynamic backout in progress.
WAIT-BLKM	Region waiting in block mover.

WAIT-BML	Region in scheduling (waiting for block mover latch). **Note:** The block mover latch comprises several smaller latches. To find which BML latch a region is waiting for, use the LATCH service.
WAIT-DLI	Region waiting for DL/I.
WAIT-INT	Region in scheduling (waiting for database intent).
WAITING	Region in nonspecific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see "LATCH - Latch Summary" on page 278.
WT-CMDP	Region waiting for a pending /DBD or /DBR command to complete.
WT-DBRC	Region waiting for DBRC.
WT-DMBP	Region in scheduling (waiting for DMB pool).
WT-EPCB	Region in scheduling (waiting for EPCB pool).
WT-IRLM	Region waiting for IRLM.
WT-ISWCH	Region did ISWITCH and is waiting in IMS dispatcher.
WT-NTFY	Region waiting for asynchronous notify(s) to complete (IRLM must be active). An asynchronous notify could be buffer invalidation, for example.
WT-OSAM	Region waiting for OSAM.
WT-PI	Region waiting for a program isolation lock to be freed.
WT-PSBP	Region waiting for PSB pool.
WT-PSBW	Region waiting for PSBW pool.
WT-SCHD	Region waiting in a nonspecific CREATE THREAD process.
WT-VSAM	Region waiting in VSAM.
WTF-ADSC	Region waiting in Fast Path for ADSC directory latch (DEDB area data sets).
WTF-AREA	Region waiting in Fast Path for DEDB area lock.
WTF-DEDB	Region waiting in Fast Path for DEDB ownership.
WTF-DMSH	Region waiting in Fast Path for DMAC share latch (DEDB area).
WTF-DMSY	Region waiting in Fast Path for DMAC synchronization latch (DEDB area).

WTF-FBFR Region waiting in Fast Path for FIX buffer (DEDB).

WTF-FCMD Region waiting in Fast Path for FNCB (Fast Path command) latch.

WTF-MSDB Region waiting in Fast Path for MSDB latch.

WTF-OBA Region waiting in Fast Path for overflow buffer interlock.

WTF-OCL Region waiting in Fast Path for open/close latch.

WTF-RSL Region waiting in Fast Path for resource latch.

WTF-SEG Region waiting in Fast Path for MSDB segment.

WTF-SYNC Region waiting in Fast Path for synchronization latch.

Note: A # character in place of the - character in a status indicates activity resulted from an IMS data capture exit (user exit for data propagation and site requirements) instead of the application program. For example, if a data capture exit made a request that is waiting for a program isolation lock, the STATUS field shows WT#PI rather than WT-PI. For more information about data capture exits, see the IBM System Administration Guide publication.

The Event Collector must be active to obtain the data capture exit status when the exit issues a DB2 call.

TRANCODE

Name of transaction currently being processed.

For an IMS transaction, you can expand from this column to the TRANQ service. For a CICS transaction, you can hyperlink to the TASKXPND service in MAINVIEW for CICS if it is installed.

TYP

Type of region processing a transaction:

BMI Batch message processing region currently executing an implicit APPC/IMS transaction.

BMP Batch message processing region.

BMW Wait for input BMP.

CON Conversational MPP region.

DBT DBCTL (CICS attachment) region.

FPU Fast Path utility regions.

MDP Message-driven Fast Path region.

MPI Message processing region currently executing an implicit APPC/IMS transaction.

MPP Message processing regions.

MPW Wait for input MPP.

NDP Non-message-driven Fast Path region.

TPI Message processing region currently executing an explicit CPI-C program.

USR/LTRM
ID of the user who submitted this transaction or LTERM where transaction was submitted. An * character indicates a terminal ID was used instead of a user ID.

```
Message View

BMC SOFTWARE---------------      IMS REGIONS        -----------PERFORMANCE MGMT
SERV ==> REGNS      INPUT     10:40:42    INTVL=> 3    LOG=> N    TGT==> IMSA
PARM ==> V=MSG,  SO=NA       ROW    1 OF                        4 SCROLL=> CSR
VIEW:    SM, MSG, DLI, DB2   EXPAND: FSEL(+), LINESEL(DREGN), MON(RGN)
PF10/11 FOR PREV/NEXT VIEW                                    *EVENT COLLECTOR*
NAME     TYP CL1 CL2 CL3 CL4 TRANCODE PRLIM QUEUED M-DEQ M-GN M-PRG M-ISR
-------- --- --- --- --- --- ++++++++ ----- ++++++ ----- ---- ----- -----
CICS3302 DBT
CICS3302 DBT                 DLZZ         0      0     0    0     0     0
CICS3302 DBT
IMSM17X  MPP   1   2   3   4
******************************** END OF DATA ********************************
```

This view shows transaction activity in each active IMS dependent region. The descriptions are arranged in alphabetical order.

For the following fields, CL1 through CL4, the currently active class is shown by a > character preceding the class:

CL1
(This field does not apply for a TYP of DBT and for all Fast Path types, including MDP and NDP.)

First class this MPP can process.

CL2
(This field does not apply for a TYP of DBT and for all Fast Path types, including MDP and NDP.)

Second class this MPP can process.

CL3
(This field does not apply for a TYP of DBTand for all Fast Path types, including MDP and NDP.)

Third class this MPP can process.

CL4

(This field does not apply for a TYP of DBT and for all Fast Path types, including MDP and NDP.)

Fourth class this MPP can process.

M-DEQ

(This field does not apply for a TYP of DBT or an IMS DBCTL system.)

Number of messages successfully processed by the application program in this scheduling. For MDPs (message-driven program), this value is 0.

M-GN

(This field does not apply for a TYP of DBT or an IMS DBCTL system.)

Number of message GET NEXT calls issued. For MDPs, this value is 0.

M-ISR

(This field does not apply for a TYP of DBT or an IMS DBCTL system.)

Number of message insert calls issued. For MDPs, this value does not include I/O PCB ISRTs.

M-PRG

(This field does not apply for a TYP of DBT or an IMS DBCTL system.)

Number of message purge calls issued.

NAME

Job name or started task procedure name of the region.

PRLIM

(This field does not apply for a TYP of DBT or an IMS DBCTL system.)

Processing limit count of the transaction.

QUEUED

(This field does not apply for a TYP of DBT or an IMS DBCTL system.)

Number of currently queued input messages with this transaction code. For MDPs (message-driven), the number of messages queued on this region's BALG.

You can expand from this column to the CLASQ service.

TRANCODE

Name of transaction currently being processed.

For an IMS transaction, you can expand from this column to the TRANQ service. For a CICS transaction, you can hyperlink to the TASKXPND service in MAINVIEW for CICS if it is installed.

TYP

Type of region processing a transaction:

BMI Batch message processing region currently executing an implicit APPC/IMS transaction.

BMP Batch message processing region.

BMW Wait for input BMP.

DBT DBCTL (CICS attachment) region.

FPU Fast Path utility regions.

MDP Message-driven Fast Path region.

MPI Message processing region currently executing an implicit APPC/IMS transaction.

MPP Message processing regions.

MPW Wait for input MPP.

NDP Nonmessage-driven Fast Path region.

TPI Message processing region currently executing an explicit CPI-C program.

```
DL/I View

BMC SOFTWARE--------------       IMS REGIONS        -----------PERFORMANCE MGMT
SERV ==> REGNS  INPUT    11:44:25  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> V=DLI, SO=ID       ROW    1 OF   4 SCROLL=>  CSR
VIEW: SM, MSG, DLI, DB2   EXPAND: FSEL(+), LINESEL(DREGN), MON(RGN)
PF10/11 FOR PREV/NEXT VIEW                                  *EVENT COLLECTOR*
NAME     TRANCODE #DB    GU    GN  GHU  GHN REPL ISRT DLET   TOT CHKP  I/O
-------- ++++++++ --- ----- ----- ---- ---- ---- ---- ---- +++++ ---- ----
MPPRGN2  SM4        2     4     2    0    0    0    0    0     6    0    0
MPPRGN3  LMZ200XX   1     1     2    0    0    0    0    0     3    0    1
CICSRGN1 DZ33       1     5     4    0    0    0    0    0     9    0    2
MPPRGN9  APPCPGM1   2     2     1    0    0    0    0    0     3    0    1
***************************** END OF DATA ************************************
```

This view shows transaction DL/I database activity in each active IMS dependent region. The descriptions are arranged in alphabetical order.

#DB

Number of DL/I databases accessed so far.

CHKPT

Total checkpoint calls (this is useful for BMP checkpoint frequency estimates) for this transaction.

DLET

Total delete calls for this transaction.

GHN
: Sum of GET HOLD NEXT and GET HOLD NEXT within PARENT calls for this transaction.

GHU
: Total GET HOLD UNIQUE calls for this transaction.

GN
: Sum of GET NEXT and GET NEXT within PARENT calls for this transaction.

GU
: Total database GET UNIQUE calls for this transaction.

I/O
: Total read and write counts for this transaction.

ISRT
: Total insert calls for this transaction.

NAME
: Job name or started task procedure name of the region.

REPL
: Total replace calls for this transaction.

TOT
: Total DL/I database calls for this transaction.

  You can expand from this column to the DLIST service.

TRANCODE
: Name of transaction currently being processed.

  For an IMS transaction, you can expand from this column to the TRANQ service. For a CICS transaction, you can hyperlink to the TASKXPND service in MAINVIEW for CICS if it is installed.

```
DB2 View

BMC SOFTWARE--------------       IMS REGIONS        -----------PERFORMANCE MGMT
SERV ==> REGNS  INPUT    11:44:25  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> V=DB2, SO=ID       ROW    1 OF   4 SCROLL=>  CSR
VIEW: SM, MSG, DLI, DB2  EXPAND: FSEL(+),  LINESEL(DREGN), MON(RGN)
PF10/PF11 FOR PREV/NEXT VIEW                              *EVENT COLLECTOR*
NAME     TRANCODE FETCH  OPEN ISRT2 DLET2 UPDT2   DDL   DYN  CNTL OTHER  TOT2
-------- ++++++++ ----- ----- ----- ----- ----- ----- ----- ----- ----- +++++
MPPRGN2  SM4          1     0     0     0     0     0     0     0     0     1
MPPRGN3  LMZ200XX     4     1     0     0     0     0     0     0     0     5
CICSRGN1 DZ33
MPPRGN9  APPCPGM1     0     0     0     0     0     0     0     0     0
**************************** END OF DATA ************************************
```

This view shows DB2 transaction activity. The descriptions are arranged in alphabetical order

CNTL

(This field does not apply for a TYP of DBT.)

Total number of SQL control-type calls, such as REVOKE, issued to DB2 by the transaction currently processing.

DDL

(This field does not apply for a TYP of DBT.)

Total number of Data Definition Language calls issued to DB2 by the transaction currently processing.

DLET2

(This field does not apply for a TYP of DBT.)

Total number of SQL DELETE calls issued to DB2 by the transaction currently processing.

DYN

(This field does not apply for a TYP of DBT.)

Total number of dynamic SQL calls issued to DB2 by the transaction currently processing.

FETCH

(This field does not apply for a TYP of DBT.)

Total number of SQL SELECT and FETCH calls issued to DB2 by the transaction currently processing.

ISRT2

(This field does not apply for a TYP of DBT.)

Total number of SQL INSERT calls issued to DB2 by the transaction currently processing.

NAME

Job name or started task procedure name of the region.

OPEN

(This field does not apply for a TYP of DBT.)

Total number of SQL OPEN calls issued to DB2 by the transaction currently processing.

OTHER

(This field does not apply for a TYP of DBT.)

Total number of other SQL calls issued to DB2 by the transaction currently processing. These are call types that do not fit in any of the other types defined in this display, such as table and security manipulation.

TOT2

(This field does not apply for a TYP of DBT.)

Total SQL calls issued to DB2 by the transaction currently processing.

You can hyperlink from this column to the DUSER service in MAINVIEW for DB2 if it is installed and there is an active DB2 thread.

TRANCODE

Name of transaction currently being processed.

For an IMS transaction, you can expand from this column to the TRANQ service. For a CICS transaction, you can hyperlink to the TASKXPND service in MAINVIEW for CICS if it is installed.

UPDT2

(This field does not apply for a TYP of DBT.)

Total number of SQL UPDATE calls issued to DB2 by the transaction currently processing.

REGNS - IMS Regions (No Event Collector Data)

REGNS
Summary View

(Default view when REGNS is requested)

```
BMC SOFTWARE---------------      IMS REGIONS        -----------PERFORMANCE MGMT
SERV ==> REGNS   INPUT   10:38:57  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> V=SM,  SO=NA        ROW    1 OF    4 SCROLL=> CSR
VIEW:    SM, MSG, DLI    EXPAND: FSEL(+), LINESEL(DREGN), MON(RGN)
PF10/11 FOR PREV/NEXT VIEW
ID NAME   TYP STATUS   PSB      TRANCODE USR/LTRM   DLI DB2 LOCKS ELAPSED
--- -------- --- -------- -------- ++++++++ -------- +++++ +++ +++++ -------
1 CICS3302 DBT IDLE
2 CICS3302 DBT ACTV-USR STBCUSR  DLZZ                 10         1
3 CICS3302 DBT IDLE     ABEM003T ABMAIL   CIR11        4 YES
******************************** END OF DATA ********************************
```

REGNS
Message View

```
BMC SOFTWARE---------------      IMS REGIONS        -----------PERFORMANCE MGMT
SERV ==> REGNS   INPUT   10:40:42  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> V=MSG,  SO=NA       ROW    1 OF    4 SCROLL=> CSR
VIEW:    SM, MSG, DLI    EXPAND: FSEL(+), LINESEL(DREGN), MON(RGN)
PF10/11 FOR PREV/NEXT VIEW
NAME   TYP CL1 CL2 CL3 CL4 TRANCODE PRLIM QUEUED M-DEQ M-GN M-PRG M-ISR
-------- --- --- --- --- --- ++++++++ ----- ++++++ ----- ---- ----- -----
CICS3302 DBT
CICS3302 DBT                DLZZ         0      0     0    0     0     0
CICS3302 DBT
IMSM17X  MPP   1   2   3   4
******************************** END OF DATA ********************************
```

REGNS
DL/I View

```
BMC SOFTWARE---------------      IMS REGIONS        -----------PERFORMANCE MGMT
SERV ==> REGNS   INPUT   10:41:18  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> V=DLI,  SO=NA       ROW    1 OF    4 SCROLL=> CSR
VIEW:    SM, MSG, DLI    EXPAND: FSEL(+), LINESEL(DREGN), MON(RGN)
PF10/11 FOR PREV/NEXT VIEW
NAME   TRANCODE M-DEQ    GU    GN   GHU   GHN  REPL  ISRT  DLET    FP   TOT
-------- ++++++++ ----- ----- ----- ----- ----- ----- ----- ----- ----- +++++
CICS3302
CICS3302 DLZZ         0     0     0     0     0     0     0     0     0     0
CICS3302
******************************** END OF DATA ********************************
```

Description: This version of REGNS shows IMS dependent region activity and the work currently being performed by IMS for the duration of a PSB scheduling. The REGNS version shown in "REGNS - IMS Regions (Event Collector Data)" on page 166 shows region activity for the transaction currently processing. It is available only when the Event Collector is active.

REGNS arranges information by views. If the Event Collector is not active, only the following views of dependent region activity are available:

SM (summary)	Shows status information about your active regions and the transactions that are currently executing. This is the default display.
MSG (message)	Shows information related to scheduling and the message queue.
DLI	Shows information by region about DL/I database activity for a scheduling.

Color: If you have a color monitor:

Blue	Indicates the current view.
Red	Highlights regions (rows) that are in a wait state.
Turquoise	Indicates normal values.
Yellow	Indicates an error message.
Pink	Indicates a WFI or pseudo-WFI transaction is waiting for input. This affects the STATUS, PSB, and TRANCODE columns.

Select Code: REGNS

Parameter:

All the REGNS parameters, except for SORT and VIEW, act as filters that restrict the information shown according to the criteria specified by the parameter(s). SORT sorts the columns in the display by specified characters. VIEW shows the requested view of REGNS data. The REGNS parameters can be used as follows:

- The filtering parameters apply across all views. All views are restricted by the specified parameter.

  For example, if you enter:

  ```
  TYPE=DBT
  ```

  in the DLI view, only the rows for DBCTL threads are displayed. A filtering parameter can be used with any view even though that view does not display the applicable field.

  Tuning Tip

  Use the NI or NOTIDLE parameter to see only those regions processing transactions.

- Multiple parameters must be separated by commas.
- A blank indicates the end of a parameter string.
- Multiple resources with similar names can be requested by using an * character as a generic qualifier and a + character as a positional qualifier. The positional qualifier is repeated for every character to be replaced. The generic qualifier replaces a group of characters.

  For example, a parameter of `NAME=MP*` shows all region names that start with MP and have any character in the rest of the name.

- If multiple filtering parameters are entered, the regions displayed must meet all the restrictions.
- If one parameter invalidates another, an error message is issued without further processing.

The following parameter descriptions are arranged alphabetically. The descriptions begin with parameters that start with a special character. Parameters containing a numeric character are first in their alphabetical group.

AC|ACTCLASS=nnn|(nnn,...)

Where nnn represents a transaction class number. It displays in each view only those regions that are currently running a transaction in the specified class(es). A maximum of four classes can be specified.

AGN=xxxxxxxx

Where xxxxxxxxx represents the name of an application group. It displays in each view only those regions with a name that matches the specified application group name. The application group name for a region is shown in the AGN field of the DREGN display.

C1|CL1=nnn

Where nnn represents a transaction class number. It displays in each view only those regions with the first class equal to the specified number.

C2|CL2=nnn

Where nnn represents a transaction class number. It displays in each view only those regions with the second class equal to the specified number.

C3|CL3=nnn

Where nnn represents a transaction class number. It displays in each view only those regions with the third class equal to the specified number.

C4|CL4=nnn

Where nnn represents a transaction class number. It displays in each view only those regions with the fourth class equal to the specified number.

CL|CLASS=nnn|(nnn,..)

Where nnn represents a transaction class number. It displays in each view only those regions that can process this class(es) of transaction. A maximum of four classes can be specified.

DT|DLET<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a DL/I database delete count. It displays in each view only those regions with transactions that have a database delete count less than (<), greater than (>), or equal to (=) the specified number.

DL|DLI<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents the total DL/I call count. It displays in each view only those regions currently executing transactions with a total DL/I call count less than (<), greater than (>), or equal to (=) the specified number.

EL|ELAPSED<nnn|>nnn|=nnn

Where nnn represents elapsed time in seconds. It displays in each view only those regions currently executing transactions that have an elapsed time less than (<), greater than (>), or equal to (=) the specified number.

FP<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a Fast Path database call count. It displays in each view only those regions with transactions that have a Fast Path database call count less than (<), greater than (>), or equal to (=) the specified number.

GN<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a GET NEXT and GET NEXT within PARENT count. It displays in each view only those regions with transactions that have a database GN and GNP count less than (<), greater than (>), or equal to (=) the specified number.

GU<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a GET UNIQUE count. It displays in each view only those regions with transactions that have a database GU count less than (<), greater than (>), or equal to (=) the specified number.

HN|GHN<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a GET HOLD NEXT and GET HOLD NEXT within PARENT count. It displays in each view only those regions with transactions that have a database GHN and GHNP count less than (<), greater than (>), or equal to (=) the specified number.

HU|GHU<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a GET HOLD UNIQUE count. It displays in each view only those regions with transactions that have a database GHU count less than (<), greater than (>), or equal to (=) the specified number.

. ID<nnn|>nnn|=nnn

Where nnn represents a region number. It displays in each view only those regions with a region number less than (<), greater than (>), or equal to (=) the specified number.

IS|ISRT<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents an INSERT count. It displays in each view only those regions with transactions that have a database ISRT count less than (<), greater than (>), or equal to (=) the specified number.

LO|LOCKS<nnnnnnnnn|>nnnnnnnnn| =nnnnnnnnn

Where nnnnnnnnn represents a PI or IRLM enqueue count. It displays in each view only those regions currently executing transactions with either outstanding PI enqueues or IRLM locks (if IMS IRLM is active) less than (<), greater than (>), or equal to (=) the specified number.

LT=xxxxxxxx

Where xxxxxxxx represents an LTERM name. It displays in each view only those regions processing transactions originating from an LTERM that matches the specified LTERM name. Multiple regions can be displayed by using an * or + qualifier; for example, `LT=SNL++060`.

MD|M-DEQ<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a message dequeue count. It displays in each view only those regions with transactions that have a message dequeue count less than (<), greater than (>), or equal to (=) the specified number.

MG|M-GN<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a message GET NEXT count. It displays in each view only those regions with transactions with message GN counts less than (<), greater than (>), or equal to (=) the specified number.

MI|M-ISR<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a message INSERT count. It displays in each view only those regions with transactions that have a message ISRT count less than (<), greater than (>), or equal to (=) the specified number.

MP|M-PRG<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a message PURGE count. It displays in each view only those regions with transactions that have a message PURG count less than (<), greater than (>), or equal to (=) the specified number.

NA|NAME=xxxxxxxx

Where xxxxxxxxx represents a region name. It displays in each view only those regions with a name that matches the specified region name. Multiple regions can be displayed by using an * or + qualifier; for example, NAME=*RGN1.

NI|NOTIDLE

It displays in each view only those regions that are not idle (active).

PR|PRLIM<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a region processing limit count. It displays in each view only those regions with transactions that have a processing limit count less than (<), greater than (>), or equal to (=) the specified number.

PS|PSB=xxxxxxxx

Where xxxxxxxxx represents a PSB name. It displays in each view only those regions with PSB names that match the specified name. Multiple regions can be displayed by using an * or + qualifier; for example, PSB=SM++0+00.

QU|QUEUED<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a transaction message input queue count. It displays in each view only those regions with transactions that have a message input queue count that is less than (<), greater than (>), or equal to (=) the specified number.

RE|REPL<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a database REPLACE count. It displays in each view only those regions with transactions that have a database REPL count less than (<), greater than (>), or equal to (=) the specified number.

SO|SORT=cc

Where cc represents any of the following two-character view columns. The display is sorted by NAME by default. The sort sequence is ascending for alphanumeric characters and descending for numeric characters except for ID. The numeric region ID is sorted in ascending sequence.

Tip

An easy way to sort is to move the cursor to the column heading and press ENTER.

The following SORT parameter descriptions are arranged alphabetically. SORT keywords that start with a special character are described first. Keywords containing a numeric character are first in their alphabetical group. All views are sorted as requested by the specified parameter.

Any of these keywords can be used in any view.

C1 Sorts the list by CL1 (descending).

C2 Sorts the list by CL2 (descending).

C3 Sorts the list by CL3 (descending).

C4 Sorts the list by CL4 (descending).

DA Sorts the list by YES (DB2 thread is active) or NO (DB2 thread is not active). The order is descending with YES first in the sort.

DL Sorts the list by DLI (descending).

DT Sorts the list by DLET (DL/I database; descending).

EL Sorts the list by ELAPSED (DL/I database; descending).

FP Sorts the list by FP (DL/I database; descending).

GN Sorts the list by GN (DL/I database; descending).

GU Sorts the list by GU (DL/I database; descending).

HN Sorts the list by GHN (DL/I database; descending).

HU Sorts the list by GHU (DL/I database; descending).

ID Sorts the list by ID (numeric region ID; ascending).

IS Sorts the list by ISRT (DL/I database; descending).

LO Sorts the list by LOCKS (descending).

LT Sorts the list by USR/LTRM (ascending).

MD Sorts the list by M-DEQ (descending).

MG Sorts the list by M-GN (descending).

MI Sorts the list by M-ISRT (descending).

MP Sorts the list by M-PRG (descending).

NA Sorts the list by NAME (default; ascending).

PL Sorts the list by PRLIM (descending).

PS Sorts the list by PSB name (ascending).

QU Sorts the list by QUEUED (descending).

RE Sorts the list by REPL (DL/I database; descending).

ST Sorts the list by STATUS (ascending).

TO Sorts the list by TOT (DL/I database; descending).

TR Sorts the list by TRANCODE (ascending).

TY Sorts the list by TYP (ascending).

US Sorts the list by USR/LTRM (ascending).

ST|STATUS=

It displays in each view only those regions that meet the specified criteria. Multiple regions can be displayed by using an * or + qualifier. For example, you can select all:

- Active regions by specifying `ST=A*`
- Idle regions by specifying `ST=ID*`
- Waiting regions by specifying `ST=W*`

Any of the region statuses described on page 121 can be specified with the STATUS parameter.

TO|TOT<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

Where nnnnnnnn represents a total DL/I database call count. It displays in each view only those regions with transactions that have a total DL/I database call count less than (<), greater than (>), or equal to (=) the specified number.

TR|TRANCODE=xxxxxxxx

Where xxxxxxxx represents a transaction code. It displays in each view only those regions that have transaction codes that match the specified code. Multiple regions can be displayed by using an * or + qualifier; for example, `TR=+MZ200XX`.

TY|TYP=xxx

Where xxx represents a region type. Multiple regions can be displayed by using an * or + qualifier; for example, TYP=M*.

The following type descriptions are arranged alphabetically:

BMI Displays batch message processing regions currently executing an implicit APPC/IMS transaction.

BMP Displays batch message processing regions.

BMW Displays wait for input BMP.

DBT Displays DBCTL (CICS attachment) regions.

FPU Displays Fast Path utility regions.

MDP Displays message-driven Fast Path regions.

MPI Displays message processing regions currently executing an implicit APPC/IMS transaction.

MPP Displays message processing regions.

MPW Displays wait for input MPP.

NDP Displays nonmessage-driven Fast Path regions.

TPI Displays message regions currently executing explicit CPI-C programs.

US|USR=xxxxxxxx

Where xxxxxxxx represents a user ID. It displays in each view only those regions with user IDs that match the specified ID. Multiple regions can be displayed by using an * or + qualifier; for example, USR=CICS*.

V|VIEW= SM|MSG|DLI

Displays the specified view:

SM Displays the REGNS summary status view (default).

MSG Displays the IMS/DC message view.

DLI Displays the DL/I database view.

View Selection: You can:

- Enter the VIEW parameter in the PARM field.
- Move the cursor to the view you want in the VIEW line and press ENTER.
- Use one of the following PF keys:

  PF10 Displays the previous view.

  PF11 Displays the next view.

Expand: The REGNS display can be EXPANDed by using the following fields as indicated:

FSEL(+)

Indicates that at least one column has cursor-sensitive fields. A string of + characters underneath a column name means this column contains cursor-sensitive fields. Moving the cursor to a field in that column and pressing the ENTER key invokes a related display for that field. For example, if the cursor is at a field value under the DLI column, pressing the ENTER key displays the DLIST service with the correct region number as the parameter. Columns with cursor-sensitive fields include:

DLI

The DLIST service showing DL/I call details can be displayed with the region number as a parameter.

DB2

You can hyperlink from this field to MAINVIEW for DB2 as described on page 201.

LOCKS

If IMS IRLM is active, the LUSRD service showing IRLM lock user details can be displayed with the region number as a parameter. If IRLM is not active, the PI service showing program isolation information can be displayed with the region number as a parameter.

QUEUED

The CLASQ service showing transaction queuing and processing can be displayed with the region number as a parameter.

TOT

The DLIST service showing DL/I call details can be displayed with the region number as a parameter.

TRANCODE

The TRANQ service showing transaction status details can be displayed with the transaction code as a parameter.

You can also hyperlink from this field to MAINVIEW for CICS as described in the hyperlink section below.

When a display service is cursor-selected from a REGNS field, that service shows system data at the time it is invoked. It is not synchronized with the REGNS display.

Use the END PF key to return to the REGNS display.

LINESEL(DREGN)

Move the cursor to a region in one of the rows of a REGNS view and press ENTER to invoke the DREGN service. DREGN shows region details for the selected region.

Selecting DREGN with the cursor from the EXPAND line invokes the DREGN service for the region in the first row of the REGNS display.

MON(RGN)

Move the cursor to this field in the EXPAND line to display the Active Timer Request service for all active region monitors.

Hyperlink:

If MAINVIEW for CICS is installed and a transaction is a CICS transaction, you can link to the TASKXPND service in MAINVIEW for CICS by using the TRANCODE column in any view to cursor-select that transaction.

If MAINVIEW for DB2 is installed and a transaction has an active DB2 thread, you can link to DUSER in MAINVIEW for DB2 by using the DB2 column in the summary view to cursor-select that transaction.

Sorting:

The display list can be sorted by:

- Using the SORT parameter
- Positioning the cursor with the TAB key to the column heading to be sorted and pressing ENTER

  This overrides any SORT parameter in the PARM field and primes that field with the action taken. The integrity of any other parameters entered in the PARM field is preserved.

The display list is sorted by NAME by default. Alphanumeric fields and the ID field are sorted in ascending order. Numeric fields are sorted in descending order. Fields with no values are sorted to the bottom of the list.

Scrolling: The display is scrollable.

Field Descriptions: Each of the fields is shown and described below by view.

```
Summary View

BMC SOFTWARE---------------      IMS REGIONS        -----------PERFORMANCE MGMT
SERV ==> REGNS   INPUT   10:38:57  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> V=SM,  SO=NA        ROW    1 OF    4 SCROLL=> CSR
VIEW:    SM, MSG, DLI    EXPAND: FSEL(+), LINESEL(DREGN), MON(RGN)
PF10/11 FOR PREV/NEXT VIEW
ID NAME   TYP STATUS   PSB      TRANCODE USR/LTRM   DLI DB2 LOCKS ELAPSED
--- -------- --- -------- -------- ++++++++ -------- +++++ +++ +++++ -------
1 CICS3302 DBT IDLE
2 CICS3302 DBT ACTV-USR STBCUSR  DLZZ                 10         1
3 CICS3302 DBT IDLE     ABEM003T ABMAIL   CIR11        4 YES
******************************** END OF DATA ********************************
```

This view shows the status of active regions and transactions. The descriptions are arranged in alphabetical order.

DB2

Indicates an active DB2 thread as:

YES This transaction has an active DB2 thread.

NO This transaction is not using DB2.

You can hyperlink from this column to the DUSER service in MAINVIEW for DB2 if it is installed and there is an active DB2 thread.

DLI

Total DL/I database call count since PSB scheduling.

You can expand from this column to the DLIST service.

ELAPSED

Current elapsed time calculated by subtracting transaction enqueue time from current time. If enqueue time is not available, this field is blank.

ID

Region identifier assigned to this region by IMS.

LOCKS

Either total outstanding PI enqueue counts or IRLM locks if IMS IRLM is active. An * character following the count indicates that this transaction is waiting for a PI or IRLM lock if IMS IRLM is active.

You can expand from this column to the LUSRD service if IRLM is active. Otherwise, you can expand to the PI service.

NAME

Job name or started task procedure name of the region.

PSB

PSB name of the application program currently being processed.

STATUS

Region status:

ACTIVE	Active in a nonspecific process.
ACTV-BKO	Region in dynamic backout.
ACTV-DB2	Active in DB2 (the Event Collector must be active).
ACTV-DBR	Region active in DBRC.
ACTV-DLI	Region active in DL/I.
ACTV-SCH	Region active in nonspecific CREATE THREAD process.
ACTV-USR	Region active in the application program.
IDLE	Region waiting for non-WFI input to process.
IDLE-HOT	Pseudo-WFI region waiting for input from the same transaction.
IDLE-WFI	Region waiting for WFI or Fast Path BALG input to process.
INACTIVE	Region defined but not started (not yet signed on).
OPENING	Region in first CREATE THREAD process.
SCH-BLR	Region in scheduling (active in block loader latch).
SCH-BLKM	Region in scheduling (active in block mover).
SCHDULE	Region in scheduling (CREATE THREAD).
TERMINAT	Region in region termination or abend.
WAIT-AOI	Region waiting for an AO message. Await for AO occurs when a region issues a GMSG call with the wait option and DFSAOE00 has no message to return to it at that time.
WAIT-BKO	Region currently in wait, but dynamic backout in progress.
WAIT-BLKM	Region waiting in block mover.

WAIT-BML	Region in scheduling (waiting for block mover latch). **Note:** The block mover latch comprises several smaller latches. To find which BML latch a region is waiting for, use the LATCH service.
WAIT-DLI	Region waiting for DL/I.
WAIT-INT	Region in scheduling (waiting for database intent).
WAITING	Region in nonspecific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see "LATCH - Latch Summary" on page 278.
WT-CMDP	Region waiting for a pending /DBD or /DBR command to complete.
WT-DBRC	Region waiting for DBRC.
WT-DMBP	Region in scheduling (waiting for DMB pool).
WT-EPCB	Region in scheduling (waiting for EPCB pool).
WT-IRLM	Region waiting for IRLM.
WT-ISWCH	Region did ISWITCH and is waiting in IMS dispatcher.
WT-NTFY	Region waiting for asynchronous notify(s) to complete (IRLM must be active). An asynchronous notify could be buffer invalidation, for example.
WT-OSAM	Region waiting for OSAM.
WT-PI	Region waiting for a program isolation lock to be freed.
WT-PSBP	Region waiting for PSB pool.
WT-PSBW	Region waiting for PSBW pool.
WT-SCHD	Region waiting in a nonspecific CREATE THREAD process.
WT-VSAM	Region waiting in VSAM.
WTF-ADSC	Region waiting in Fast Path for ADSC directory latch (DEDB area data sets).
WTF-AREA	Region waiting in Fast Path for DEDB area lock.
WTF-DEDB	Region waiting in Fast Path for DEDB ownership.
WTF-DMSH	Region waiting in Fast Path for DMAC share latch (DEDB area).
WTF-DMSY	Region waiting in Fast Path for DMAC synchronization latch (DEDB area).

WTF-FBFR Region waiting in Fast Path for FIX buffer (DEDB).

WTF-FCMD Region waiting in Fast Path for FNCB (Fast Path command) latch.

WTF-MSDB Region waiting in Fast Path for MSDB latch.

WTF-OBA Region waiting in Fast Path for overflow buffer interlock.

WTF-OCL Region waiting in Fast Path for open/close latch.

WTF-RSL Region waiting in Fast Path for resource latch.

WTF-SEG Region waiting in Fast Path for MSDB segment.

WTF-SYNC Region waiting in Fast Path for synchronization latch.

Note: A # character in place of the - character in a status indicates activity resulted from an IMS data capture exit (user exit for data propagation and site requirements) instead of the application program. For example, if a data capture exit made a request that is waiting for a program isolation lock, the STATUS field shows WT#PI rather than WT-PI. For more information about data capture exits, see the IBM System Administration Guide publication.

The Event Collector must be active to obtain the data capture exit status when the exit issues a DB2 call.

TRANCODE

Name of transaction currently being processed.

For an IMS transaction, you can expand from this column to the TRANQ service. For a CICS transaction, you can hyperlink to the TASKXPND service in MAINVIEW for CICS if it is installed.

TYP

Type of region that is processing the transaction:

BMI Batch message processing region currently executing an implicit APPC/IMS transaction.

BMP Batch message processing region.

BMW Wait for input BMP.

CON Conversational MPP region.

DBT DBCTL (CICS attachment) region.

FPU Fast Path utility regions.

MDP Message-driven Fast Path region.

MPI Message processing region currently executing an implicit APPC/IMS transaction.

MPP Message processing regions.

MPW Wait for input MPP.

NDP Non-message-driven Fast Path region.

TPI Message processing region currently executing an explicit CPI-C program.

USR/LTRM

ID of the user who submitted this transaction or LTERM where transaction was submitted. An * character indicates a terminal ID was used instead of a user ID.

```
Message View

BMC SOFTWARE---------------      IMS REGIONS        -----------PERFORMANCE MGMT
SERV ==> REGNS   INPUT   10:40:42  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> V=MSG,  SO=NA       ROW    1 OF    4 SCROLL=> CSR
VIEW:    SM, MSG, DLI    EXPAND: FSEL(+), LINESEL(DREGN), MON(RGN)
PF10/11 FOR PREV/NEXT VIEW
NAME   TYP CL1 CL2 CL3 CL4 TRANCODE PRLIM QUEUED M-DEQ M-GN M-PRG M-ISR
-------- --- --- --- --- --- ++++++++ ----- ++++++ ----- ---- ----- -----
CICS3302 DBT
CICS3302 DBT                 DLZZ         0      0     0    0     0     0
CICS3302 DBT
IMSM17X  MPP   1   2   3   4
******************************** END OF DATA ********************************
```

This view shows transaction activity in each active IMS dependent region. The descriptions are arranged in alphabetical order.

For the following fields, CL1 through CL4, the currently active class is shown by a > character preceding the class:

CL1

(This field does not apply for a TYP of DBT and for all Fast Path types, including MDP and NDP.)

First class this MPP can process.

CL2

(This field does not apply for a TYP of DBT and for all Fast Path types, including MDP and NDP.)

Second class this MPP can process.

CL3

(This field does not apply for a TYP of DBT and for all Fast Path types, including MDP and NDP.)

Third class this MPP can process.

CL4

(This field does not apply for a TYP of DBT and for all Fast Path types, including MDP and NDP.)

Fourth class this MPP can process.

M-DEQ

(This field does not apply for a TYP of DBT or an IMS DBCTL system.)

Number of messages successfully processed by the application program in this scheduling. For MDPs (message-driven program), this value is 0.

M-GN

(This field does not apply for a TYP of DBT or an IMS DBCTL system.)

Number of message GET NEXT calls issued by this program since PSB scheduling. For MDPs, this value is 0.

M-ISR

(This field does not apply for a TYP of DBT or an IMS DBCTL system.)

Number of message insert calls issued by this program since PSB scheduling. For MDPs, this value does not include I/O PCB ISRTs.

M-PRG

(This field does not apply for a TYP of DBT or an IMS DBCTL system.)

Number of message purge calls issued by this program since PSB scheduling.

NAME

Job name or started task procedure name of the region.

PRLIM

(This field does not apply for a TYP of DBT or an IMS DBCTL system.)

Processing limit count of the transaction.

QUEUED

(This field does not apply for a TYP of DBT or an IMS DBCTL system.)

Number of currently queued input messages with this transaction code. For MDPs (message-driven program), the number of messages queued on this region's BALG.

You can expand from this column to the CLASQ service.

TRANCODE

Name of transaction currently being processed.
For an IMS transaction, you can expand from this column to the TRANQ service.
For a CICS transaction, you can hyperlink to the TASKXPND service in MAINVIEW for CICS if it is installed.

TYP

Type of region processing a transaction:

BMI	Batch message processing region currently executing an implicit APPC/IMS transaction.
BMP	Batch message processing region.
BMW	Wait for input BMP.
DBT	DBCTL (CICS attachment) region.
FPU	Fast Path utility regions.
MDP	Message-driven Fast Path region.
MPI	Message processing region currently executing an implicit APPC/IMS transaction.
MPP	Message processing regions.
MPW	Wait for input MPP.
NDP	Nonmessage-driven Fast Path region.
TPI	Message processing region currently executing an explicit CPI-C program.

```
DL/I View

BMC SOFTWARE---------------      IMS REGIONS        -----------PERFORMANCE MGMT
SERV ==> REGNS   INPUT   10:41:18  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> V=DLI,  SO=NA       ROW    1 OF    4 SCROLL=> CSR
VIEW:    SM, MSG, DLI    EXPAND: FSEL(+), LINESEL(DREGN), MON(RGN)
PF10/11 FOR PREV/NEXT VIEW
NAME   TRANCODE M-DEQ    GU    GN   GHU   GHN  REPL  ISRT  DLET    FP   TOT
-------- ++++++++ ----- ----- ----- ----- ----- ----- ----- ----- ----- +++++
CICS3302
CICS3302 DLZZ         0     0     0     0     0     0     0     0     0     0
CICS3302
******************************** END OF DATA ********************************
```

This view shows transaction DL/I database activity in each active IMS dependent region. The descriptions are arranged in alphabetical order.

M-DEQ
: (This field does not apply for a TYP of DBT or an IMS DBCTL system.)

  Number of messages successfully processed by the application program since PSB scheduling. For MDPs (message-driven program), this value is 0.

NAME
: Job name or started task procedure name of the region.

TRANCODE
: Name of transaction currently being processed.

  For an IMS transaction, you can expand from this column to the TRANQ service. For a CICS transaction, you can hyperlink to the TASKXPND service in MAINVIEW for CICS if it is installed.

For the following fields, the counts do not include calls to DEDBs and MSDBs. Fast Path calls are totaled in the FP column.

DLET
: Total delete calls since PSB scheduling.

FP
: Total calls to Fast Path databases since PSB scheduling.

GHN
: Sum of GET HOLD NEXT and GET HOLD NEXT within PARENT calls since PSB scheduling.

GHU
: Total GET HOLD UNIQUE calls since PSB scheduling.

GN
: Sum of GET NEXT and GET NEXT within PARENT calls since PSB scheduling.

GU
: Total database GET UNIQUE calls since PSB scheduling.

ISRT

Total insert calls since PSB scheduling.

REPL

Total replace calls since PSB scheduling.

TOT

Total DL/I database calls since PSB scheduling.

From this column, you can expand to the DLIST service.

STAT/STATR - System Status

```
BMC SOFTWARE----- -------------- SYSTEM STATUS --------------- PERFORMANCE MGMT
SERV ==> STATR      INPUT   13:21:09  INTVL=> 3  LOG=> N   TGT==>       IMS22X
PARM ==>       RA0600I - ENTER FIRST REGION NUMBER      SCROLL => N/A
RGN     1    2    3
TYPE  DBT  DBT  BMP
STAT IDLE IDLE ACTV
DB2     CON
WARN
--IMS DATA SETS--    TOTAL FREE    %    ALLOCATED    %   ****WARNING****
SHORT   8,675   8,652  100      23    0      (HI=     18)
LONG              1,025         972   95           53    5      (HI=     57)
QBLKS            19,700      19,653  100           47    0      (HI=      4)
ACBLIBA  MODBLKSB      SYSTEM: DB/DC     ETO: ACTIVE   DLQT:  5 SUSPEND QUEUE
FORMATA  DFSOLP00     RELEASE: 6.1      APPC: ENABLED  -IMSLU62
--TRACES--  DL/I..LOCK..DLOG..DISP..SCHD..SUBS..LATC....PI....FP...MON..TIMEOUT
              ON    ON    ON    ON    ON   OFF   OFF   OFF   OFF   OFF  AUTO  5
--STOPPED RESOURCES--  LINES:    6   TRANS:    0   DB'S:   33   RTCDE'S:    0
                       NODES:    0    PGMS:    0 APPCLU:    0
--RESTART DATA--   12/15/00  10:29:15  DFSVNUC9     --LOCK MANAGER-- IRLM IR15
--SCHEDULING--   FAILURES:        0   0%
CLASS    001     002     003     004     005     006    REST   TOTAL      FP
Q'D        0       0       0       0       0       0       0       0       0
PROC     245     143       0       0       0       0       0     388       0
```

Description: This display provides an overview of the status of the total IMS system (the work performed and consumption of resources) with indicators and highlighting of possible problem areas.

Note: STAT and STATR are equivalent except for the STOPPED RESOURCES lines that are shown only with STATR. STAT executes faster than STATR on large IMS systems with many resources defined.

Select Code: STAT or STATR

Parameter: No entry or enter 1 to display regions 1 through 15.

Enter n to display regions n through n+14, where n is a valid region identification number within the range of defined regions.

Enter 0 to display active regions only.

Field Descriptions: Each of the fields is shown and described below by display area.

```
Area 1

RGN    1    2    3
TYPE  MPP  MPP  BMP
STAT IDLE IDLE ACTV
DB2             CON
WARN
```

The first area presents a concise summary of the status of 15 dependent regions. If any current or potential problem is detected, it is indicated in the corresponding region column on a warning line (for example, region in a program isolation wait, dynamic backout would fail, and so on).

The descriptions are arranged in alphabetical order.

DB2	DB2 Connection status:	
	blank	No connection to DB2
	CON	Region is connected to DB2
	SON	Region has signed on to DB2 and established a connection
	THD	Thread (unit of work) is active in DB2
RGN	Region number	
STAT	Region status:	
	blank	Undefined
	ACTV	Active in the application program
	BACK	Dynamic backout in progress
	BG-W	Fast Path MDP (Message-driven Program) waiting for input on BALG
	DB2	Active in DB2; a dependent region is executing an SQL call
	DL/I	Active in DL/I
	I-HT	Pseudo WFI region waiting for recurrence of the same transaction code. See the IBM publication, *IMS System Definition Reference*, for more information.
	IDLE	Started but not processing
	INAC	Inactive (defined but not started)
	OPEN	In open processing
	SCHD	Scheduling: waiting for some resource
	TERM	In region termination
	WF-W	WFI region waiting for input
TYPE	Region type:	
	blank	Undefined or inactive
	BMP	Batch message processing
	BWFI	BMP wait-for-input
	DBT	DBCTL thread
	FPU	Fast Path utility
	MDP	Fast Path message-driven program
	MPP	Message processing program
	MWFI	MPP wait-for-input
	NDP	Fast Path nonmessage-driven program
	TPI	MPP region currently executing a CPI-C driven program
WARN	Warning. Possible problem indicators:	
	BACK	Dynamic backout is in progress.
	BKNG	Dynamic backout failed; IMS will ABEND.
	NOBK	Dynamic backout is no longer valid for this region. The dynamic log has wrapped and this region was unable to log all database changes. If an ABEND, pseudo-ABEND, or roll call occurs, IMS ABENDs.
	W-FB	Region is waiting for a Fast Path fixed buffer.

W-FC	Region is waiting for a Fast Path control interval (CI contention).
W-FO	Region is waiting for the Fast Path overflow buffer latch (OBA latch).
W-FR	Region is waiting for the Fast Path resource latch.
W-FS	Region is waiting for the Fast Path sync-point latch.
W-IR	Region is in IRLM wait (IRLM must be active) for a resource, belonging to this or another IMS, that is being held by another region.
W-LT	Region is waiting for a CLLE latch
W-NF	Region is waiting for asynchronous notify(s) to complete.
W-PI	Region is in a program isolation wait for a resource held by another region.
W-ST	Region is waiting for storage in one of the IMS pools.

```
Area 2

--IMS DATA SETS--    TOTAL        FREE    %    ALLOCATED    %   ****WARNING****
SHORT                8,675       8,652  100           23    0      (HI=     18)
LONG                 1,025         972   95           53    5      (HI=     57)
QBLKS               19,700      19,653  100           47    0      (HI=      4)
```

The second area shows the current status of the queue data sets. A warning is indicated on the right if a problem is detected (for example, a data set usage threshold is reached).

The descriptions are arranged in alphabetical order by row.

--IMS DATA SETS--

LONG

(This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Long message queue data set utilization:

ALLOCATED %

Number of records that are allocated and the percentage of the total records allocated.

FREE %

Number of records that are free and the percentage of the total records free.

TOTAL

Total number of records.

****WARNING****

Indicates whether the QTU threshold has been reached as follows:

When the % value for ALLOCATED records for the long message queue data set exceeds the threshold specified by the QTU parameter for the IMS control region, THRESHOLD is displayed and highlighted in this field.

If the % value for ALLOCATED records for the long message queue data set does not exceed the threshold specified by the QTU parameter, the high-water mark is shown in this field.

If CHKPT PURGE, CHKPT DUMPQ, or CHKPT FREEZ is displayed, SCHEDULING STOPPED is shown in Area 5 of the display as described on page 219.

Note: (IMS DB/DC only)

The ALLOCATED total may exceed the high-water mark early in an IMS session. This happens because the ALLOCATED totals include bit-map and message-queue records that are rebuilt into the current IMS at restart. As these records are put into actual use, the high-water marks (highest record number) eventually adjust.

QBLKS

(This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

QBLKS message queue data set utilization:

ALLOCATED %

Number of records that are allocated and the percentage of the total records allocated.

FREE %

Number of records that are free and the percentage of the total records free.

TOTAL

Total number of records.

****WARNING****

Indicates whether the QTU threshold has been reached as follows:

When the % value for ALLOCATED records for the QBLKS message queue data set exceeds the threshold specified by the QTU parameter for the IMS control region, THRESHOLD is displayed and highlighted in this field.

If the % value for ALLOCATED records for the long message queue data set does not exceed the threshold specified by the QTU parameter, the high-water mark is shown in this field.

If CHKPT PURGE, CHKPT DUMPQ, or CHKPT FREEZ is displayed, SCHEDULING STOPPED is shown in Area 5 of the display as described on page 219

Note: (IMS DB/DC only)

The ALLOCATED total may exceed the high-water mark early in an IMS session. This happens because the ALLOCATED totals include bit-map and message-queue records that are rebuilt into the current IMS at restart. As these records are put into actual use, the high-water marks (highest record number) eventually adjust.

SHORT

(This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Short message queue data set utilization:

ALLOCATED %

Number of records that are allocated and the percentage of the total records allocated.

FREE %

Number of records that are free and the percentage of the total records free.

TOTAL

Total number of records.

****WARNING****

Indicates whether the QTU threshold has been reached as follows:

When the % value for ALLOCATED records for the short message queue data set exceeds the threshold specified by the QTU parameter for the IMS control region, THRESHOLD is displayed and highlighted in this field.

If the % value for ALLOCATED records for the long message queue data set does not exceed the threshold specified by the QTU parameter, the high-water mark is shown in this field.

If CHKPT PURGE, CHKPT DUMPQ, or CHKPT FREEZ is displayed, SCHEDULING STOPPED is shown in Area 5 of the display as described on page 219.

Note: (IMS DB/DC only)

The ALLOCATED total may exceed the high-water mark early in an IMS session. This happens because the ALLOCATED totals include bit-map and message-queue records that are rebuilt into the current IMS at restart. As these records are put into actual use, the high-water marks (highest record number) eventually adjust.

```
Area 3

ACBLIBA  MODBLKSB      SYSTEM: DB/DC     ETO: ACTIVE   DLQT:  5 SUSPEND QUEUE
FORMATA  DFSOLP00     RELEASE: 6.1      APPC: ENABLED  -IMSLU62
```

The third area shows the ddnames in use, IMS system type, current release, status of the ETO feature and Dead Letter Queue time in days for IMS 6.1, and the status of the APPC feature for IMS 6.1.

The descriptions are arranged in alphabetical order.

ACBLIBA MODBLKSA

Current IMS ddnames in use.

APPC

This field is highlighted if the status is STOPPED or different from the requested status.

The value can be either INACTIVE or in the form of xxxxxxxx -nnnnnnnn, where:

xxxxxxxx Is the IMS status, which can be one of the following:

- CANCELED
- DISABLED
- ENABLED
- FAILED
- OUTBOUND
- PURGING
- STARTING
- STOPPED

See IBM's *IMS Operator Reference* for a description of the status in the “/DIS APPC” section.

nnnnnnnn Is the IMS base LU6.2 name (if known)

DLQT

Shows the Dead Letter Queue Time (DLQT) in days for this IMS. This value is specified at IMS startup and represents the number of days that an ETO user structure can go unreferenced before it is considered to be in a dead queue status.

This field is blank for DBCTL targets.

ETO

This field shows the status of the ETO feature as ACTIVE or INACTIVE.

It is blank for DBCTL targets.

FORMATA DFSOLP00

Current IMS ddnames in use.

RELEASE

IMS system release.

SUSPEND QUEUE

This is displayed and highlighted in the WARNING column if there are any transactions on the suspend queue. It is not displayed if there are no transactions on the suspend queue.

SYSTEM

IMS system type:

DB/DC
DBCTL
DCCTL

```
Area 4

--TRACES--  DL/I..LOCK..DLOG..DISP..SCHD..SUBS..LATC....PI....FP...MON..TIMEOUT
              ON    ON    ON    ON    ON   OFF   OFF   OFF   OFF   OFF  AUTO  5
--STOPPED RESOURCES--  LINES:   6  TRANS:   0  DB'S:  33  RTCDE'S:   0
                            NODES:    0    PGMS:    0 APPCLU:    0
```

The fourth area shows the current status of the internal traces, the total number of stopped lines, transactions, databases, routing codes, VTAM nodes, and programs (PSBs).

Note: STOPPED RESOURCES is available only with the STATR service. STAT shows blanks in this area.

The descriptions are arranged in alphabetical order.

--TRACES--

This section displays the status of IMS traces.

The trace abbreviations for internal traces are the same as those used in the /TRA IMS command. The trace status for internal traces is shown as:

OFF	IMS internal trace is not active.
ON	IMS internal trace is active.

The VTAM timeout trace has special status indicators as follows:

TIMEOUT VTAM timeout trace. The format is:

```
ssss mm
```

where:

`ssss` Is the status of the VTAM I/O timeout trace. Possible values:

AUTO	Timeout trace active with AUTO option
MSG	Timeout trace active with MSG option
OFF	Timeout trace not active
ON	Timeout trace active; neither MSG or AUTO option specified

`mm` Is the timeout threshold in minutes, 0 (no timeout limit), or blank (trace is not active).

--STOPPED RESOURCES--

The values shown in this area are determined according to the rules of the /DISPLAY STATUS command; they are available only with the STATR service. The lines are blank in the STAT service.

The descriptions are arranged in alphabetical order.

APPCLU — The number of APPC LUs that are stopped or have an associated, stopped TP (transaction program). This field is blank for DBCTL targets.

DB'S — The number of databases currently stopped (stopped, locked, not open, inquiry only). Uninitialized databases are not included in this count.

LINES — (This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

The number of communication lines currently stopped (no input, no output, no queuing, idle).

NODES — (This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

VTAM stopped nodes.

PGMS — Number of programs (PSBs) currently stopped.

RTCDE'S — (This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

The number of routing codes currently stopped if Fast Path is installed.

TRANS — The number of transaction codes currently stopped (no queuing, no scheduling, locked, locked for /DBD).

```
Area 5

--RESTART DATA--   12/15/00  11:28:52  DFSVNUC8     --LOCK MANAGER-- IRLM IR15
--SCHEDULING--   FAILURES:        0   0%
   CLASS    001     002     003     004     005     006    REST   TOTAL      FP
   Q'D        0       0       0       0       0       0       0       0       0
   PROC     245     143       0       0       0       0       0     388       0
```

The fifth area shows scheduling: the number of failures, the current status, how many transactions are currently queued, and how many have been processed.

The descriptions are arranged in alphabetical order.

--RESTART DATA--

Note: When IMS 6.1or later is running, UTC (Universal Time Clock) time is used. When IMS 5.1 is running, local time is used.

12/15/00
The restart date (mm/dd/yy).

11:28:52
The IMS restart time (hh:mm:ss).

DFSVNUC2
Current IMS nucleus loaded.

LOCK MANAGER

Displays the current IMS lock manager. Possible values:

IRLM `ssid`	Locks are managed by IRLM with subsystem ID `ssid`.
PI	Locks are managed by Program Isolation.

--SCHEDULING--

CLASS

(This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

Transaction class. The counts for classes 001 through 006 are shown separately, higher classes are summarized under REST. Totals are also shown. If Fast Path is installed, the counts are summarized under FP.

FAILURES

The number of unsuccessful attempts at scheduling and the percent this represents of total activity.

Note: Because the counts of the different types of failures are kept in halfword counters, this sum is invalid if any one of these exceeds 65,535.

PROC

The number of transactions processed since the last IMS cold start.

Note: These counts are accumulated from halfword counters kept by transaction code. If more than 32,767 transactions of one type are processed, this counter wraps to zero and the accumulation is lower than the true total.

Q'D

(This field does not apply for a TYPE of DBT or an IMS DBCTL system.)

The number of transactions currently queued. An asterisk appears to the right of the count if any enqueued transactions within that class are not schedulable (locked, stopped, or priority zero).

SCHEDULING STOPPED

This is displayed to the right of FAILURES if scheduling is not currently active. The reason is shown in the WARNING column (see the Area 2 description):

CHKPT DUMPQ	A checkpoint DUMPQ is in progress.
CHKPT FREEZE	A checkpoint FREEZE is in progress.
CHKPT PURGE	A checkpoint PURGE is in progress.

Chapter 13. Database Displays

This chapter describes the displays that show the status, activity, and performance of IMS resources as programs execute in the dependent regions, accessing message queues and various databases (DL/I or DB2).

DBST - OSAM Global Pool Statistics

```
BMC SOFTWARE  ------------------- OSAM POOLS ---------------- PERFORMANCE MGMT
SERV ==> DBST            INPUT   13:21:09  INTVL=> 3  LOG=> N   TGT==>  IMS22X
PARM ==>       RA1307I ENTER SUBPOOL TO BE DISPLAYED             SCROLL => N/A

- - - - - - - - - - -  OSAM DATABASE POOL STATISTICS - - - - - - - - -  - - - -
     460,800 TOTAL POOL SIZE       8 SUBPOOLS      DL/I TRACE IS ON

- - - - - - - - - - -  OSAM BUFFER HANDLER REQUESTS   - - - - - - - - - - - - -
       1,946 SEARCHES                          140 ALTERS
         198 RETRIEVES BY KEY                    0 BLOCK CREATES
           0 GET NEXTS                          70 PURGES

- - - - - - - - - - -  OSAM BUFFER HANDLER PERFORMANCE - - - - - - - - - - - -
                                                 0 OSAM WRITES - STEAL
         117 OSAM READS WITH I/O                28 OSAM WRITES - PURGE
       1,809 SATISFIED FROM POOL                98 BLOCKS WRITTEN - TOTAL
        93.9 HIT RATIO                           0 FORMAT CYLINDER
                                                 0 BLOCKS CREATED
           0 ERROR BUFFERS IN POOL               0 MAX ERROR BUFFERS IN POOL

- - - - - - - - - - -  SEQUENTIAL BUFFERING STATISTICS - - - - - - - - - - - -
             STATUS: ACTIVE                     0K STORAGE CURRENTLY IN USE
        100K STORAGE LIMIT                     66K MAX STORAGE USED
```

Description: This display shows global statistics, accumulated since IMS restart, for the whole pool.

Select Code: DBST

Global pool statistics.

Parameter: None for this global display.

Entry of a valid subpool number returns the subpool display (see "DBST - OSAM Subpool Statistics" on page 225).

Field Descriptions: Each of the fields is shown and described below by display area.

Area 1

```
- - - - - - - - - - -  OSAM DATABASE POOL STATISTICS - - - - - - - - -  - - - -

     460,800 TOTAL POOL SIZE       8 SUBPOOLS      DL/I TRACE IS ON
```

This area shows the current pool definition. The descriptions are arranged in alphabetical order.

DL/I TRACE IS ON/OFF
: The status of the DL/I buffer handler trace is shown as either ON or OFF.

SUBPOOLS
: The number of subpools.

TOTAL POOL SIZE
: The total pool size in bytes (including all overhead).

```
Area 2


- - - - - - - - - - -  OSAM BUFFER HANDLER REQUESTS  - - - - - - - - - - - - -
       1,946 SEARCHES                          140 ALTERS
         198 RETRIEVES BY KEY                    0 BLOCK CREATES
           0 GET NEXTS                          70 PURGES
```

This area displays the total requests made to the buffer handler. The descriptions are arranged in alphabetical order.

ALTERS
: The number of mark buffer altered requests.

BLOCK CREATES
: These requests are made when it is necessary to format a new block in the data set.

GET NEXTS
: The number of get nexts (incremented only for databases accessed through OSAM).

PURGES
: The number of purge requests required for synchronization point or checkpoint processing.

RETRIEVES BY KEY
: The number of retrieves by key (incremented only for databases accessed through OSAM).

SEARCHES
: Includes block locates, byte locates, and searches to get or free space.

```
Area 3


- - - - - - - - - - - - - OSAM BUFFER HANDLER PERFORMANCE - - - - - - - - - - -
                                                 0 OSAM WRITES - STEAL
         117 OSAM READS WITH I/O                28 OSAM WRITES - PURGE
       1,809 SATISFIED FROM POOL                98 BLOCKS WRITTEN - TOTAL
        93.9 HIT RATIO                           0 FORMAT CYLINDER
                                                 0 BLOCKS CREATED
           0 ERROR BUFFERS IN POOL               0 MAX ERROR BUFFERS IN POOL
```

This area displays the actual work performed by the buffer handler to satisfy the above requests. The descriptions are arranged in alphabetical order.

BLOCKS CREATED
: The number of new blocks added to the data set.

BLOCKS WRITTEN - TOTAL
: Total blocks written, including OSAM WRITES - STEAL and OSAM WRITES - PURGE.

ERROR BUFFERS IN POOL
: The number of error buffers currently in the pool.

FORMAT CYLINDER
: The number of new cylinders formatted in the data set.

HIT RATIO
: The hit ratio for all OSAM buffer pools combined. It is a measure of buffer pool performance. A high hit ratio means that a high percentage of reads were satisfied from the buffer pool without having to access external storage.

  Hit ratio is computed as follows:

```
100 x (A / (A + B))
```

  where:

  A — Requests satisfied from pool

  B — OSAM reads with I/O

MAX ERROR BUFFERS IN POOL
: The largest number of error buffers ever in the pool since IMS restart.

OSAM READS WITH I/O
: The number of reads performed by OSAM in the overflow area to retrieve the next sequential block. Each read counted here indicates that the buffer requested was not in the OSAM buffer pool and had to be read from external storage.

OSAM WRITES - PURGE
: This counter is incremented when the pool is purged because of synchronization point or checkpoint processing. Each write may cause multiple blocks to be written.

OSAM WRITES - STEAL
: The counter is incremented whenever a buffer is written to make space in the pool. These writes are very expensive and should be avoided. They indicate that your buffer pools may be too small.

SATISFIED FROM POOL
: This counter is incremented when the request is satisfied with a record already in the pool.

```
Area 4

- - - - - - - - - - - -  SEQUENTIAL BUFFERING STATISTICS - - - - - - - - - - - -
             STATUS: ACTIVE                      0K STORAGE CURRENTLY IN USE
        100K STORAGE LIMIT                      66K MAX STORAGE USED
```

This area displays sequential buffering statistics. It is blank for IMS releases prior to IMS 2.2. The descriptions are arranged in alphabetical order.

MAX STORAGE USED
: High-water mark for storage used (in K) by sequential buffering for this run of IMS.

STATUS
: Status of sequential buffering in this IMS system. Possible values:

  ACTIVE
  : Sequential buffering is enabled.

  NOT INITIALIZED
  : Sequential buffering option was not selected.

  SOFTWARE PROBLEM
  : Error with sequential buffering component.

  STOPPED
  : Sequential buffering was active but has been stopped with an operator command.

STORAGE CURRENTLY IN USE
: Number of kilobytes of storage currently used by sequential buffering for all regions.

STORAGE LIMIT
: Maximum amount of storage (in K) that can be allocated by sequential buffering. If no limit was specified, NO STORAGE LIMIT is displayed.

DBST - OSAM Subpool Statistics

```
BMC SOFTWARE  ------------------ OSAM POOLS ------------------ PERFORMANCE MGMT
SERV ==> DBST            INPUT   13:21:09  INTVL=> 3  LOG=> N   TGT==> IMS22X
PARM ==> 7     RA1307I ENTER SUBPOOL TO BE DISPLAYED             SCROLL=> N/A

- - - - - - - - - - - - - OSAM SUBPOOL STATISTICS - - - - - - - - - - - - - -
ID CP1    BUFFER SIZE   8,192      7 BUFFERS     PAGEFIX: BUFFERS N  PREFIXES N

- - - - - - - - - - - - - OSAM SUBPOOL REQUESTS - - - - - - - - - - - - - -
        879 LOCATES                            52 ALTERS
         65 PURGES                              0 BLOCK CREATES

- - - - - - - - - - - - - OSAM SUBPOOL PERFORMANCE - - - - - - - - - - - - -
        103 OSAM READS WITH I/O                 0 OSAM WRITES - STEAL
        774 SATISFIED FROM POOL                26 BLOCKS WRITTEN - PURGE
       88.3 HIT RATIO                       1,058 BUFFERS SEARCHED

          0 LOCATE CALLS WHICH WAITED FOR BUSY IDENTS
          0 BUFFER STEAL WAITS FOR BUFFER BUSY WRITING
          0 BUFFER STEAL WAITS FOR BUFFER BUSY READING
          0 BUFFER STEAL OR PURGE WAITS FOR OWNERSHIP TO BE RELEASED
          0 BUFFER STEAL WAITS BECAUSE NO BUFFER WAS AVAILABLE TO BE STOLEN

   LEVEL            0      1      2      3      4      5      6      7      8
BUFFERS STOLEN     92     12      0      0      0      0      0      0      0
```

Description: Statistics on OSAM buffer pool management are also kept by subpool, not just for the whole pool. These statistics are cumulative from IMS restart.

Select Code: DBST

Parameter: Enter subpool number (1 or 2 digits).

If no entry is made, the global pool display (see "DBST - OSAM Global Pool Statistics" on page 221) is returned.

Field Descriptions: Each of the fields is shown and described below by display area.

Area 1

```
- - - - - - - - - - - - - OSAM SUBPOOL STATISTICS - - - - - - - - - - - - - -
ID CP1    BUFFER SIZE   8,192      7 BUFFERS     PAGEFIX: BUFFERS N  PREFIXES N
```

This area shows the current subpool definition. The descriptions are arranged in alphabetical order.

BUFFERS
: Number of buffers specified.

BUFFER SIZE
: The subpool buffer size in bytes.

ID
: Four-character subpool identification from the ID field on the IOBF control statement. Used when defining multiple subpools of the same size.

  N/A if not used.

PAGEFIX: BUFFERS
: Indicates (Y/N) whether the long term page fixing option was chosen for data buffers in this pool.

PAGEFIX: PREFIXES
: Indicates (Y/N) whether the long term page fixing option was chosen for buffer prefixes in this pool.

```
Area 2

- - - - - - - - - - - - - OSAM SUBPOOL REQUESTS - - - - - - - - - - - - - - -
        879 LOCATES                              52 ALTERS
         65 PURGES                                0 BLOCK CREATES
```

This area displays the number of subpool requests. However, at this time, only the number of purge requests is being incremented by IMS. The descriptions are arranged in alphabetical order.

ALTERS
: The number of alters.

BLOCK CREATES
: The number of blocks created.

LOCATES
: The number of locates.

PURGES
: The number of purges.

```
Area 3

- - - - - - - - - - - - - OSAM SUBPOOL PERFORMANCE - - - - - - - - - - - - -
        103 OSAM READS WITH I/O                   0 OSAM WRITES - STEAL
        774 SATISFIED FROM POOL                  26 BLOCKS WRITTEN - PURGE
       88.3 HIT RATIO                         1,058 BUFFERS SEARCHED
```

This area displays the actual work performed by the buffer handler in this subpool. The descriptions are arranged in alphabetical order.

BLOCKS WRITTEN - PURGE
: This counter is incremented by the number of blocks purged from the pool in synchronization point or checkpoint processing. The number of OSAM WRITES/STEAL may be added to this to get the total number of blocks written.

BUFFERS SEARCHED

The total number of buffers searched to find the records. Both this counter and SATISFIED FROM POOL exclude work done for keyed requests; therefore, the sum of the subpool counters is less than the global counter displayed for the whole pool.

HIT RATIO

This is a measure of buffer pool performance. A high hit ratio means that a high percentage of reads were satisfied from the buffer pool without having to access external storage.

Hit ratio is computed as follows:

```
100 x (A / (A + B))
```

where:

A Requests satisfied from pool

B OSAM reads with I/O

OSAM READS WITH I/O

The number of OSAM reads. Each read counted here indicates that the buffer requested was not in the OSAM buffer pool and had to be read from external storage.

OSAM WRITES - STEAL

This counter is incremented whenever a buffer is written to make space in the pool. These writes are very expensive and should be avoided. They indicate that your buffer pool may be too small.

SATISFIED FROM POOL

This counter is incremented when the request is satisfied with a record already in the subpool.

Area 4

```
0 LOCATE CALLS WHICH WAITED FOR BUSY IDENTS
0 BUFFER STEAL WAITS FOR BUFFER BUSY WRITING
0 BUFFER STEAL WAITS FOR BUFFER BUSY READING
0 BUFFER STEAL OR PURGE WAITS FOR OWNERSHIP TO BE RELEASED
0 BUFFER STEAL WAITS BECAUSE NO BUFFER WAS AVAILABLE TO BE STOLEN
```

This area displays five counters of waits that may occur in the buffer handler. The reason for each type of wait is documented in the display.

```
Area 5

      LEVEL            0      1    2     3     4      5    6    7    8
  BUFFERS STOLEN      92     12    0     0     0      0    0    0    0
```

This area presents an overview of the work performed to free space in the buffer pool. The descriptions are arranged in alphabetical order.

BUFFERS STOLEN
: The number of buffers taken at each level.

LEVEL
: The nine levels represent a difference in the amount of work necessary to free the buffer.

- A buffer at level 0 or 1 can be used immediately because it is unowned and unaltered.
- A buffer at level 2 or 3 can be used when a write that has already been initiated is complete.
- At level 4 or 5, the buffer must first be written out.
- Levels 0, 2, 4 indicate that the last owner of the buffer is the PST currently requesting one, while buffers at levels 1, 3, 5 belonged to another PST.
- Ownership must be released before a buffer at levels 6, 7, or 8 may be stolen.
- At level 6 the buffer is not marked altered; at level 7 it has been altered; and at level 8 the data is currently being read in.

FPBST - Fast Path Buffer Pool Statistics

```
BMC SOFTWARE  ---------- SERVICE FAST PATH BUFFER POOL ------- PERFORMANCE MGMT
SERV ==> FPBST           INPUT   13:21:09  INTVL=> 3  LOG=> N   TGT==>  IMS22X
PARM ==>                                                       SCROLL => N/A

                     FAST PATH BUFFER POOL STATISTICS
         30 TOTAL BUFFERS  (DBBF)                25 FIXED BUFFERS
         10 TOTAL PRE-FIXED BUFFERS  (DBFX)       0 BUFFERS IN USE BY PROGRAMS
      2,048 BUFFER SIZE  (BSIZ)                   1 BUFFERS BEING WRITTEN
                                                 24 FIXED BUFFERS AVAILABLE
                                                  5 UNFIXED BUFFERS

          2 TOTAL OUTPUT THREADS (OTHR)           2 IDLE OUTPUT THREADS

                 61,440 TOTAL FAST PATH BUFFER POOL SIZE
                 51,200 TOTAL PAGE-FIXED BUFFER POOL SIZE

 REGION----NBA-OBA-USED   REGION----NBA-OBA-USED   REGION----NBA-OBA-USED
1-MDR5       6   0    0  2-MPR5       6   2    0
```

Description: This display describes the Fast Path buffer pool. It shows its size, the options in effect, and the users of the pool.

Select Code: FPBST

Parameter: Enter the 1- to 3-digit region number. Default is 1. Enter the number of the region that you want displayed first in the detailed region area.

Field Descriptions: Each of the fields is shown and described below by display area.

Area 1

```
                     FAST PATH BUFFER POOL STATISTICS
         30 TOTAL BUFFERS  (DBBF)             25 FIXED BUFFERS
         10 TOTAL PRE-FIXED BUFFERS  (DBFX)    0 BUFFERS IN USE BY PROGRAMS
      2,048 BUFFER SIZE  (BSIZ)                1 BUFFERS BEING WRITTEN
```

This area shows the defined characteristics of the Fast Path buffer pool. The descriptions are arranged in alphabetical order.

BUFFER SIZE (BSIZ)
The size of each Fast Path buffer as specified in the JCL.

BUFFERS BEING WRITTEN
The number of fixed buffers that are currently being written by an output thread or that are accumulating sequential dependent segments.

Note: Because this number includes buffers assigned to SDEPs, this number can be nonzero even if all output threads are idle.

BUFFERS IN USE BY PROGRAMS
The number of fixed buffers that are currently in use in the dependent regions.

FIXED BUFFERS
The total number of buffers that are currently page-fixed.

TOTAL BUFFERS (DBBF)
The total number of buffers in the pool as specified in the JCL.

TOTAL PRE-FIXED BUFFERS (DBFX)
The total number of buffers to be fixed when the first region starts, as specified in the JCL.

```
Area 2

                                                    24 FIXED BUFFERS AVAILABLE
                                                     5 UNFIXED BUFFERS
```

This area shows buffer availability. The descriptions are arranged in alphabetical order.

FIXED BUFFERS AVAILABLE
The number of fixed buffers available for use by the dependent regions.

UNFIXED BUFFERS
The number of buffers that are not page fixed and could be used to start up additional dependent regions.

```
Area 3

          2 TOTAL OUTPUT THREADS (OTHR)           2 IDLE OUTPUT THREADS

                 61,440 TOTAL FAST PATH BUFFER POOL SIZE
                 51,200 TOTAL PAGE-FIXED BUFFER POOL SIZE
```

This area shows output thread and pool size statistics. The descriptions are arranged in alphabetical order.

IDLE OUTPUT THREADS
The number of output threads available for use by the dependent regions.

TOTAL FAST PATH BUFFER POOL SIZE
The total virtual storage size of the Fast Path buffer pool (DBBF x BSIZ).

TOTAL OUTPUT THREADS (OTHR)
The total number of output threads as specified in the JCL.

TOTAL PAGE-FIXED BUFFER POOL SIZE
: The amount of the Fast Path buffer pool that has been page-fixed by IMS (depends on DBFX, the number of active regions, and the number of open DEDBs).

```
Area 4

 REGION----NBA-OBA-USED   REGION----NBA-OBA-USED   REGION----NBA-OBA-USED
1-MDR5       6   0    0  2-MPR5       6   2    0
```

This area shows fixed buffer usage by region.

NBA
: The normal buffer allocation specified in the JCL.

OBA
: The overflow buffer allocation specified in the JCL.

REGION
: The region identification and job name.

Note: The CICS job name is shown as the message region name when DBCTL threads allocate PSBs with Fast Path resources. The CICS job name appears only while the PSB is allocated. When the transaction completes and the PSB is deallocated, the Fast Path buffers are freed and the CICS job name no longer appears in the display (no DBCTL thread).

USED
: The number of fixed buffers currently in use by the region.

VSST - VSAM Global Pool Statistics

```
BMC SOFTWARE  ------------------- VSAM POOLS -----------------PERFORMANCE MGMT
SERV ==> VSST            INPUT    13:57:26  INTVL=> 3  LOG=> N  TGT==>  IMS22X
PARM ==>                                     LINE     1 OF    12 SCROLL => CSR
                                                                  << EXPAND >>
 - - - - - - - - - - - VSAM DATABASE POOL STATISTICS - - - - - - - - -  - - - -
        POOL IS LOCAL                        84K TOTAL VSAM POOL SIZE
        DL/I TRACE IS ON                      4K TOTAL BUFFER HANDLER POOL SIZE
        BACKGROUND WRITE:  34%                 2 BACKGROUND WRITES
   72.4 HIT RATIO FOR ALL SUBPOOLS             5 PURGE/CHKPT CALLS RECEIVED

 - - - - - - - - - - - - - - -  SUBPOOL SUMMARY - - - - - - - - - - - - - - - -
            BUFFER         HIPERSPACE     HIT      READS     WRITES     WRITES
 SP  ID   T   SIZE  BUFFERS   BUFFERS    RATIO   WITH I/O     (USER)     (VSAM)
  1  I001 D  1,024        8         0     98.9        102          0          0
  2  I001 D  2,048        8         0     34.0        340         24          2
  3  I001 D  4,096       15         5     64.1         51          5          0
  4  I002 I  4,096       15        10     92.6         55          1          0
 ******************************** END OF DATA ********************************
```

Description: This display describes the VSAM buffer pool: its size, the options in effect, and the defined subpools.

Select Code: VSST (global pool statistics)

Parameter: None for this global display.

Entry of a valid subpool number returns the subpool display (see "VSST - VSAM Subpool Statistics" on page 235).

Expand: The subpool detail display can be accessed by moving the cursor to the line in the Subpool Summary for the desired subpool and pressing ENTER.

Scrolling: The display is scrollable so that any number of subpools can be displayed.

Field Descriptions: Each of the fields is shown and described below by display area.

Area 1

```
 - - - - - - - - - - - VSAM DATABASE POOL STATISTICS - - - - - - - - -  - - - -
        POOL IS LOCAL                        84K TOTAL VSAM POOL SIZE
        DL/I TRACE IS ON                      4K TOTAL BUFFER HANDLER POOL SIZE
        BACKGROUND WRITE:  34%                 2 BACKGROUND WRITES
   72.4 HIT RATIO FOR ALL SUBPOOLS             5 PURGE/CHKPT CALLS RECEIVED
```

This area shows the defined characteristics of the VSAM database pool. The descriptions are arranged in alphabetical order.

BACKGROUND WRITE:
: OFF if background write is not selected. If background write is on, this field shows the percent of buffers in each subpool to be considered as candidates for writing by the background write function. This number is specified or defaults to the OPTIONS statement.

BACKGROUND WRITES
: The number of times background write was invoked since IMS restart.

DL/I TRACE IS ON/OFF
: The status of the DL/I buffer handler trace is shown as either ON or OFF.

HIT RATIO FOR ALL SUBPOOLS
: A measure of buffer pool performance for all the VSAM subpools. A high hit ratio means that a high percentage of reads were satisfied from the buffer pools without having to access external storage.

The hit ratio for all subpools is calculated as:

```
100 x (A / (A + B))
```

where:

A Number of read requests satisfied from all VSAM pools
B Number of reads with I/O for all VSAM pools

POOL IS LOCAL/GLOBAL
: The pool is identified as either GLOBAL (in CSA) or LOCAL (in IMS private storage).

PURGE/CHKPT CALLS RECEIVED
: The number of purge or checkpoint calls received since IMS restart.

TOTAL BUFFER HANDLER POOL SIZE
: Kilobytes of storage for the VSAM statistics, RPL blocks, and the DL/I trace table if tracing is requested.

TOTAL VSAM POOL SIZE
: The number of kilobytes of storage allocated for all subpools.

Area 2

```
 - - - - - - - - - - - - - - -  SUBPOOL SUMMARY - - - - - - - - - - - - - - - -
             BUFFER          HIPERSPACE     HIT      READS     WRITES     WRITES
 SP  ID   T   SIZE  BUFFERS   BUFFERS    RATIO   WITH I/O     (USER)     (VSAM)
  1  I001 D  1,024        8         0     98.9        102          0          0
  2  I001 D  2,048        8         0     34.0        340         24          2
  3  I001 D  4,096       15         5     64.1         51          5          0
  4  I002 I  4,096       15        10     92.6         55          1          0
```

This area shows the characteristics of each defined subpool and the I/O activity since IMS restart. The descriptions are arranged in alphabetical order.

BUFFERS
: Number of virtual storage buffers for this subpool.

BUFFER SIZE
: The size of a subpool buffer.

HIPERSPACE BUFFERS
: Number of Hiperspace buffers defined for this subpool.

HIT RATIO
: A measure of buffer pool performance. A high hit ratio means that a high percentage of reads are satisfied from the buffer pool without having to access external storage.

  The hit ratio for each subpool is computed as follows:

  ```
  100 x (A / (A + B))
  ```

  where:

  A Requests satisfied from pool

  B VSAM reads with I/O

ID
: Four character pool ID for this VSAM subpool: `xxxx` is shown if an ID is if not specified.

READS WITH I/O
: Represents the number of times VSAM had to access external storage because the VSAM control interval was not in the virtual storage or Hiperspace buffer pool.

SP
: Relative subpool number.

T
: Subpool type. It can be:

  D Data
  I Index

WRITES (USER)
: Writes by VSAM initiated by the user for synchronization point processing.

WRITES (VSAM)
: Number of writes initiated by VSAM to make free space in the pool. These types of writes are very expensive and indicate that the pool may be too small. They also are called VSAM steal writes or forced writes.

VSST - VSAM Subpool Statistics

```
BMC SOFTWARE  ------------------- VSAM POOLS ---------------- PERFORMANCE MGMT
SERV ==> VSST            INPUT    13:57:59  INTVL=> 3  LOG=> N  TGT==> IMS22X
PARM ==> 04                                 LINE     1 OF    20 SCROLL=> CSR

- - - - - - - - - - - IMS VSAM SUBPOOL STATISTICS - - - - - - - - - - - - - -
SP    4    BUFFER SIZE   4,096            15 BUFFERS         PAGEFIX BUFFERS N
ID I001    BFR TYPE      INDEX            10 H/S BUFFERS     PAGEFIX IO BLKS N

- - - - - - - - - - - IMS VSAM BUFFER HANDLER REQUESTS - - - - - - - - - - -
          0 RETRIEVES BY RBA                    0 ESDS INSERTS
        500 RETRIEVES BY KEY                    1 KSDS INSERTS
                                                0 ALTERS

- - - - - -  VSAM RETRIEVE REQUESTS / VSAM PERFORMANCE STATISTICS - - - - - -
        500 VSAM GETS                           0 WRITES (VSAM INITIATED)
          0 VSAM SEARCH BUFFER POOL             1 WRITES (USER INITIATED)
        691 SATISFIED FROM POOL
         55 READS WITH I/O                      0 ERROR BUFFERS IN POOL
       92.6 HIT RATIO                           0 MAX ERROR BUFFERS IN POOL

- - - - - - - - - - - HIPERSPACE BUFFER STATISTICS - - - - - - - - - - - - -
       42.9 HIPERSPACE HIT RATIO
        320 SUCCESSFUL READS                    6 SUCCESSFUL WRITES
          0 UNSUCCESSFUL READS                  0 UNSUCCESSFUL WRITES
******************************** END OF DATA ********************************
```

Description: For the VSAM buffer pool, most of the statistics are kept by subpool. This display shows the requests and work performed in the selected subpool since IMS restart.

This display can be accessed by cursor selection from the VSST global display or by parameter specification.

Select Code: VSST (subpool statistics)

Parameter: Enter subpool number (1 or 2 digits).

If no entry is made, the global pool display (see "VSST - VSAM Global Pool Statistics" on page 232) is returned.

Scrolling: This display is scrollable.

Field Descriptions: Each of the fields is shown and described below by display area.

Area 1

```
- - - - - - - - - - - IMS VSAM SUBPOOL STATISTICS - - - - - - - - - - - - - -
SP    4    BUFFER SIZE   4,096            15 BUFFERS         PAGEFIX BUFFERS N
ID I001    BFR TYPE      INDEX            10 H/S BUFFERS     PAGEFIX IO BLKS N
```

This area shows the current subpool definition. The descriptions are arranged in alphabetical order.

BFR TYPE
: Possible values:

  DATA
  : Data buffers and any index buffers not assigned to an index pool in this pool (default)

  INDEX
  : Only index buffers in this pool

BUFFERS
: The number of buffers specified.

BUFFER SIZE
: The subpool buffer size in bytes.

H/S BUFFERS
: Number of Hiperspace buffers specified for this subpool.

ID
: Four-character VSAM subpool ID.

PAGEFIX BUFFERS
: Indicates (Y/N) whether buffers are page fixed for this subpool.

PAGEFIX IO BLKS
: Indicates (Y/N) whether I/O blocks are page fixed for this subpool.

SP
: Relative subpool number.

Area 2

```
 - - - - - - - - - - - IMS VSAM BUFFER HANDLER REQUESTS - - - - - - - - - - -
           0 RETRIEVES BY RBA                    0 ESDS INSERTS
         500 RETRIEVES BY KEY                    1 KSDS INSERTS
                                                 0 ALTERS
```

This area displays the number of requests made to this subpool, separated by the type of request. The descriptions are arranged in alphabetical order.

ALTERS
: The number of alters.

ESDS INSERTS
: The number of ESDS inserts.

KSDS INSERTS
: The number of KSDS inserts.

RETRIEVES BY KEY
The number of retrieves by key.

RETRIEVES BY RBA
The number of retrieves by RBA.

```
Area 3

 - - - - - -  VSAM RETRIEVE REQUESTS / VSAM PERFORMANCE STATISTICS - - - - - - -
         500 VSAM GETS                           0 WRITES (VSAM INITIATED)
           0 VSAM SEARCH BUFFER POOL             1 WRITES (USER INITIATED)
         691 SATISFIED FROM POOL
          55 READS WITH I/O                      0 ERROR BUFFERS IN POOL
        92.6 HIT RATIO                           0 MAX ERROR BUFFERS IN POOL
```

This area displays the retrieve requests made to VSAM and the amount of VSAM I/O required to satisfy all requests. The descriptions are arranged in alphabetical order.

ERROR BUFFERS IN POOL
Error buffers currently in the pool.

HIT RATIO
A measure of buffer pool performance. A high hit ratio means that a high percentage of reads are satisfied from the buffer pool without having to access external storage.

The hit ratio is computed as follows:

```
100 x (A / (A + B))
```

where:

A Requests satisfied from pool

B VSAM reads with I/O

MAX ERROR BUFFERS IN POOL
The largest number of error buffers ever in the pool since IMS restart.

READS WITH I/O
Represents the number of times VSAM had to access external storage because the VSAM control interval was not in the virtual storage or Hiperspace buffer pool.

SATISFIED FROM POOL
Requests satisfied with a record already in the pool.

VSAM GETS
The number of VSAM GET requests.

VSAM SEARCH BUFFER POOL
The number of VSAM search buffer requests.

WRITES (USER INITIATED)
: Writes by VSAM initiated by the user for synchronization point or background write processing.

WRITES (VSAM INITIATED)
: Writes initiated by VSAM to free space in the pool. These writes are very expensive and indicate that the pool may be too small. They are also called VSAM steal writes or forced writes.

```
Area 4

 - - - - - - - - - - - HIPERSPACE BUFFER STATISTICS - - - - - - - - - - - - - -
        42.9 HIPERSPACE HIT RATIO
         320 SUCCESSFUL READS                    6 SUCCESSFUL WRITES
           0 UNSUCCESSFUL READS                  0 UNSUCCESSFUL WRITES
```

This area shows the number of Hiperspace reads and writes requested. The descriptions are arranged in alphabetical order.

HIPERSPACE HIT RATIO
: The portion of the VSAM hit ratio that is due to Hiperspace buffering. It is calculated as follows:

```
100 x (A / (B + C))
```

where:

A Successful reads from Hiperspace

B Requests satisfied from pool (includes successful Hiperspace reads)

C Reads with I/O

SUCCESSFUL READS
: The number of successful reads from Hiperspace for this subpool.

SUCCESSFUL WRITES
: The number of successful writes to Hiperspace for this subpool.

UNSUCCESSFUL READS
: The number of unsuccessful reads from Hiperspace. Each unsuccessful read represents an occasion when data had to be obtained from external storage because the Hiperspace page was stolen. If IMS determines in advance that the desired CI is not in Hiperspace, it does not attempt the Hiperspace read. Therefore, the number of reads to external storage can be greater than the number of unsuccessful Hiperspace reads.

UNSUCCESSFUL WRITES
: The number of unsuccessful writes to Hiperspace.

Chapter 14. IMS Internals Displays

This chapter describes the displays that show the status of IMS resources when internal IMS functions are invoked for transaction processing.

APPCA - APPC Activity Summary

```
BMC SOFTWARE  -------------     APPC ACTIVITY       -----------PERFORMANCE MGMT
SERV ==> APPCA   INPUT   12:58:43  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==>                                          ROW   1 OF    2 SCROLL=> CSR
EXPAND:  APPCL, USER, LINESEL(DAPPC), FSEL(+)
                                                  --- ACTIVE CONVERSATIONS ---
IMS BASE LU NAME: IMSLU62   CURRENT STATUS: ENAB    SYNC:     1    INPUT:     1
     XRF LU NAME:           DESIRED STATUS: ENAB   ASYNC:     0   OUTPUT:     0

     NETID/      TPNAME -------------------------------------------------------
    LUNAME    D CONVERSATION ID   USERID  QCNT TRANCODE CLS RGN MSG STATUS
--------  - ---------------- -------- ---- ++++++++ --- +++ --- -------
RXAPPC  * O DFSSIDE
               0000000000000000             3                      STO
MVSTEST   I INQUIRY_PART
               03C8F62800000012 JCL3          PART       1   1 IMP
******************************** END OF DATA ***********************************
```

Description: This display shows summary information for the IMS APPC connection and an individual line for each LUNAME/TPNAME currently in a conversation with IMS as one of the partner LUs.

If there is no IMS support for APPC, the following message appears:

```
IMS DOES NOT SUPPORT APPC
```

with no other data displayed on the screen.

Color: If you have a color monitor:

Red Highlights the:

- Current APPC connection (CURRENT STATUS) and the requested APPC connection (DESIRED STATUS) if they are different.
- LU name and TP name rows for LU and TP name combinations that are stopped.

Select Code: APPCA

Parameter: All of the APPCA parameters, except for SORT, act as filters that restrict the information shown according to the criteria specified by the parameters.

Use the parameters as follows:

- Multiple parameters must be separated by commas.

  If multiple filtering parameters are entered, **all** restrictions must be met.

- A blank indicates the end of a parameter string; it cannot be used as a delimiter.

- Multiple resources with similar names can be requested by using an * character as a generic qualifier and a + character as a positional qualifier. The positional qualifier is repeated for every character to be replaced. The generic qualifier replaces a group of characters. For example, a parameter of `LU=AB+D*` shows all LUs that start with AB, have D in the fourth position, and have any character following D.

Invalid parameter combinations include:

If one parameter invalidates another, the following warning message is issued:

```
INCONSISTENT PARAMETERS ENTERED, xxx IGNORED
```

where xxx is the parameter ignored; processing continues.

Invalid parameter combinations and the action taken are:

`D=I,QCNT>n|XON`

Warning Message: `D=I PARAMETER IGNORED`

The invalid D parameter is replaced with `D=O` and all valid data is displayed.

`D=O,USERID=id|TRANCODE=trncode|CLASS=nnn|RGN=nnn`

Warning Message: `D=O PARAMETER IGNORED`

The invalid D parameter is replaced with `D=I` and all valid data is displayed.

`QCNT>n|XON,USERID=id|TRANCODE=trncode|CLASS=nnn|RGN=nnn`

Error Message: `QCNT AND XON INVALID WITH TRANCODE, USERID, CLASS AND RGN PARMS`

Valid keywords for APPCA parameters include the following. The parameter descriptions are arranged in alphabetical order.

CLASS|CLS=`nnn`

Note: Where `nnn` is a valid class number. Displays only those entries with a matching class.

When this parameter is entered, `D=I` is assumed since only input allocation directions have a class.

CONVID=`hex`

Where `hex` must be a 16-character hexadecimal ID. Displays only those conversation IDs that match the CONVID value.

D=I|O

Displays only those LUNAME/TPNAME combinations that match the allocation direction request where:

I Allocation requests directed to IMS as input.

O Allocation requests directed from IMS as output.

LU=`name`

Where `name` is a 1- to 8-character LU name. Generic and positional qualifiers can be used for the LU name. Displays only those LU names that have a matching name.

QCNT|Q>`n`

Where `n` can be a 1- to 4-character count. Displays only those LUNAME/TPNAME entries with a queue count greater than `n`.

Note: When this parameter is entered, `D=O` is assumed since only output allocation directions have a queue count.

RGN=`nnn`

Where `nnn` is a valid region number. Displays only those entries with a matching region number.

Note: When this parameter is entered, `D=I` is assumed since only input allocation directions have a region.

SORT|SO=`cc`

Where cc can be any of the following two characters. The display list is sorted by QCNT in descending numerical order by default. The primary sort is by a selected column. A secondary sort for all columns is by LUNAME and TPNAME in ascending alphabetical order.

The following descriptions are arranged in alphabetical order:

CL Sorts the list in descending numerical order by CLS (class).

CO Sorts the list in descending numerical order by CONVERSATION ID.

D Sorts the list alphabetically by D (allocation direction).

LU Sorts the list alphabetically by LUNAME.

This includes the LU summary line.

MS Sorts the list alphabetically by MSG (input message type).

NE Sorts the list alphabetically by network ID of the LU name

QC Sorts the list in descending numerical order by QCNT (queue count) with a secondary sort on LUNAME.

RG Sorts the list in descending numerical order by RGN (region).

ST Sorts the list alphabetically by STATUS.

TP Sorts the list alphabetically by TPNAME.

TR Sorts the list alphabetically by TRANCODE.

US Sorts the list alphabetically by USERID.

TP=`name`

Where `name` is a TP name (maximum of 52 characters). Generic and positional qualifiers can be used for the TP name. Displays only those TP names that have a matching name.

TRANCODE|TRAN|TR=`trancode`

Where `trancode` can be a 1- to 8-character transaction name. Generic and positional qualifiers can be used for the transaction name. Displays only those transaction codes that have a matching name.

Note: When this parameter is entered, `D=I` is assumed since only input allocation directions have a transaction code.

USERID|US=`id`

Where `id` is a 1- to 8-character user ID. Generic and positional qualifiers can be used for the user ID. Displays only those users that have a matching ID.

Note: When this parameter is entered, `D=I` is assumed since only input allocation directions have a user ID.

XON

Displays only LUNAME/TPNAME entries when there is a status in the STATUS field.

Expand: APPC can be EXPANDed by using the following fields as indicated:

APPCL

Move the cursor to this field and press ENTER to invoke the APPC LU status display.

USER

Move the cursor to this field and press ENTER to invoke the user status summary display (USER).

LINESEL(DAPPC)

Move the cursor to an LU name in one of the rows of the APPCA display and press ENTER to invoke the DAPPC service. DAPPC shows detail information for the selected LU name.

Selecting DAPPC with the cursor from the EXPAND line invokes the DAPPC service for the LU name in the first row of the APPCA display.

FSEL(+)

Indicates that at least one column has cursor-sensitive fields. A string of `+` characters underneath a column name means that this column contains cursor-sensitive fields. Moving the cursor to a field in that column and pressing the ENTER key invokes a related display for that field. For example, if the cursor is at a field value under the RGN column, pressing the ENTER key displays the REGNS service with the correct region number as the parameter. Columns with cursor-sensitive fields include:

RGN

The REGNS service showing IMS dependent region activity for the transaction currently processing can be displayed with the region number as a parameter.

TRANCODE

The TRANQ service showing transaction status details can be displayed with the transaction code as a parameter.

Sorting: The display list can be sorted by:

- Using the SORT parameter.
- Positioning the cursor with the TAB key to the column heading to be sorted and pressing ENTER.

  This overrides any SORT parameter entered in the PARM field and primes the field with the action taken. The integrity of any other parameters entered in the PARM field is preserved.

  The display list is sorted by QCNT by default with a secondary sort by LUNAME and TPNAME.

Scrolling: The display is scrollable.

Field Descriptions: Each of the fields is shown and described below by display area.

```
Area 1

                                                        --- ACTIVE CONVERSATIONS ---
 IMS BASE LU NAME: IMSLU62   CURRENT STATUS: ENAB    SYNC:     1    INPUT:     1
      XRF LU NAME:           DESIRED STATUS: ENAB   ASYNC:     0   OUTPUT:     0
```

This area shows APPC status. The descriptions are arranged in alphabetical order.

ASYNC

The count of currently active asynchronous conversations.

CURRENT STATUS

Note: If the DESIRED STATUS is different from the CURRENT STATUS, both fields are highlighted in red.

The current status of the IMS connection to APPC. This can be:

CAN	The APPC/IMS connection was cancelled.
DISA	The APPC/IMS connection is disabled.
ENAB	The APPC/IMS connection is enabled (active).
FAIL	The APPC/IMS connection failed.
OUTB	The APPC/IMS connection is outbound.
PURG	The APPC/IMS connection is purging.
STOP	The APPC/IMS connection stopped.

STRT The APPC/IMS connection is starting.

DESIRED STATUS
The requested status of the IMS connection to APPC. This can be:

CAN The APPC/IMS connection was cancelled.

DISA The APPC/IMS connection is disabled.

ENAB The APPC/IMS connection is enabled (active).

FAIL The APPC/IMS connection failed.

OUTB The APPC/IMS connection is outbound.

PURG The APPC/IMS connection is purging.

STOP The APPC/IMS connection stopped.

STRT The APPC/IMS connection is starting.

IMS BASE LU NAME
The LU name used by APPC to route connections to this IMS subsystem. This is defined in SYS1.PARMLIB member APPCPMxx where xx is a user-defined APPC startup parameter. This field contains N/A when IMS is not connected to APPC.

INPUT
The count of currently active input conversations.

OUTPUT
The count of currently active output conversations.

XRF LUNAME
The LU name of the XRF system associated with this IMS.

Note: Neither this field nor its label is displayed if XRF is not defined to the system.

SYNC
The count of currently active synchronous conversations.

Area 2

```
NETID/      TPNAME -------------------------------------------------------
LUNAME    D CONVERSATION ID   USERID  QCNT TRANCODE CLS RGN MSG STATUS
--------  - ---------------- -------- ---- ++++++++ --- +++ --- ----------
USBMC   * O DFSSIDE
 RXAPPC     0000000000000000             3                      STO
USBMC     I INQUIRY_PART
 MVSTEST    03C8F62800000012 JCL3          PART       1   1 IMP
```

This area contains one entry for every LU name, TP name, and conversation connection to IMS. The descriptions are arranged in alphabetical order.

CLS

The IMS scheduling class of this transaction.

Note: This field shows a class only when the value in the D column is I.

CONVERSATION ID

The conversation ID for this conversation. For output conversation, it might be zeros.

D

The direction of the allocation request. This can be:

I This allocation request is directed as input to IMS from the LU name. The conversation is allocated by the partner LU as shown in the LUNAME column.

O This allocation request is directed as output to the LU name from IMS. The conversation is allocated by IMS.

MSG

Type of message received from this TP name:

CMD IMS command.

CNV Conversational transaction.

EMH Expedited Message Handler (Fast Path) buffered transaction.

EXP Explicit transaction (scheduling information derived from a TP name definition in APPC).

IMP Implicit transaction (scheduling information derived from a TRANSACT macro).

MSW Message switch.

REC Recoverable transaction.

RSP Transaction response.

Note: This field shows a message type only when the value in the D column is I.

NETID/LUNAME

The network ID of the LU name or the LU name of the partner LU to IMS for this conversation. Depending on how the conversation is initiated, this is often not an actual LU name when the conversation is initiated by IMS (the value in the D column is O); for example:

- The LU name is actually the name of a SIDEINFO entry in APPC. This results from an allocation request specifying only the SIDEINFO name with no other conversation parameters.

- The LU name is DFSLU. This is the default LU name used by IMS when no LU name is supplied.

An asterisk indicates that this LU name is actually a SIDEINFO name.

QCNT
Count of requests currently queued to this LU name and TP name awaiting execution.

Note: This field shows a count only when the value in the D column is O.

RGN
The region where this transaction is executing.

Note: This field shows a value only when the D column contains an I. If 0 is shown, this means the region is not scheduled.

STATUS
The following statuses (up to a maximum of 10 characters) can appear in this field in the order shown below. To see all the statuses associated with an LUNAME/TPNAME, use the DAPPC service. To see all the statuses associated with an LUNAME only, use the APPCL service.

STO
This LUNAME/TPNAME is stopped. If this is the status for the LUNAME/TPNAME, this line is highlighted in red.

LUSTO
This LUNAME is stopped. The LUNAME/TPNAME may still be active, but the LUNAME is stopped. If this is the status for the LU, this line is highlighted in red.

TRA
Trace is on for this LUNAME/TPNAME.

LUTR
Trace is on for this LUNAME only.

TPNAME
The TP name used in the initiation of the conversation by APPC with IMS to control scheduling.

- If this is an input conversation, this TPNAME is passed to APPC by the partner LU as shown in the LUNAME field.
- If this is an output TP name, then this TPNAME is passed to APPC by IMS.

TRANCODE
The transaction code scheduled for this TP name. This is specified in the APPC TP name definition and may be a transaction code specified in a TRANSACT macro or an implicit APPC transaction, or it may be the name of a program associated with an explicit APPC transaction.

Note: This field shows a transaction code only when the value in the D column is I.

USERID
The ID of the user who established the connection. For input connections, this is the ID of the user currently connected to this LU with this TP name.

Note: This field shows an ID only when the value in the D column is I.

APPCL - APPC LU Status

```
BMC SOFTWARE  -------------     APPC LU STATUS      -----------PERFORMANCE MGMT
SERV ==> APPCL   INPUT   07:21:13  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==>      ROW   1 OF    6 SCROLL=> CSR
EXPAND:  APPCA, LINESEL(APPCA)
                                                ACTIVE CONVERSATIONS
IMS BASE LU NAME: IMSLU62   CURRENT STATUS  ENAB   SYNC :     1   INPUT:      1
XRF LU NAME:                DESIRED STATUS  ENAB   ASYNC:     1   OUTPUT:     1

    NETID    LUNAME    DIRECT   CONV  QCNT  ENQCT   TPCNT  TPSTP  STATUS
   -------- --------  ------  -----  ----  ------  -----  -----  -----------
   USBMC    MVSTEST   INPUT       1                     1         TRA
   USBMC    MVSTEST   OUTPUT      0     0       0      0      0
   USBMC    RXAPPC    INPUT       0                     0
   USBMC    RXAPPC  * OUTPUT      1     6       6      1      0
   USBMC    RXAPPC2   INPUT       0                     0
   USBMC    RXAPPC2 * OUTPUT      0     1       1      1      0
******************************** END OF DATA ***********************************
```

Description: This display shows summary information for the IMS APPC connection and an individual line for each LU in a conversation with IMS as one of the partner LUs.

If IMS is not connected to APPC, the following message appears:

```
IMS NOT CONNECTED TO APPC
```

with no other data displayed on the screen.

Color: If you have a color monitor:

Red Highlights the:

- Current APPC connection (CURRENT STATUS) and the requested APPC connection (DESIRED STATUS) if they are different.
- LU names that are stopped or have a nonzero TPSTP value.
- LU names with a status of STO.

Select Code: APPCL

Parameter: All of the APPCL parameters, except for SORT, act as filters that restrict the information shown according to the criteria specified by the parameters.

Use the parameters as follows:

- Multiple parameters must be separated by commas.

  If multiple filtering parameters are entered, all restrictions must be met.

- A blank indicates the end of a parameter string; it cannot be used as a delimiter.
- Multiple resources with similar names can be requested by using an * character as a generic qualifier and a + character as a positional qualifier. The positional qualifier is repeated for every character to be replaced. The generic qualifier replaces a group of characters. For example, a parameter of `LU=AB+D*` shows all LUs that start with AB, have D in the fourth position, and have any character following D.

Invalid parameter combinations include:

If one parameter invalidates another, the following warning message is issued:

```
INCONSISTENT PARAMETERS ENTERED, xxx IGNORED
```

where xxx is the parameter ignored; processing continues.

Invalid parameter combinations and the action taken are:

`D=I,QCNT>n|XON`

Warning Message: `D=I PARAMETER IGNORED`

The invalid D parameter is replaced with `D=O`.

Valid keywords for APPCL parameters include:

DIRECT|D=I|O

Displays only those LU names that match the allocation direction request where:

I Allocation requests directed to IMS as input.

O Allocation requests directed to IMS as output.

LU=`name`

Where `name` is a 1- to 8-character LU name. Generic and positional qualifiers can be used for the LU name. Displays only those LU names that have a matching name.

QCNT|Q>`n`

Where `n` can be a 1- to 4-character count. Displays only those LUNAME entries with a queue count greater than `n`.

Note: When this parameter is entered, `D=O` is assumed since only output allocation directions have a queue count.

SORT|SO=cc

Where cc can be any of the following two characters. The display list is sorted by QCNT in descending numerical order by default. The primary sort is by a selected column. A secondary sort for all columns is by LUNAME in ascending alphabetical order.

CO Sorts the list in descending numerical order by CONV (count of active conversations).

This includes the LU summary line.

DI Sorts the list alphabetically by DIRECT (allocation direction).

EN Sorts the list in descending numerical order by the ENQCT (enqueue count).

LU Sorts the list alphabetically by LUNAME.

This includes the LU summary line.

NE Sorts the list alphabetically by the network ID of the LU name.

QC Sorts the list in descending numerical order by QCNT (queue count) by default with a secondary sort on LUNAME.

ST Sorts the list alphabetically by STATUS.

TP Sorts the list in descending numerical order by TPCNT (count of TP names for an LU name).

TS Sorts the list in descending numerical order by TPSTP (count of stopped TPs for an LU name).

XON

Displays only LUNAME entries when there is a status in the STATUS field or when TPSTP contains a nonzero value.

Expand: APPCL can be EXPANDed by moving the cursor to the following fields in the EXPAND line and pressing ENTER:

APPCA APPC activity summary display.

LINSEL(APPCA) APPCA activity summary display for the first LU name in LUNAME of the APPCL display.

The PARM field of the APPCA display is primed with the LU name.

You can also move the cursor to a field in the LUNAME column and press ENTER to EXPAND to the selected LU in the APPCA display.

Sorting: The display list can be sorted by:

- Using the SORT parameter.
- Positioning the cursor with the TAB key to the column heading to be sorted and pressing ENTER.

  This overrides any SORT parameter entered in the PARM field and primes the field with the action taken. The integrity of any other parameters entered in the PARM field is preserved.

The display list is sorted by QCNT by default with a secondary sort by LUNAME.

Scrolling: The display is scrollable.

Field Descriptions: Each of the fields is shown and described below by display area.

```
Area 1


                                                        ACTIVE CONVERSATIONS
 IMS BASE LU NAME: IMSLU62   CURRENT STATUS  ENAB   SYNC :     1   INPUT:      1
 XRF LU NAME:                DESIRED STATUS  ENAB   ASYNC:     1   OUTPUT:     1
```

This area shows APPC status. The descriptions are arranged in alphabetical order.

ASYNC
: The count of currently active asynchronous conversations.

CURRENT STATUS

Note: If the DESIRED STATUS is different from the CURRENT STATUS, both fields are highlighted in red.

The current status of the IMS connection to APPC. This can be:

CAN	The APPC/IMS connection was cancelled.
DISA	The APPC/IMS connection is disabled.
ENAB	The APPC/IMS connection is enabled (active).
FAIL	The APPC/IMS connection failed.
OUTB	The APPC/IMS connection is outbound.
PURG	The APPC/IMS connection is purging.
STOP	The APPC/IMS connection stopped.
STRT	The APPC/IMS connection is starting.

DESIRED STATUS
: The requested status of the IMS connection to APPC. This can be:

CAN	The APPC/IMS connection was cancelled.
DISA	The APPC/IMS connection is disabled.

ENAB The APPC/IMS connection is enabled (active).

FAIL The APPC/IMS connection failed.

OUTB The APPC/IMS connection is outbound.

PURG The APPC/IMS connection is purging.

STOP The APPC/IMS connection stopped.

STRT The APPC/IMS connection is starting.

IMS BASE LU NAME
The LU name used by APPC to route connections to this IMS subsystem. This is defined in SYS1.PARMLIB member APPCPMxx where xx is a user-defined APPC startup parameter. This field contains N/A when IMS is not connected to APPC.

INPUT
The count of currently active input conversations.

OUTPUT
The count of currently active output conversations.

SYNC
The count of currently active synchronous conversations.

XRF LUNAME
The LU name of the XRF system associated with this IMS.

Note: Neither this field nor its label is displayed if XRF is not defined to the system.

Area 2

NETID	LUNAME	DIRECT	CONV	QCNT	ENQCT	TPCNT	TPSTP	STATUS
USBMC	MVSTEST	INPUT	1			1		TRA
USBMC	MVSTEST	OUTPUT	0	0	0	0	0	
USBMC	RXAPPC	INPUT	0			0		
USBMC	RXAPPC *	OUTPUT	1	6	6	1	0	
USBMC	RXAPPC2	INPUT	0			0		
USBMC	RXAPPC2 *	OUTPUT	0	1	1	1	0	

This area contains a one-line summary entry for each LU allocation direction by LU name. The descriptions are arranged in alphabetical order.

CONV
The current number of active conversations. For output conversation, it might be zeros.

DIRECT
The direction of the allocation request. This can be:

INPUT This allocation request is directed as input to IMS from the LU name. The conversation is allocated by the partner LU as shown in the LUNAME column.

OUTPUT This allocation request is directed as output to the LU name from IMS. The conversation is allocated by IMS.

ENQCT
Count of requests queued to all TPs for this LU name since the last IMS cold start.

This field contains a count only when the value in the DIRECT column is OUTPUT.

LUNAME
The LU name of the partner LU to IMS for this conversation. Depending on how the conversation is initiated, this is often not an actual LU name when the conversation is initiated by IMS (the value in the DIRECT column is OUTPUT); for example:

- The LU name is actually the name of a SIDEINFO entry in APPC. This results from an allocation request specifying only the SIDEINFO name with no other conversation parameters.
- The LU name is DFSLU. This is the default LU name used by IMS when no LU name is supplied.

An asterisk indicates that this LU name is actually a SIDEINFO name.

NETID
The network ID of the LU name.

QCNT
Count of requests that are awaiting execution and are currently queued to all TPs for this LU name.

Note: This field shows a count only when the value in the DIRECT column is OUTPUT.

STATUS
The status of this LU name:

STO This LU name is stopped. If this is the status for the LU, this line is highlighted in red.

TRA The trace is set on for this LU name.

Notes:

- If the LU name is stopped, this status appears as the left-most status.
- This field shows a status only when the value in the DIRECT column is OUTPUT.

TPCNT

The count of all TP names for this LU name.

- For OUTPUT allocation direction, this is a count of TP names since the last IMS cold start.
- For INPUT allocation direction, this is a count of all currently active TP names.

TPSTP

A count of the number of TP names that are stopped for this LU name.

DAPPC - Input Allocation Direction

```
BMC SOFTWARE  -------------      APPC DETAIL        -----------PERFORMANCE MGMT
SERV ==> DAPPC   INPUT   07:24:43  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> CONVID=03C8F62800000012       ROW     1 OF   12 SCROLL=> CSR
EXPAND:  APPCL, APPCA, DREGN, TRANQ

 LU NAME : MVSTEST       NETID:  USBMC
 ACTIVE CONV:     1                         LU STATUS: TRA

 TPNAME  : INQUIRY_PART

 CONVID  : 03C8F62800000012
   DIRECTION : INPUT               TRANCODE: PART
   MODENAME  : LU62APPC            TRANTYPE: IMPLICIT
   MSG       : IMP                 CLASS   :   1
   CONV TYPE : MAPPED              QUEUED  :   0
   SYNC LEVEL: CONFIRM             RGN #   :   1
   USERID    : JCL3                RGNNAME : DFSMPR
                                   PSBNAME : DFSSAM02
                                   DB2STAT : N/A
                                   DLI TOT :   2
                                   SQL TOT :   0
****************************** END OF DATA **********************************
```

Description: This display can be selected by EXPANDing from the APPCA display or by selecting DAPPC from the analyzer service list (Primary Option Menu 1). If you select this service from the list and do not specify a conversation ID, the first conversation found is displayed.

The DAPPC display shown is determined by the allocation direction of the conversation. The display for the input allocation direction shows detail information about an inbound allocation conversation to IMS. It shows the LU, TP, and the conversation. The data displayed for the input allocation direction TP names reflects the information passed to IMS from APPC.

If the IMS control region supports APPC but there is no APPC connection, any data available for this conversation and the following message are displayed:

`IMS NOT CONNECTED TO APPC`

If the IMS control region does not support APPC, the following message is displayed only:

`IMS DOES NOT SUPPORT APPC`

Color: If you have a color monitor:

Red Highlights the:

- LU STATUS field if the LU is stopped.
- TP STATUS field if the TP is stopped.

Select Code: DAPPC

Parameter: CONVID=`hex`

Where `hex` is a 16-character hexadecimal ID.

If this parameter is not specified, the first conversation found is displayed. The conversation could be in an output allocation direction instead of an input allocation direction, depending upon the conversation found.

Expand: DAPPC can be EXPANDed by moving the cursor to the following fields in the EXPAND line and pressing ENTER:

APPCL	APPC LU status display.
APPCA	APPCA activity summary display.
DREGN	Region detail display. The PARM field of the DREGN display is primed with the RGNNAME value from DAPPC.
TRANQ	Transaction queue status display. The PARM field of the TRANQ display is primed with the TRANCODE value from DAPPC.

Scrolling: The display is scrollable below TPNAME.

Field Descriptions: Each of the fields is shown and described below by display area.

```
Area 1

 LU NAME : MVSTEST                                NETID:     USBMC
    ACTIVE CONV:     1                            LU STATUS: TRA
```

This area shows the LU name and its status. The descriptions are arranged in alphabetical order.

ACTIVE CONV
: The count of currently active conversations for this LU name in the allocation direction shown by the DIRECTION field.

LU NAME
: The LU name of the partner LU to IMS for this conversation. Depending on how the conversation is initiated, this is often not an actual LU name when the conversation is initiated by IMS (the value in the DIRECTION field is OUTPUT); for example:

  The LU name is DFSLU. This is the default LU name used by IMS when no LU name is supplied.

LU STATUS

The status of this LU:

STO This LU name is stopped. The field is highlighted in red.

TRA Trace is on for this LU name.

Note: If the LU name is stopped, this status appears as the left-most status.

NETID

The network ID of the LU name.

```
Area 2

 TPNAME  : INQUIRY_PART
```

This area shows the TP name.

TPNAME

The TP name used in the initiation of the conversation by the partner LU/TP to IMS LU.

```
Area 3

 CONVID  : 03C8F62800000012
    DIRECTION : INPUT
    MODENAME  : LU62APPC
    MSG       : IMP
    CONV TYPE : MAPPED
    SYNC LEVEL: CONFIRM
    USERID    : JCL3
```

This area shows conversation-level data. The descriptions are arranged in alphabetical order.

CONVID

The conversation ID used in this APPC conversation.

CONV TYPE

Conversation type:

BASIC Basic conversation.

MAPPED Mapped conversation.

DIRECTION

The direction of the allocation request as INPUT.

This allocation request is directed as input to IMS from the LU name. The conversation is allocated by the partner LU as shown in the LU NAME field.

MSG

Type of message received from this TP name:

CMD	IMS command.
CNV	Conversational transaction.
EMH	Expedited Message Handler (Fast Path) buffered transaction.
EXP	Explicit transaction. Scheduling information is derived from a TP name definition in APPC.
IMP	Implicit transaction. Scheduling information is derived from a TRANSACT macro.
MSW	Message switch.
REC	Recoverable transaction.
RSP	Transaction response.

MODENAME

The mode name used by the partner LU/TP to allocate this conversation.

SYNC LEVEL

Synchronization level:

CONFIRM	Confirmation is required for CPI-C SEND requests.
NONE	No synchronization.

USERID

The ID of the user who established the connection:

- For output connections, this is the user ID of the last user to connect to this LU with this TP name.
- For input connections, this is the user ID of the user currently connected to this LU with this TP name.

Area 4

```
TRANCODE: PART
TRANTYPE: IMPLICIT
CLASS   :   1
QUEUED  :   0
RGN #   :   1
RGNNAME : DFSMPR
PSBNAME : DFSSAM02
DB2STAT : N/A
DLI TOT :   2
SQL TOT :   0
```

This area shows IMS-related data. The descriptions are arranged in alphabetical order.

CLASS

Processing class for this transaction.

DB2STAT

The DB2 connection status for the region. If the region is connected, the first half of the DB2 status message shows the DB2 subsystem name. The second half of the message shows the connection status:

-CON IMS connects this region to DB2 if a connection is available and the EXEC parameter SSM (to establish a DB2 connection) is valid.

-SON The application is signed on and a recovery token is assigned by DB2 if the EXEC parameter SSM is valid, the connection is successful, and the application issues a DB2 request.

-THD IMS had a thread with DB2 when it processed the EXEC parameter SSM to establish a connection to DB2.

If a region is connected to more than one DB2 subsystem and a thread is active, -THD is shown. If no thread is active, only the first connection is shown.

DLI TOT

The total number of DL/I calls since program scheduling.

PSBNAME

The PSB name (if any) currently scheduled for this transaction.

QUEUED

Number of currently queued input messages with this transaction code.

RGN #

The region where this transaction is currently executing.

RGNNAME

The name of the region where this transaction is currently executing.

Note: If the transaction is not currently scheduled, either because it has completed or because it cannot be scheduled, NOT SCHEDULED appears to the right of this field.

SQL TOT

The total number of SQL calls issued to DB2 by the transaction currently processing. If the Event Collector is not active, this field contains N/A.

TRANCODE

The transaction code scheduled for this TP name. This is specified in the APPC TP name definition. It can be:

- An implicit APPC transaction.
- The name of a program associated with an explicit APPC transaction (TPI).

TRANTYPE

Transaction APPC type:

IMPLICIT Implicit transaction (transaction code defined in Stage 1 of IMS system generation).

TPI CPI-C driven (dynamic transaction not defined in Stage 1 of IMS system generation).

DAPPC - Output Allocation Direction

```
BMC SOFTWARE  -------------      APPC DETAIL        -----------PERFORMANCE MGMT
  SERV ==> DAPPC   INPUT   07:25:55  INTVL=> 3  LOG=> N  TGT==> IMSA
  PARM ==> CONVID=03C8F3200000000B       ROW     1 OF   15 SCROLL=> CSR
  EXPAND:  APPCL, APPCA

   LU NAME : RXAPPC   (SIDEINFO NAME)      NETID: USBMC
  ACTIVE CONV:   1                                      LU STATUS:

   TPNAME  : DFSSIDE
     QCNT :     6         TOT ALLOCATION REQUESTS:     3    TP STATUS:
     ENQCT:     6             ALLOCATION FAILURES:     0
                           NORMAL DEALLOC REQUESTS:     3
                         ABNORMAL DEALLOC REQUESTS:     0
                               CONFIRMATION COUNTS:     3

   CONVID  : 03C8F3200000000B
     DIRECTION: OUTPUT          CONVERSATION TYPE: BASIC
     MODENAME :                        SYNC LEVEL: NONE
```

Description: This display can be selected by EXPANDing from the APPCA display or by selecting DAPPC from the analyzer service list (Primary Option Menu 1). If you select this service from the list and do not specify a conversation ID, the first conversation found is displayed.

The DAPPC display shown is determined by the allocation direction of the conversation. The display for the output allocation direction shows detail information about an outbound allocation to a partner LU/TP from IMS. It shows the LU, TP, and the conversation. The data displayed for output reflects the information passed to APPC from IMS.

If the IMS control region supports APPC but there is no APPC connection, any data available for this conversation and the following message are displayed:

```
IMS NOT CONNECTED TO APPC
```

If the IMS control region does not support APPC, the following message is displayed only:

```
IMS DOES NOT SUPPORT APPC
```

Color: If you have a color monitor:

Red — Highlights the:

- LU STATUS field if the LU is stopped.
- TP STATUS field if the TP is stopped.

Select Code: DAPPC

Parameter: CONVID=`hex`

Where `hex` is a 16-character hexadecimal ID.

Note: If this parameter is not specified, the first conversation found is displayed. The conversation could be in an input allocation direction instead of an output allocation direction, depending upon the conversation found.

Expand: DAPPC can be EXPANDed by moving the cursor to the following fields in the EXPAND line and pressing ENTER:

APPCL APPC LU status display.

APPCA APACHE activity summary display.

Scrolling: The display is scrollable below TPNAME.

Field Descriptions: Each of the fields is shown and described below by display area.

```
Area 1

 LU NAME : RXAPPC   (SIDEINFO NAME)                        NETID:     USBMC
    ACTIVE CONV:     1                                     LU STATUS:
```

This area shows the LU name and its status. The descriptions are arranged in alphabetical order.

ACTIVE CONV
: The count of currently active conversations for this LU name in the allocation direction shown by the DIRECTION field.

LU NAME
: The LU name of the partner LU to IMS for this conversation. Depending on how the conversation is initiated, this is often not an actual LU name when the conversation is initiated by IMS (the value in the ALLOCATION DIRECTION field is OUTPUT); for example:

- The LU name is actually the name of a SIDEINFO entry in APPC. This results from an allocation request specifying only the SIDEINFO name with no other conversation parameters. SIDEINFO NAME is displayed.
- The LU name is DFSLU. This is the default LU name used by IMS when no LU name is supplied.

LU STATUS
: The status of this LU:

STO This LU name is stopped. The field is highlighted in red.

TRA Trace is on for this LU name.

Note: If the LU name is stopped, this status appears as the left-most status.

NETID
The network ID of the LU name

```
Area 2

 TPNAME  : DFSSIDE
    QCNT :     6         TOT ALLOCATION REQUESTS:     3    TP STATUS:
    ENQCT:     6             ALLOCATION FAILURES:     0
                          NORMAL DEALLOC REQUESTS:     3
                        ABNORMAL DEALLOC REQUESTS:     0
                             CONFIRMATION COUNTS:     3
```

This area shows the TP name. The descriptions are arranged in alphabetical order.

ABNORMAL DEALLOC REQUESTS
The count of deallocation requests to APPC for this LUNAME/TPNAME that ended abnormally since the last IMS cold start.

ALLOCATION FAILURES
The total number of allocation failures to this LU/TP. It is derived by subtracting NORMAL DEALLOC REQUEST and ABNORMAL DEALLOC REQUEST from TOT ALLOCATION REQUEST. If a conversation is active, 1 is subtracted from the result.

CONFIRMATION COUNTS
The count of confirmations received by this TP.

ENQCT
Count of requests queued to all TPs for this LUNAME/TPNAME since the last IMS cold start.

NORMAL DEALLOC REQUESTS
The count of deallocation requests to APPC for this LUNAME/TPNAME that ended normally since the last IMS cold start.

QCNT
Count of requests that are awaiting execution and are currently queued to this LUNAME/TPNAME.

TOT ALLOCATION REQUESTS
The total number of allocation requests to APPC for this TP name since the last IMS cold start.

TP STATUS
The status of this TP name:

STO — This TP name is stopped. If this is the status for the LU, this line is highlighted in red.

TRA — Trace is on for this TP name.

Note: This field shows a status only when the value in the DIRECTION field is OUTPUT.

TPNAME

The TP name used in the initiation of the conversation by IMS using APPC services. If the TP name is not provided when the allocation request is made, this field contains DFSSIDE. This could occur, for example, if the LU name is a SIDEINFO entry name.

If this is an input conversation, this TP name is passed to APPC by the partner LU, as shown in the LU NAME field.

If this is an output TP name, this TP name is passed to APPC by IMS except when the TP name is DFSSIDE.

```
Area 3

 CONVID  : 03C8F3200000000B
    DIRECTION: OUTPUT          CONVERSATION TYPE: BASIC
    MODENAME :                        SYNC LEVEL: NONE
```

This area shows conversation-level data. The descriptions are arranged in alphabetical order.

CONVERSATION TYPE

Conversation type as:

BASIC	Basic conversation.
MAPPED	Mapped conversation.

CONVID

The conversation ID used in this APPC conversation.

DIRECTION

The direction of the allocation request as OUTPUT.

This allocation request is directed as output to the LU name from IMS. The conversation is allocated by IMS.

MODENAME

The mode name used in this conversation.

SYNC LEVEL

Synchronization level:

CONFIRM	Confirmation is required for CPI-C SEND requests.
NO	No synchronization.

DLTCH - Latch Detail

```
BMC SOFTWARE  ------------------- LATCH DETAIL -------------- PERFORMANCE MGMT
SERV ==> DLTCH  INPUT   13:21:09  INTVL=> 3  LOG=> N   TGT==>  IMSA
PARM ==> MSDB-CUSTDB          SCROLL => N/A
              --WAIT-COUNT--        ------OWNER------  ----WAITING REGIONS-----
LATCH ID      CUM       CURR  STAT  RGN STAT  PSBNAME  RGN1 RGN2 RGN3 RGN4 RGN5
------------- --------- ----  ----  --- ---- --------  ---- ---- ---- ---- ----
MSDB-CUSTDB         N/A    0  EXCL  001 ACTV PSB1MSDB   002
MSDB-CUSTORDR       N/A    2  EXCL  008 ACTV PSB2MSDB   007  006
MSDB-CUSTPART       N/A    0  EXCL  002 ACTV PSB2MSDB
```

Description: IMS uses latches to serialize resource access to prevent loss of control at critical times. Use this display to find the source of any generic latch contention.

Select Code: DLTCH

Parameter: To display detail statistics for generic latches, you can EXPAND from LATCH for a selected latch or enter the following in the parameter line (line 3) of the display:

genltch[-id][,H|W]

where:

genltch Can be any of the following IMS generic latch names:

CBTS
DBBP
DMSH
DMSY
MSDB

A scrollable list of latches for the requested generic name is displayed.

-id Is a user-defined identifier for a specific latch within the specified IMS generic latch. For example, entering:

CBTS-DPST

in the parameter line puts the CBTS-DPST latch at the top of a scrollable list of CBTS latches. The identifiers that can be specified for each generic latch are:

Latch Example	Description
CBTS-DPST	CBTE name
DBBP-1024	OSAM subpool size
DMSH-AREA1	Fast Path DEDB share area name

DMSY-AREA24	Fast Path DEDB SYNC area name
MSDB-CUSTDB	Fast Path MSDB name

,H
: Shows latches that are being held. It can be entered in the parameter line with a generic IMS latch name or with the name and a latch ID. For example:

```
CBTS,H
```

displays all the CBTS latches being held.

,W
: Is the default. Shows only those latches that are being held and for which resources are waiting. It can be entered in the parameter line with a generic IMS latch name or with the generic latch and a latch ID. For example:

```
CBTS,W
```

displays all the CBTS-held latches for which resources are waiting.

Field Descriptions: Each of the fields is shown and described below by display area.

Area 1

```
                    --WAIT-COUNT--
 LATCH ID           CUM       CURR
 ------------- ---------      ----
 MSDB-CUSTDB        N/A         0
 MSDB-CUSTORDR      N/A         2
 MSDB-CUSTPART      N/A         0
```

This area lists requested latches and shows how many regions are waiting for each latch. The descriptions are arranged in alphabetical order.

LATCH ID
: A scrollable list of requested latches.

--WAIT-COUNT--
: The number of times the resource waited for a latch:

CUM
: The cumulative wait count for generic latches is not available.

CURR
: The number of regions currently waiting for this latch.

Area 2

```
                                  ------OWNER------
                              STAT  RGN STAT  PSBNAME
                              ----  --- ---- --------
                              EXCL  001 ACTV PSB1MSDB
                              EXCL  008 ACTV PSB2MSDB
                              EXCL  002 ACTV PSB2MSDB
```

This area identifies the latch owner(s). The descriptions are arranged in alphabetical order.

---OWNER---

The entries in this column correspond to the STAT values. If STAT is SHR, this column contains the number of regions sharing the latch, such as:

```
------OWNER------
RGN STAT  PSBNAME
--- ---   -------
SHR-CNT=    1
```

If STAT is EXCL, the OWNER fields identify the exclusive owner of the latch, for example:

```
------OWNER------
RGN STAT  PSBNAME
--- ---   -------
001 ACTV  CUSTHISM
```

PSBNAME — Either PSB name or INTERNAL (latch is held by an internal IMS function).

RGN — Region ID number of the exclusive owner of this latch. A `000` value indicates that the owner is an IMS internal ITASK.

STAT — Current status can be:

- WAIT — Owner is waiting
- ACTV — Owner is active

STAT

The current status of the latch can be:

EXCL — Exclusive

SHR — Shared

```
Area 3

                                                    ----WAITING REGIONS-----
                                                    RGN1 RGN2 RGN3 RGN4 RGN5
                                                    ---- ---- ---- ---- ----
                                                     002
                                                     007  006
```

This area shows the regions waiting for the requested latches.

---WAITING REGIONS---

The identification number of the region(s) waiting for the latch is shown in the RGNn fields (a maximum of five regions per latch can be displayed). If a region is currently holding another latch, the region ID number is preceded by an * character.

DPOOL - Detail Pool (Non-CBT Fixed Pool)

```
BMC SOFTWARE --------------  POOL DETAIL DISPLAY    -----------PERFORMANCE MGMT
SERV ==> DPOOL            INPUT   15:28:03  INTVL=> 3  LOG=> N  TGT==> I7AM3BCT
PARM ==> LUMP,SORT=FS                       ROW      1 OF      8 SCROLL=> CSR

NAME: LUMP        SP:   0   HI-MARK: 103,336     %HI:   0     EXP+CMP:       4
TYPE: FIXED      LOC: EPRV     CURR:  66,224     %CU:   0     EXP-CMP:       2
 RGN: CTL                    MAX-SZ: NOLIMIT                   WASTED:   1,960

BUFFER  -BFR/BLOCK-        -----BLOCK COUNT----                  ---BFR COUNT---
SIZE     PRI   SEC  WA/BFR  CURR   FREE  HI-MRK EX+CMP EX-CMP    CURR   HI-MRK
------- ----- ----- ------ ------ ------ ------ ------ ------   ------- -------
    136    32    32      0      0      0      0      0      0         0       0
    264    32    16      0      0      0      0      0      0         0       0
    520    32    16      0      0      0      0      0      0         0       0
  1,032    32    16      0      0      0      0      0      0         0       0
  3,072    12    12    360      0      0      1      2      0         0       1
  2,056    16     8    282      1      0      1      1      1         1       2
  4,104     8     8    472      1      0      1      1      1         1       1
 33,032     4     2      0      0      0      0      0      0         0       0
```

Description: This display shows detail information about a non-CBT fixed pool.

Select Code: DPOOL

Parameter: Multiple parameters must be separated by a comma.

Pool selection:

id Where id is a valid four-character fixed pool ID.

Valid fixed pool IDs:

- AIOP
- CESS
- CIOP
- EMHB
- FPWP
- HIOP
- LUMP
- LUMC

This DPOOL display can be requested by its Service Select Code with a valid fixed pool ID or by moving the cursor to a fixed pool in the POOLS display and pressing ENTER.

Display sort:

SORT You can enter:

`,SORT|SO=cc`

where cc can be any of the following two characters. The fixed pool detail display is sorted by BUFFER SIZE by default. The sort sequence is ascending for alphanumeric characters and descending for numeric characters.

Tip

An easy way to sort is to move the cursor to the column heading and press ENTER.

The following SORT parameter descriptions are arranged alphabetically. SORT keywords that start with a special character are described first.

BC	Sorts the list by BLOCK COUNT: CURRENT.
BF	Sorts the list by BLOCK COUNT: FREE.
BH	Sorts the list by BLOCK COUNT: HI-MARK.
BS	Sorts the list by BUFFER SIZE (default).
FC	Sorts the list by BFR COUNT: CURRENT.
FH	Sorts the list by BFR COUNT: HI-MARK.
FP	Sorts the list by BFRS PER BLOCK: PRIMARY.
FS	Sorts the list by BFRS PER BLOCK: SECOND.
NE	Sorts the list by EX-CMP (net expansions).
TO	Sorts the list by EX+CMP (total expansions and compressions).
WA	Sorts the list by WA/BFR (average wasted space per buffer request).

Sorting: The display list can be sorted by:

- Using the SORT parameter.
- Positioning the cursor with the TAB key to the heading of the column to be sorted and pressing ENTER.

  This overrides any SORT parameter entered in the PARM field and primes the field with the action taken. The integrity of any other parameters entered in the PARM field is preserved.

  The display list is sorted by BUFFER SIZE by default. Alphanumeric fields are sorted in ascending order and numeric fields are sorted in descending order.

Scrolling: The list is scrollable.

Field Descriptions: Each of the fields is shown and described below by display area.

```
Area 1

NAME: LUMP        SP:   0   HI-MARK: 103,336     %HI:   0     EXP+CMP:       4
TYPE: FIXED      LOC: EPRV     CURR:  66,224     %CU:   0     EXP-CMP:       2
 RGN: CTL                    MAX-SZ: NOLIMIT                   WASTED:   1,960
```

This area shows the pool identification, location, and statistics. The descriptions are arranged in alphabetical order.

%CU
: The current allocation size percentage:

```
CURR / MAX-SZ * 100
```

%HI
: The high-water mark percentage:

```
HI-MRK / MAX-SZ * 100
```

CURR
: The total current pool allocation size.

EXP+CMP
: The total number of expansions and compressions of blocks for this pool.

EXP-CMP
: The difference between total expansions and compressions (net expansions) of blocks for this pool.

HI-MARK
: The high-water mark allocation size since IMS startup.

LOC
: The storage location of the pool can be:

  CSA
  : Common storage area

  ECSA
  : Extended CSA

  EPRV
  : Extended private

  PRV
  : Private

MAX-SZ
: The upper-size-limit of the fixed pool. An * character indicates this limit is reached. If there is no limit, NOLIM is displayed.

NAME

The pool identification can be:

`pppp/dddd`

or

`pppp`

where:

dddd Is a pool descriptor.

pppp Is the valid IMS pool ID.

Pool IDs are defined in the IBM *IMS System Definition Reference* manual. The descriptor added to the pool ID in the POOLS display is a more common term than the pool ID.

AOIP
: A fixed automated operator interface buffer pool.

CESS
: A fixed external subsystem work pool.

CIOP
: A fixed pool for terminal buffers.

EMHB
: A fixed pool for IFP message-driven regions.

FPWP
: A Fast Path fixed work pool.

HIOP
: A fixed communication I/O buffer pool.

LUMC
: A fixed pool for the APPC/IMS LU6.2 function.

LUMP
: A fixed pool for the APPC/IMS LU6.2 function.

RGN

Pool ownership by region:

CTL Control region.

DLS DLI address space.

SP

The OS/390 subpool number where this pool is allocated.

TYPE

The type of pool as:

FIXED

Up to 32 different buffer sizes can be specified for a fixed pool. For each buffer size, you can specify the buffer count for the primary block and the buffer count for the secondary blocks. There is only one primary block per buffer size for a given fixed pool. When the space in the primary block is exhausted, a secondary block is allocated (expansion). Subsequent secondary blocks are allocated (expansion) as needed. You can specify an upper-limit size for a fixed pool.

Tuning Tip

- Secondary blocks (and potentially the primary block if specified) can be deleted (compressed) when they are no longer used. Expansions (allocation of secondary blocks) should occur only for a heavy workload. Performance would be degraded if new blocks are frequently being allocated (expansion) and deleted (compression). The primary blocks should handle most of the normal workload, while the secondary blocks handle the heavy workload.

  If specific buffer sizes are rarely used (for example, once a week for special processing), you can specify the primary blocks for those buffer sizes as compressible. This way, the primary blocks are allocated only when they are needed, as opposed to being allocated when the pool is initialized. Those blocks are deleted (compressed) when they are not needed. The DPOOL service can be used to determine the usage of all buffer sizes for a given fixed pool.

- Since the buffers in a fixed pool are fixed sizes (there are 32 maximum buffer sizes allowed), some of the spaces in the buffers would be wasted. A small amount of wasted space is unavoidable. However, a large amount of wasted storage should be avoided because it can impact performance. If the value is large, use the DPOOL service to determine which buffer sizes can be adjusted (if any). If a specific buffer size uses only a few buffers (for example, 1), the primary buffer count per block can be reduced.

WASTED

The accumulative wasted space for all buffer sizes in this pool since IMS started.

Area 2

BUFFER SIZE	-BFR/BLOCK- PRI	SEC	WA/BFR	-----BLOCK COUNT---- CURR	FREE	HI-MRK	EX+CMP	EX-CMP	---BFR COUNT--- CURR	HI-MRK
136	32	32	0	0	0	0	0	0	0	0
264	32	16	0	0	0	0	0	0	0	0
520	32	16	0	0	0	0	0	0	0	0
1,032	32	16	0	0	0	0	0	0	0	0
3,072	12	12	360	0	0	1	2	0	0	1
2,056	16	8	282	1	0	1	1	1	1	2
4,104	8	8	472	1	0	1	1	1	1	1
33,032	4	2	0	0	0	0	0	0	0	0

This area shows detailed pool data by buffer size. The descriptions are arranged in alphabetical order.

-BFR/BLOCK-

PRI The number of user-defined buffers in the primary block. There is only one primary block for a given buffer size.

SEC The number of user-defined buffers in the secondary blocks.

---BFR COUNT---

CURR
The number of currently used buffers.

HI-MRK
The maximum buffer counts since initialization.

---BLOCK COUNT---

CURR The number of currently allocated blocks. The secondary blocks can be compressed.

FREE The number of free blocks not compressed.

HI-MRK The maximum block counts since initialization.

BUFFER SIZE
The defined buffer size. A maximum of 32 different buffer sizes can be defined in a fixed pool. An asterisk (*) indicates this is an overflow buffer size.

EX+CMP
The total number of expansions and compressions of blocks for this buffer size.

EX-CMP
The difference between the expansions and compressions counts (net expansions) of blocks for this buffer size.

WA/BFR
Average wasted space per buffer request for this buffer size.

Tuning Tips

Since the buffers in a fixed pool are of fixed sizes (there are 32 maximum buffer sizes allowed), some of the spaces in the buffers would be wasted. A small amount of wasted space is unavoidable. However, a large amount of wasted storage should be avoided because it can impact performance. If the value is large, use the DPOOL service to determine which buffer sizes can be adjusted (if any). Moreover, if a certain buffer size uses only a few buffers (for example, 1), the primary buffer count per block can be reduced.

DPOOL - Detail Pool (Non-CBT Variable Pool)

```
BMC SOFTWARE -------------  POOL DETAIL DISPLAY    -----------PERFORMANCE MGMT
SERV ==> DPOOL            INPUT   15:37:09  INTVL=> 3  LOG=> N  TGT==> I7AM3BCT
PARM ==> PSBW                                                   SCROLL=> CSR

NAME: PSBW        SP: 231     HI-MRK:   5,720       %HI:  23
TYPE: VARIABLE   LOC: ECSA      CURR:   5,720       %CU:  23
 RGN: DLS                       FREE:  18,856    MAX-SZ:  24,576

             BLOCK CNTS    SMALLEST    AVERAGE      LARGEST
     FREE:          1      18,856      18,856       18,856
ALLOCATED:          1       5,720       5,720        5,720
```

Description: This display shows detail information for the selected non-CBT variable pool.

Select Code: DPOOL

Parameter: A valid four-character variable pool ID.

Valid variable pool IDs:

- DBWP
- DLDP
- DLMP
- DPSB
- EPCB
- MAIN
- MFBP
- PSBW (default)
- QBUF

This DPOOL display can be requested by its Service Select Code with a valid variable pool ID or by moving the cursor to a variable pool in the POOLS display and pressing ENTER.

Field Descriptions: Each of the fields is shown and described below by display area.

```
Area 1

NAME: PSBW        SP: 231     HI-MRK:   5,720       %HI:  23
TYPE: VARIABLE   LOC: ECSA      CURR:   5,720       %CU:  23
 RGN: DLS                       FREE:  18,856    MAX-SZ:  24,576
```

This area shows the pool identification, location, and statistics. The descriptions are arranged in alphabetical order.

%CU
: The current size allocation percentage:

```
CURR / MAX-SZ * 100
```

This value is 0 when the displayed pool has no limit.

%HI
: The high-water mark percentage:

```
HI-MRK / MAX-SZ * 100
```

This value is 0 when the displayed pool has no limit.

CURR
: The current total pool allocation size.

FREE
: The total length of all free spaces in the variable pool.

HI-MRK
: The high-water mark pool allocation size since IMS startup.

LOC
: The storage location of the pool can be:

CSA
: Common storage area

ECSA
: Extended CSA

EPRV
: Extended private

PRV
: Private

MAX-SZ
: The total pool size in bytes.

NAME
: The pool identification can be:

```
pppp/dddd
```

or

```
pppp
```

where:

dddd Is a pool descriptor.

pppp Is the valid IMS pool ID.

Pool IDs are defined in the IBM *IMS System Definition Reference* manual. The descriptor added to the pool ID in the DPOOL display is a more common term than the pool ID.

DBWP/DMBW
: The DBWP (DMBW) pool is the pool for the DMB work areas.

DLDP/DMBP
: The DLDP (DMBP) pool holds DMBs.

DLMP/PSBC
: The DLMP (PSBC) pool is the total PSB pool in the:

- Control region (CTL) when the IMS option LSO is not S.
- CSA partition of the PSB pool when `LSO=S`.

DPSB/PSBD
: The DPSB pool is the DL/I SAS private partition of the PSB pool. This appears only when `LSO=S`.

EPCB
: This pool is required for Fast Path database access.

MAIN/WKAP
: MAIN (WKAP) is the general work pool.

MFBP
: MFS pool.

PSBW
: PSB work pool.

QBUF
: QMGR buffer pool.

RGN
: Pool ownership by region:

CTL Control region.

DLS DLI address space.

SP
: The OS/390 subpool number where this pool is allocated.

TYPE
: The type of pool as:

VARIABLE

```
Area 2

             BLOCK CNTS    SMALLEST    AVERAGE      LARGEST
     FREE:          1      18,856      18,856       18,856
ALLOCATED:          1       5,720       5,720        5,720
```

This area shows fragmentation information. The descriptions are arranged in alphabetical order.

ALLOCATED: AVERAGE
: The average length of the allocated blocks in the pool.

ALLOCATED: BLOCK CNT
: The number of allocated blocks in the pool.

ALLOCATED: LARGEST
: The length of the largest allocated block in the pool.

ALLOCATED: SMALLEST
: The length of the smallest allocated block in the pool.

FREE: AVERAGE
: The average length of the free spaces in the pool.

FREE: BLOCK CNT
: The number of free block counts in the pool.

FREE: LARGEST
: The length of the largest free space in the pool.

FREE: SMALLEST
: The length of the smallest free spaces in the pool.

LATCH - Latch Summary

```
BMC SOFTWARE  --------------LATCH SUMMARY----------------------PERFORMANCE MGMT
SERV ==> LATCH  INPUT             11:44:25  INTVL=> 3  LOG=> N  TGT==> IMS61X
PARM ==> SORT=LA                                   LINE 1 OF 50  SCROLL==>  CSR
EXPAND:  MON(INTNL),LINESEL(DLTCH)
               CURR                                        ---- WAIT ----
                    WAIT    -----OWNER------- --WAITING REGIONS-- TOT   CNT  AVG
 LATCH NAME    ID   CNT  ST RGN STAT  PSBNAME RGN1 RGN2 RGN3 RGN4  (s)      (us)
 ------------- ---- ---- -- --- ---- -------- ---- ---- ---- ---- ---- ---- ----
 ALLOC PSB     APSB    2 EX 003 WAIT PHDAMINQ *002  004              0 1564  584
 BLK LOADER    DBLR    0 EX 001 ACTV CUSTHISM                        1  23K   44
 CBTS LQB      VLQB    0 ---------------GENERIC------------------    2  44K  423
*CBTS POOL     CBTS    0 ---------------GENERIC------------------   23 433K   52
 CBTS VTCB     VTCB    0 ---------------GENERIC------------------    0  245  874
 CCTL          CCTL    0                                             0   34  643
 CONV CHKPT    CONV    0                                             0  346   34
 DB CHKPT      DBSL    0                                             0  557  878
 DBRC AUTH     DBAU    0                                             0  574  537
 DC CHKPT      DCSL    0                                             3  76K   45
 DDIR BLK      DDRB    0 ---------------GENERIC------------------    0  579  246
 DDIR POOL     DDRP    0                                            46  47K  970
 DEP REGION    DBLK    0                                             5  643 7656
 DISPATCHER    DISP    0                                             0 4334   34
*DMAC SHARE    DMSH  N/A ---------------GENERIC------------------  N/A  N/A  N/A
*DMAC SYNC     DMSY  N/A ---------------GENERIC------------------  N/A  N/A  N/A
 DMB BLK       DMBB    0 ---------------GENERIC------------------    0  234  975
 DMB POOL      DMBP    0 EX 006 WAIT PHDARHDR                        0  423   48
 FP-CMD         N/A    0                                           N/A  N/A  N/A
 FP-RESOURCE    N/A    0                                           N/A  N/A  N/A
 FP-SYNC        N/A    0 EX 005 ACTV DBFCST00                      N/A  N/A  N/A
 LOG           LOGL    0 EX 000 ACTV INTERNAL                        0  423   54
 APPC INPUT    LUBT  N/A ---------------GENERIC------------------  N/A  N/A  N/A
 LU 6.2 LUM    LUML    0                                             0    0    0
*MSDB          MSDB  N/A ---------------GENERIC------------------  N/A  N/A  N/A
*OSAM BUFP     DBBP    0 ---------------GENERIC------------------    0 6756   57
 PDIR BLK      PDRB    0 ---------------GENERIC------------------    0  24K   12
 PDIR POOL     PDRP    0                                             0   68  867
 PI ENQ,DEQ    XCNQ    0                                             6 8547  687
 PSB BLK       PSBB    0 ---------------GENERIC------------------    0   43   24
 PSB POOL      PSBP    0                                             3  423 6898
 QUEUE BUFFER  QBSL    0 ---------------GENERIC------------------    0   35  245
 QUEUE MGR     QMGR    0 ---------------GENERIC------------------   41  53K  765
 SCHED SUBQ    SUBQ    0 ---------------GENERIC------------------    0   76  757
 SCHEDULE      SCHD    0                                             2  43K   35
 SMB HASH      BLKM    0 ---------------GENERIC------------------    0   35  345
 STATISTICS    ACTL    0                                             2  42K   58
 STORAGE MGR   SMGT    0 ---------------GENERIC------------------    0  357  976
 TCT BLOCK     TCTB    0 ---------------GENERIC------------------    0  658  234
 TERMINAL      TERM    0                                             0  243    5
 USER          USER    0                                             0 3463   66
***************************** END OF DATA ************************************
```

Description: LATCH shows detailed contention information for nongeneric latches and summary statistics for generic latches. To see contention statistics for selected generic latches, you can use the DLTCH service (see “Expand” in this service description).

IMS uses latches to serialize task access to resources to prevent loss of control at critical times. Use this LATCH service display to find the source of any latch contention. The display shows statistics for the latches listed in the first column. These latches may be used by multiple regions. If more than one region is waiting for a latch, the regions waiting for the latches are shown by their identification number in the RGNn fields (RGN1 through RGN4).

Select Code: LATCH

Parameter: You can enter:

`SORT|SO=cc`

where cc can be any of the following two characters. The display list is sorted by CURR WAIT CNT and LATCH NAME, respectively, by default.

AT Sorts the list by AVG WAIT TIME.

CC Sorts the list by CURR WAIT CNT and LATCH NAME, respectively (default).

ID Sorts the list by ID.

LA Sorts the list by LATCH NAME.

TC Sorts the list by TOT WAIT CNT.

TT Sorts the list by TOT WAIT TIME.

Expand: This LATCH display can be EXPANDed by moving the cursor to the following fields and pressing ENTER:

MON(INTNL) Active Timer Requests display of all active IMS internals monitors (INTNL area).

DLTCH Detail latch display.

Move the cursor to one of the generic latches with an * character in front of its LATCH NAME and press ENTER to expand that latch in the DLTCH display.

Sorting: The display list can be sorted by:

- Using the SORT parameter.
- Positioning the cursor with the TAB key to the column heading to be sorted and pressing ENTER.

  This overrides any SORT parameter entered in the PARM field and primes the field with the action taken. The integrity of any other parameters entered in the PARM field is preserved.

The display list is sorted by CURR WAIT CNT as the primary sort default and by LATCH NAME as the secondary sort. Alphanumeric fields are sorted in ascending order and numeric fields are sorted in descending order.

Scrolling: The display list is scrollable.

Field Descriptions: Each of the fields is shown and described below by display area.

```
Area 1

                        CURR
                        WAIT
      LATCH NAME    ID   CNT
     ------------- ---- ----
      ALLOC PSB    APSB    2
      BLK  LOADER  DBLR    0
```

This area lists the latches and shows how many regions are waiting for each latch. The descriptions are arranged in alphabetical order.

CURR WAIT CNT
: Number of regions currently waiting for the latch.

ID
: The IMS latch ID associated with the descriptive latch name (see “LATCH NAME” below).

LATCH NAME
: The first column is a descriptive latch name for the IMS latch ID shown in the second column. A generic latch that can be expanded has an * character in front of its name. The latches that are displayed include:

ALLOC PSB	IMS latch ID: APSB A block mover latch that serializes PSB allocation processing.
APPC INPUT	IMS latch ID: LUBT It serializes the IMS LU6.2 blocks (TIBs) used to initiate an LU6.2 conversation.
BLK LOADER	IMS latch ID: DBLR This latch serializes the loading of a PSB when it is not found in memory.
CBTS LQB	IMS latch ID: VLQB It serializes access of CBTS LQB control blocks.
CBTS POOL	IMS latch ID: CBTS It serializes access of CBTS pool control blocks.
CBTS VTCB	IMS latch ID: VTCB It serializes access of CBTS VTCB control blocks.

CCTL	IMS latch ID: CCTL It serializes the access of a DBCTL resource.
CONV CHKPT	IMS latch ID: CONV The conversational latch serializes checkpoint and conversation processing.
DB CHKPT	IMS latch ID: DBSL It serializes DB checkpoint processing because some control blocks cannot be changed in the middle of a checkpoint.
DBRC AUTH	IMS latch ID: DBAU A block mover latch that serializes the move of DBRC authorization blocks.
DC CHKPT	IMS latch ID: DCSL It serializes DC checkpoint processing because some control blocks cannot be changed in the middle of checkpoint.
DDIR BLK	IMS latch ID: DDRB A block mover latch that serializes the move of DDIR blocks.
DDIR POOL	IMS latch ID: DDRP A block mover latch that serializes the access of DDIR pool space required for a DDIR.
DEP REGION	IMS latch ID: DBLK It serializes access of dependent region control blocks.
DISPATCHER	IMS latch ID: DISP It serializes the usage of some of the IMS system dispatcher's control blocks.
DMAC SHARE	IMS latch ID: DMSH These latches control Data Entry DataBase (DEDB) access. There is one latch per DEDB.
DMAC SYNC	IMS latch ID: DMSY These latches control DEDB synchronization. There is one latch per DEDB.
DMB BLK	IMS latch ID: DMBB A block mover latch that serializes the move of a DMB block.
DMB POOL	IMS latch ID: DMBP A block mover latch that serializes the access of DMB pool space required for a DMB block move.

The following, FP-CMD, FP-RESOURCE, and FP-SYNC, are designated as a pseudo-latch, because they are not managed by DFSCLM00.

FP-CMD	IMS latch ID: Not applicable The Fast Path command pseudo-latch serializes any IMS commands relating to Fast Path with Fast Path processing.
FP-RESOURCE	IMS latch ID: Not applicable The exclusive control Fast Path resource pseudo-latch (IMS XCGL) serializes Fast Path buffers.
FP-SYNC	IMS latch ID: Not applicable Fast Path checkpoint synchronization pseudo-latch controls the execution of synchronization process modules for Fast Path regions.
LOG	IMS latch ID: LOGL It serializes IMS log processing.
LU 6.2 LUM	IMS latch ID: LUML It serializes IMS LU6.2 control blocks.
MSDB	IMS latch ID: MSDB These latches control the locks on the Main Storage DataBase (MSDB). There is one latch per MSDB.
OSAM BUFP	IMS latch ID: DBBP latch It serializes OSAM database buffer pools. There is one latch for each subpool.
PDIR BLK	IMS latch ID: PDRB A block mover latch that serializes the move of PDIR blocks.
PDIR POOL	IMS latch ID: PDRP A block mover latch that serializes the access of PDIR pool space required for a PDIR block move.
PI ENQ,DEQ	IMS latch ID: XCNQ It serializes enqueue/dequeue for program isolation.
PSB BLK	IMS latch ID: PSBB A block mover latch that serializes the move of a PSB block.
PSB POOL	IMS latch ID: PSBP A block mover latch that serializes the access of PSB pool space required for a PSB block move.
QUEUE BUFFER	IMS latch ID: QBSL It serializes access of queue buffers.
QUEUE MGR	IMS latch ID: QMGR It serializes storage management.

SCHED SUBQ — IMS latch ID: SUBQ

It serializes access of scheduler subqueues. There is one latch for each scheduler subqueue.

SCHEDULE — IMS latch ID: SCHD

It protects the scheduling process from online change and allows synchronization with other IMS modules involved in the scheduling process.

SMB HASH — IMS latch ID: BLKM

It serializes access of SMB hash tables that are required for dynamic SMB (transactions) as a result of CPI-C transactions.

STATISTICS — IMS latch ID: ACTL

It serializes statistics control blocks.

STORAGE MGR — IMS latch ID: SMGT

It serializes access of storage pool control blocks.

TCT BLOCK — IMS latch ID: TCTB

This latch is required to coordinate the activity of SMB chains from TCT (transaction class table). There is one latch for each TCT.

TERMINAL — IMS latch ID: TERM

It serializes terminal control block access.

USER — IMS latch ID: USER

It serializes the access of user/SPQB blocks.

Area 2

```
                    -----OWNER-------
                  ST RGN STAT  PSBNAME
                  -- --- ---- --------
                  EX 003 WAIT PHDAMINQ
                  EX 001 ACTV CUSTHISM
```

This area identifies the latch owner(s). The descriptions are arranged in alphabetical order.

---OWNER---

The entries in this column correspond to the ST values. If ST is SH, this column contains the number of regions sharing the latch, for example:

```
-----OWNER------
RGN STAT PSBNAME
--- ---- -------
SHR-CNT=   1
```

If ST is EX, the OWNER fields identify the exclusive owner of the latch as follows:

```
-----OWNER------
RGN STAT PSBNAME
--- ---- -------
001 ACTV CUSTHISM
```

PSBNAME — Either PSB name or INTERNAL (latch is held by an internal IMS function).

RGN — Region ID number of the exclusive owner of this latch. A 000 value indicates that the owner is an IMS internal ITASK.

STAT — Current status can either be WAIT (owner is waiting) or ACTV (owner is active).

ST

The current status of the latch as:

EX — Exclusive

SH — Shared

Area 3

```
                                                        ---- WAIT ----
                                              --WAITING REGIONS-- TOT   CNT  AVG
                                               RGN1 RGN2 RGN3 RGN4  (s)      (us)
                                               ---- ---- ---- ---- ---- ---- ----
                                               *002  004              0 1564  584
                                                                     1  23K   44
```

This area shows the regions waiting for the latch and the amount of wait time. The descriptions are arranged in alphabetical order.

---- WAIT ----

The latch wait time as:

AVG (us) — The average wait time for the latch type in microseconds.

CNT — The total accumulative wait count for the latch type.

TOT (s) — The total wait time for the latch type in seconds. These statistics reflect only the activity since the last IMS checkpoint.

-WAITING REGIONS-

The identification number of the region(s) waiting for the latch is shown in the RGNn fields (a maximum of four regions per latch can be displayed). If a region is currently holding another latch, the region ID number is preceded by an * character.

LOGST - Log Statistics

```
BMC SOFTWARE  ----------------- LOG STATISTICS --------------- PERFORMANCE MGMT
SERV ==> LOGST           INPUT   13:21:09  INTVL=> 3  LOG=> N   TGT==>  IMS71X
PARM ==>                                                        SCROLL => N/A
 - - - - - - - - - - -  LOG DATA SET CONFIGURATION - - - - - - - - - - - - -
  DDNAME     TYPE  BLKSIZE DEVICE VOLUME DEVN BLOCK NO  MODE    --COMMENTS--
DFSOLP02   P-OLDS   12,288   3350 BABP03 0250 00000083  SINGLE   73% USED
DFSWADS0   P-WADS    2,080   3350 BABP03 0250 00000084  SINGLE
 - - - - - - - - - - - - - - -  OLDS STATISTICS  - - - - - - - - - - - - - -
      MAX BLKS THIS OLDS           15    ALLOCATED OLDS                3
      FIRST BLOCK(HEX)       00000079    ARCHIVE COUNT                 0
      CURRENT BLOCK(HEX)     00000083    AUTO ARCHIVE                  1
      LAST BLOCK(HEX)        00000087    BUFFERS                       2
      RECOVERY BLOCK(HEX)    00000076    BUFFER SIZE              12,288
      AWE WRITE REQUESTS            0    BUFFER WAITS                 10
      CHECK WRITE REQS          1,797    BLOCKS WRITTEN              131
      WAIT WRITE REQUESTS           0    BLOCKS READ                   0
 - - - - - - - - - - - - - - -  WADS STATISTICS  - - - - - - - - - - - - - -
NUMBER EXCPS       1,805      SEGS WRITTEN       2,320       SEGS PER I/O  1.29
 - - - - - - - - - - - - - - -  CHECKPOINT DATA  - - - - - - - - - - - - - -
   LATEST:      86120/105021 00000076    CHKPT RECORDS               495
   SNAPQ/DUMPQ: 86120/103511 00000002    CHKPT FREQUENCY           5,000
   OLDEST LCRE: 86120/105021 00000076
```

Description: LOGST displays checkpoint, configuration, and statistical information on the Online Log Data Set (OLDS) and Write Ahead Data Set (WADS).

Select Code: LOGST

Parameter: None.

Field Descriptions: Each of the fields is shown and described below by display area.

Area 1

```
 - - - - - - - - - - -  LOG DATA SET CONFIGURATION - - - - - - - - - - - - -
  DDNAME     TYPE  BLKSIZE DEVICE VOLUME DEVN BLOCK NO  MODE    --COMMENTS--
DFSOLP02   P-OLDS   12,288   3350 BABP03 0250 00000083  SINGLE   73% USED
DFSWADS0   P-WADS    2,080   3350 BABP03 0250 00000084  SINGLE
```

This area shows the configuration of the current log data sets. The descriptions are arranged in alphabetical order.

BLKSIZE — The block size of the data set. This is always 2080 for the WADS; 2048 segment size plus a 32-byte suffix. The OLDS block size is obtained from the DSCB for the data set and must be a multiple of 2048. All OLDSs must have the same block size.

BLOCK NO — The last sequential block number (hexadecimal) written to the data set. The WADS block number is ahead of or the same as the OLDS block number.

COMMENTS Could be one of the following:

- xx% USED

  where xx is the percentage of blocks that are used in the current OLDS. The WADS does not show the percentage because it is a preformatted data set that is continually reused.

- DCB NOT OPEN

  This message appears in the comments field whenever LOGST detects that the data set is not open. This occurs when IMS is in the process of switching to a new OLDS.

- WADS NOT ACTIVE

  This message appears in the comments field whenever the WADS is not active, which can occur when all available WADS and spares have I/O errors. This causes degradation because IMS must write directly to the OLDS and pad and truncate blocks when CHECK WRITES are requested.

DDNAME The current ddname being used by IMS.

DEVICE The type of DASD device where the data set resides. If `?DEVT?` appears, it indicates an unknown DASD device type. If `?UNIT?` appears, it indicates an unsupported device type. BMC Software should be contacted to include these device types.

DEVN The address of the volume containing the data set.

MODE Indicates whether SINGLE or DUAL OLDS/WADS was specified at IMS initialization.

TYPE Identifies the type of data set. The first character is either a P for primary or S for secondary. The character P or S is followed either by OLDS for the Online Log Data Set or by WADS for the Write Ahead Data Set.

VOLUME The name of the volume containing the data set.

Area 2

```
 - - - - - - - - - - - - - - -  OLDS STATISTICS  - - - - - - - - - - - - - - -
      MAX BLKS THIS OLDS           15    ALLOCATED OLDS                 3
      FIRST BLOCK(HEX)       00000079    ARCHIVE COUNT                  0
      CURRENT BLOCK(HEX)     00000083    AUTO ARCHIVE                   1
      LAST BLOCK(HEX)        00000087    BUFFERS                        2
      RECOVERY BLOCK(HEX)    00000076    BUFFER SIZE               12,288
      AWE WRITE REQUESTS            0    BUFFER WAITS                  10
      CHECK WRITE REQS          1,797    BLOCKS WRITTEN               131
      WAIT WRITE REQUESTS           0    BLOCKS READ                    0
```

This area shows OLDS status and logger activity. The descriptions are arranged in alphabetical order.

ALLOCATED OLDS
Number of OLDSs that IMS has allocated.

ARCHIVE COUNT
This figure is used to determine when IMS needs to issue an archive request to DBRC if automatic archiving is selected (see AUTO ARCHIVE below). It reflects the number of OLDS filled since the last archive request by IMS. ARCHIVE COUNT never exceeds AUTO ARCHIVE and does not reflect the OLDS that still require archiving.

AUTO ARCHIVE
User specified number of OLDSs to be filled before IMS schedules an archive job. Zero means no automatic archive (see ARCHIVE COUNT above). When the ARCHIVE COUNT reaches the AUTO ARCHIVE limit, IMS issues an archive request to DBRC.

AWE WRITE REQUESTS
Number of asynchronous write requests to the IMS logger under an Asynchronous Work Element (AWE). IMS Fast Path is the prime user of this type of request. It issues an AWE write request to chain together multiple log records to be written in a single request to the logger.

BLOCKS READ
Number of blocks read from the OLDSs since IMS restart. Blocks are read only for backout processing.

BLOCKS WRITTEN
Number of physical blocks written to the OLDS since IMS restart.

BUFFER SIZE
The buffer size of the OLDSs.

BUFFER WAITS
Number of times the logger had to wait for a buffer. An attempt was made to place a logical record in a physical log buffer, but the buffers were not written to the OLDS and no buffer was available.

BUFFERS
Number of access method buffers used for the OLDS. This number is specified on the DD statement for the OLDS by the `DCB=BUFNO=` keyword. There are no separate WADS buffers because WADS uses the same buffers as OLDS, but each buffer is segmented into 2K segments.

CHECK WRITE REQS
Number of check write requests to the logger. This type of request forces a physical write to the WADS/OLDS, if not already done. The requestor is suspended until the write is done. The main use of this type of request is for log write ahead for database updates.

CURRENT BLOCK(HEX)
Hexadecimal sequence number of the last block physically written to the OLDS.

FIRST BLOCK(HEX)
Hexadecimal sequence number of the first block on the current OLDS.

LAST BLOCK(HEX)
: Hexadecimal sequence number of the last block that could be written to the current OLDS.

MAX BLKS THIS OLDS
: Total capacity, in blocks, of the current OLDS.

RECOVERY BLOCK(HEX)
: Hexadecimal sequence number of the most recent block needed for recovery in the event of a restart. This number is obtained from the oldest local recovery element (LCRE).

Tip

If this number is far behind the CURRENT number, it is most likely a BMP that is executing and not taking sufficient checkpoints.

WAIT WRITE REQUESTS\
: Number of wait write requests to the logger. This type of request is the same as a check write request with the exception that the request does not have to be immediately satisfied. The requestor is prepared to wait until the block is written, which happens after someone else issues a CHKW request; the buffer then fills up, or 1 second elapses on an internal timer. The request could be satisfied immediately or the requestor could wait a maximum of 1 second. The prime user of this type of request is the DC Log Write Ahead (DCLWA) option, which ensures that a terminal output message is placed on the log before it is sent to the terminal.

Note: IMS does not keep statistics for ordinary write requests to the log; therefore, the total of the above statistics for the logger is not a total of all requests.

```
Area 3


 - - - - - - - - - - - - - -  WADS STATISTICS  - - - - - - - - - - - - - - -
NUMBER EXCPS       1,805      SEGS WRITTEN       2,320       SEGS PER I/O  1.29
```

This area displays statistics about WADS activity. The descriptions are arranged in alphabetical order.

NUMBER EXCPS
: Number of physical I/O requests issued to each WADS. If dual WADS logging is selected, the actual number of EXCPs is twice this amount.

SEGS PER I/O
: Average number of segments written per I/O operation. IMS attempts to chain as many segments together as possible to reduce the number of physical I/Os.

SEGS WRITTEN
: Number of segments written to the WADS. IMS segments each log buffer into 2K segments.

```
Area 4

 - - - - - - - - - - - - - - -  CHECKPOINT DATA  - - - - - - - - - - - - - - -
   LATEST:      86120/105021 00000076    CHKPT RECORDS               495
   SNAPQ/DUMPQ: 86120/103511 00000002    CHKPT FREQUENCY           5,000
   OLDEST LCRE: 86120/105021 00000076
```

This area displays the IMS checkpoint data. The descriptions are arranged in alphabetical order.

CHKPT FREQUENCY
: Number of logical log records between IMS checkpoints, specified in the IMS system definition.

CHKPT RECORDS
: Current count of logical log records written to the log since the last checkpoint. This count is reset when it reaches CHKPT FREQUENCY and a checkpoint is issued.

LATEST
: Latest IMS checkpoint identifier and hexadecimal log block sequence number.

OLDEST LCRE
: Oldest IMS checkpoint identifier and hexadecimal log block sequence required to back out a currently running program or transaction. LCRE is an IMS internal control block used for recovery purposes.

SNAPQ/DUMPQ
: The IMS checkpoint identifier and hexadecimal log block sequence number when the last /CHE SNAPQ or DUMPQ was issued. If a SNAPQ or DUMPQ is not issued, this is the last cold start checkpoint.

PI - Program Isolation

```
BMC SOFTWARE  --------------- PROGRAM ISOLATION ------------- PERFORMANCE MGMT
SERV ==> PI              INPUT   13:21:09  INTVL=> 3  LOG=> N   TGT==>  IMS22X
PARM ==>                                     LINE    1 OF     16 SCROLL => CSR
                                                                  << EXPAND >>
- - - - - - - - - - - - PI POOL SPACE SUMMARY - - - - - - - - - - - - - - - - - -
                           DYNAMIC POOL          INTERNAL POOL
                          BYTES        QCBS       BYTES    QCBS
CURRENT POOL SIZE             0           0       1,584      66
INCREMENT                 1,024          42
MAXIMUM POOL SIZE         4,096         170
FREE SPACE                    0           0       1,584      66

 - - - - - - - - - - - - PI ENQUEUE SUMMARY - - - - - - - - - - - - - - - - - - -
RGN PROGRAM  TRANSACT ENQCNTR   READS UPDATES  EXCL   RGN DB/AREA DCB   RBA
  1 PIWAIT1  PIWAIT1        1       1       0     0
  2 PIWAIT2  PIWAIT2        2       0       2     0     1 CUSTHISM  1   0000165C
```

Description: The PI service allows investigation into program isolation problems. All dependent regions with outstanding enqueues are shown. Any region holding a resource causing a wait is highlighted. For regions in a PI wait, information about the lock holder is displayed to the right.

Select Code: PI

Parameter: First region number to display (optional)

Expand: The details of the DL/I call being performed by the region can be viewed on the DLIST display. This service can be accessed from the PI display by moving the cursor to the row showing that region and pressing the ENTER key. DLIST shows the call details when the ENTER key is pressed. It is not synchronized with the PI ENQUEUE SUMMARY area of the display.When returning from a DLIST EXPAND, the data shown is the same as when DLIST was selected.

Scrolling: The display is scrollable so you can view all the regions without refreshing the data. Data is refreshed when the ENTER key is pressed and no cursor selection is used.

Field Descriptions: Each of the fields is shown and described below by display area.

Area 1

```
- - - - - - - - - - - - PI POOL SPACE SUMMARY - - - - - - - - - - - - - - - - - -
                           DYNAMIC POOL          INTERNAL POOL
                          BYTES        QCBS       BYTES    QCBS
CURRENT POOL SIZE             0           0       1,584      66
INCREMENT                 1,024          42
MAXIMUM POOL SIZE         4,096         170
FREE SPACE                    0           0       1,584      66
```

This area summarizes the state of the program isolation pools. The descriptions are arranged in alphabetical order.

CURRENT POOL SIZE
: The current size of the dynamic pool and internal pool, given both in bytes and the corresponding number of 16-byte queue control blocks (QCBs) that it can contain.

FREE SPACE
: The amount of free space in the dynamic pool or internal pool, given both in bytes and the corresponding number of 16-byte QCBs that it can contain.

INCREMENT
: The amount the PI pool is expanded in similar units if additional space is required.

MAXIMUM POOL SIZE
: The maximum possible size of the dynamic pool, given both in bytes and the corresponding number of 16-byte QCBs that it can contain.

```
Area 2

 - - - - - - - - - - - PI ENQUEUE SUMMARY - - - - - - - - - - - - - - - - - - -
RGN PROGRAM  TRANSACT ENQCNTR   READS UPDATES  EXCL
  1 PIWAIT1  PIWAIT1        1       1       0     0
  2 PIWAIT2  PIWAIT2        2       0       2     0
```

This area gives a one-line program isolation summary for the regions with outstanding enqueues. If a region holds a resource resulting in a wait of another region, the holding region is highlighted. The resource may be identified by examining the data shown for the waiting region(s) in Area 3 of the display.

The descriptions are arranged in alphabetical order.

ENQCNTR
: The number of enqueues currently held by the region.

PROGRAM/TRANSACT
: The program and transaction, if scheduled.

READS/UPDATES/EXCL
: Enqueues, broken down by level.

RGN
: The region ID.

```
Area 3

 - - - - - - - - - - - PI ENQUEUE SUMMARY - - - - - - - - - - - - - - - - - - -
                                                        RGN DB/AREA DCB   RBA

                                                          1 CUSTHISM  1   0000165C
```

Data appears in this area only for regions in a PI wait. The descriptions are arranged in alphabetical order.

DB/AREA

The needed resource is identified by database or area name. If ?????? appears in this field, the DCB field is blank.

DCB

The needed resource is identified by DCB number. If ?????? appears, the enqueue is on an internal IMS system resource. An example is the enqueue issued during data set open/close.

RBA

The hexadecimal ID used by the Program Isolation routines in IMS to identify the resource. It is most commonly the relative byte address (RBA) of the VSAM control interval (CI) or the relative block number (RBN) of the OSAM block containing the segment in contention. The rules that IMS uses to construct the resource ID are listed below to assist in problem determination.

FP DEDB

The ID is the high order three bytes of the RBA of the VSAM control interval containing the segment.

FP MSDB

The ID is the address of the segment prefix in the IMS Control Region's private virtual storage.

Note: This is not an RBA; it is an address that may change each time IMS is started.

HDAM OSAM

The ID is the RBA of the block containing the segment.

Other OSAM

The ID is the RBN of the block containing the segment. In addition, bit 1 (x'40') of the high order byte is turned on.

VSAM ESDS

The ID is the RBA of the VSAM control interval containing the segment.

VSAM KSDS

If the key is four bytes or less, the ID is the actual key. Otherwise, the ID is the hashed key, using the algorithm in DFSHASH0.

In some cases, Program Isolation uses special resource ID values that do not represent a relative byte address (RBA) In these cases, the following text is displayed in the RBA field:

AREA

Used by Fast Path to lock an entire area. This is mostly used during /STOP AREA processing and XRF takeovers.

BFROVFL

Buffer Overflow (Fast Path only). This is used when a region has to use the overflow buffers (OBA parameter). IMS allows only one region at a time to use the overflow buffers, so it uses program isolation to serialize the process.

DATASET
: Used at data set open time for buffer invalidation.

DS-BUSY
: Data set busy is used to ensure that no CI or CA split occurs during a read.

EXTEND
: Used to serialize data set extension.

NON-DBRC
: Database is not registered with DBRC.

RGN The ID of the region currently holding the needed resource.

POOLC - Pool Summary (CBT)

```
BMC SOFTWARE  ----------------  POOL SUMMARY  --------------  PERFORMANCE MGMT
SERV ==> POOLC           INPUT   13:21:09  INTVL=> 3  LOG=> N   TGT==>  IMS22X
PARM ==> AWE                                                     SCROLL => N/A
  ID RGN  LOC FX  SP      SIZE       HWM   BLK BLKTH  GETM FREEM COMMENTS
IOSB CTL  CSA  N 228     8,192     8,192    14    14     1     0
GIOB CTL  CSA  N 228         0         0     0     1     0     0
OSWA CTL  CSA  N 228     8,192     8,192     7     7     1     0
GOWA CTL  CSA  N 228         0         0     0     1     0     0
PST  CTL  CSA  N 231    53,248    53,248    13     1    13     0 GBL INT PST
DPST CTL  CSA  N 231     8,192     8,192     2     2     2     0 DEP PST
SAP  CTL  CSA  N 231    12,288    12,288    84    86     2     0
GQMW CTL  CSA  N 231     8,192     8,192    24     2     2     0
LQMW CTL  PRI  N   0    16,384    16,384    48     1     4     0
D1WA CTL  CSA  N 228     4,096     4,096    15    17     1     0
DL2W CTL  PRI  N   0     8,192     8,192    26    26     2     0
DG2W CTL  CSA  N 231     4,096     4,096    13     2     1     0
QSAV CTL  CSA  N 231     8,192     8,192     7     1     1     0
VRPL CTL  CSA  N 231     8,192     8,192    16    18     2     0
LSAV CTL  PRI  N   0    28,672    28,672   392     1     6     0

              CSA   PRIVATE   EXT-CSA  EXT-PRIV
CONTROL   330,184    57,344         0         0
DLISAS          0         0         0         0
```

Description: This display shows summary information for all CBT pools and detail information for up to 15 pools per screen.

Select Code: POOLC

Parameter: Pool selection:

blanks — Enter four blanks to display all pools, beginning with the first 15 pools.

poolid — Enter the valid four-character pool ID of the first pool to be displayed. Pool IDs are defined in the IBM IMS Diagnosis Guide and Reference manual. When POOLC is requested, it displays a scrollable list of pools. The pool ID in the PARM field is the identifier of the next list of pools to be displayed. Pressing ENTER pages through the pool IDs and puts the pool ID shown in the PARM field at the top of the list.

Field Descriptions: Each of the fields is shown and described below by display area.

Area 1

ID	RGN	LOC	FX	SP	SIZE	HWM	BLK	BLKTH	GETM	FREEM	COMMENTS
IOSB	CTL	CSA	N	228	8,192	8,192	14	14	1	0	
GIOB	CTL	CSA	N	228	0	0	0	1	0	0	
OSWA	CTL	CSA	N	228	8,192	8,192	7	7	1	0	
GOWA	CTL	CSA	N	228	0	0	0	1	0	0	
PST	CTL	CSA	N	231	53,248	53,248	13	1	13	0	GBL INT PST
DPST	CTL	CSA	N	231	8,192	8,192	2	2	2	0	DEP PST
SAP	CTL	CSA	N	231	12,288	12,288	84	86	2	0	
GQMW	CTL	CSA	N	231	8,192	8,192	24	2	2	0	
LQMW	CTL	PRI	N	0	16,384	16,384	48	1	4	0	
D1WA	CTL	CSA	N	228	4,096	4,096	15	17	1	0	
DL2W	CTL	PRI	N	0	8,192	8,192	26	26	2	0	
DG2W	CTL	CSA	N	231	4,096	4,096	13	2	1	0	
QSAV	CTL	CSA	N	231	8,192	8,192	7	1	1	0	
VRPL	CTL	CSA	N	231	8,192	8,192	16	18	2	0	
LSAV	CTL	PRI	N	0	28,672	28,672	392	1	6	0	

This area shows the pool identification and size information. The descriptions are arranged in alphabetical order.

BLK — Total number of control blocks in the pool.

BLKTH — The threshold's target block number for STM (storage manager) task compression.

COMMENTS — Additional significant information about the pool, usually a pool description.

FREEM — Number of FREEMAINs issued for pool compression.

FX — Indication whether pool is page-fixed (Y), not page-fixed (N), or conditionally page-fixed (C).

GETM — Number of GETMAINs issued for pool expansion.

HWM — High-water mark of the pool size in bytes.

ID — The name of the CBT pool as defined in the IBM IMS *System Definition Reference* manual.

LOC — The location of pool storage (CSA, ECSA, EPRIV, or PRIV).

RGN — The region that owns the pool, such as CTL or DLS.

SIZE — The size of the pool in bytes.

SP — The number of the OS/390 subpool where the IMS pool is located.

```
Area 2

              CSA   PRIVATE   EXT-CSA  EXT-PRIV
CONTROL   330,184    57,344         0         0
DLISAS          0         0         0         0
```

This area shows storage size by region. The descriptions are arranged in alphabetical order.

CONTROL — The total CBT pool storage size held by the control region, shown by pool storage location.

DLISAS — The total CBT pool storage size held by the DL/I SAS region, shown by pool storage location.

POOLS - Pool Summary (Non-CBT Variable and Fixed Pools)

```
BMC SOFTWARE  ------------- POOL SUMMARY (NON-CBT)  -----------PERFORMANCE MGMT
SERV ==> POOLS  INPUT    14:50:18  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> ,SORT=%C      ROW 1 OF 16 SCROLL=> CSR
EXPAND:  MON(INTNL), LINESEL(DPOOL/QUEST/MFSST)
                              CSA      EXT-CSA      PRIVATE   EXT-PRIV
                    CONTROL REG    17,976    304,720            0    283,952
                    DLISAS  REG         0      1,112            0      2,320
    NAME   TYP RGN LOC  SP   CURR  %CU HI-MRK %HI MAX-SZ  WASTED EXP+CMP EXP-CMP
--------- --- --- ---- --- ------ --- ------ --- ------  ------ ------- -------
DPSB/PSBD VAR DLS EPRV   0   2320   5   2320   5  40960     N/A     N/A     N/A
DLMP/PSBC VAR DLS ECSA 231    424   3    424   3  12288     N/A     N/A     N/A
LUMP      FIX CTL ECSA   0 234624   2 234624   2 10000K    5691       4       4
DLDP/DMBP VAR DLS ECSA 231    688   1    688   1  49152     N/A     N/A     N/A
AOIP      FIX CTL EPRV   0  22912   0  40120   0  NOLIM     708       5       1
CESS      FIX CTL EPRV 231      0   0   8760   0  NOLIM      87       4       0
CIOP      FIX CTL  CSA   0  17976   0  17976   0  NOLIM   22162       0       0
DBWP/DMBW VAR DLS ECSA 231      0   0    672   2  24576     N/A     N/A     N/A
EMHB      FIX CTL EPRV 231      0   0      0   0  NOLIM       0       0       0
EPCB      VAR CTL ECSA 231      0   0      0   0  12288     N/A     N/A     N/A
FPWP      FIX CTL EPRV   0      0   0      0   0  NOLIM       0       0       0
HIOP      FIX CTL EPRV   0 283952   0 283952   0  NOLIM    9613       8       6
LUMC      FIX CTL ECSA 231  70096   0  70096   0 10000K   42072       6       2
MFBP      VAR CTL EPRV   0      0   0      0   0  49152     N/A     N/A     N/A
```

Description: This display shows summary information for all non-CBT variable and fixed pools.

Up to 32 different buffer sizes can be used for a fixed pool. For each buffer size, you can specify the buffer count for the primary block and the buffer count for the secondary blocks. There is only one primary block per buffer size for a given fixed pool. When the space in the primary block is exhausted, a secondary block is allocated (expansion). Subsequent secondary blocks are allocated (expansion) as needed. You can specify an upper-limit size for a fixed pool.

Tuning Tips

- Secondary blocks (and potentially the primary block depending on your specification) can be deleted (compressed) when they are no longer used. In theory, expansions (allocation of secondary blocks) should occur only for a heavy workload. Performance would be degraded if new blocks are frequently allocated (expanded) and deleted (compressed). The primary blocks should handle most of the normal workload, while the secondary blocks handle a heavy workload.

  If certain buffer sizes are rarely used (for example, once a week for some special processing), you can specify the primary blocks for those buffer sizes as compressible. This way, the primary blocks are allocated only when they are needed, as opposed to being allocated when the pool is initialized. Moreover, these blocks are deleted (compressed) when they are not needed. The DPOOL service can be used to determine the usage of all buffer sizes for a given fixed pool.

- Since the buffers in a fixed pool are of fixed sizes (there are 32 maximum buffer sizes allowed), some of the space in the buffers would be wasted. A small amount of wasted space is unavoidable. However, a large amount of wasted storage should be avoided because it can impact performance. The POOLS/ DPOOL services can be used to identify which pool and which buffer sizes have the problem.

Select Code: POOLS

Parameter: Multiple parameters must be separated by a comma (,).

Display sort:

SORT You can enter:

`,SORT|SO=cc`

where cc can be any of the following two characters. The display list is sorted by %CU field (current usage percentage) by default. The sort sequence is ascending for alphanumeric characters and descending for numeric characters.

Tip

An easy way to sort is to move the cursor to the column heading and press ENTER.

The following SORT parameter descriptions are arranged alphabetically. SORT keywords that start with a special character are described first.

%C	Sorts the list by %CU (current usage percentage).
%H	Sorts the list by %HI (high-water mark percentage).
CU	Sorts the list by CURR (current size).
HI	Sorts the list by HI-MRK (high-water mark).
LO	Sorts the list by LOC (location).
MA	Sorts the list by MAX-SZ (maximum size).
NA	Sorts the list by NAME.
NE	Sorts the list by EXP-CMP (net expansions).
RG	Sorts the list by RGN (region).
SP	Sorts the list by SP (subpool).
TO	Sorts the list by EXP+CMP (total number of expansions and compressions).
TY	Sorts the list by TYP (type).
WA	Sorts the list by WASTED (accumulated wasted space for all buffer sizes for the pool since IMS started).

Pool selection:

TYPE

You can enter:

`TYPE=ALL|FIX|VAR`

ALL	Displays all pools (default).
FIX	Displays only fixed pools.
VAR	Displays only variable pools.

Expand:

This POOLS display can be EXPANDed by moving the cursor to the following fields and pressing ENTER:

- MON(INTNL)

  Active Timer Requests display of all active IMS internals monitors (INTNL area).

- LINESEL(DPOOL/QUEST/MFSST)

  The display is expanded to the appropriate detail for the first pool in the list:

  – For an MFBP pool, the EXPAND is to the MFFST display service. This does not apply to an IMS DBCTL system.

  – For a QBUF pool, the EXPAND is to the QUEST display service. This does not apply to an IMS DBCTL system.

  – For all other pools, the EXPAND is to the DPOOL display service.

  You can also move the cursor to any line in the display list and press ENTER to expand to the detail display for that pool.

Sorting: The display list can be sorted by:

- Using the SORT parameter.
- Positioning the cursor with the TAB key to the column heading to be sorted and pressing ENTER.

  This overrides any SORT parameter entered in the PARM field and primes the field with the action taken. The integrity of any other parameters entered in the PARM field is preserved.

The display list is sorted by %CU field (current usage percentage) by default. Alphanumeric fields are sorted in ascending order and numeric fields are sorted in descending order.

Scrolling: The display is scrollable.

Field Descriptions: Each of the fields is shown and described below by display area.

```
Area 1

                                  CSA      EXT-CSA      PRIVATE   EXT-PRIV
                  CONTROL REG   17,976    304,720            0    283,952
                  DLISAS  REG        0      1,112            0      2,320
```

This area shows all storage usage by pools and by location.

CONTROL REG and DLISAS REG
: The total allocated pool space in CSA, extended CSA, private, and extended private under each region.

Area 2

NAME	TYP	RGN	LOC	SP	CURR	%CU	HI-MRK	%HI	MAX-SZ	WASTED	EXP+CMP	EXP-CMP
DPSB/PSBD	VAR	DLS	EPRV	0	2320	5	2320	5	40960	N/A	N/A	N/A
DLMP/PSBC	VAR	DLS	ECSA	231	424	3	424	3	12288	N/A	N/A	N/A
LUMP	FIX	CTL	ECSA	0	234624	2	234624	2	10000K	5691	4	4
DLDP/DMBP	VAR	DLS	ECSA	231	688	1	688	1	49152	N/A	N/A	N/A
AOIP	FIX	CTL	EPRV	0	22912	0	40120	0	NOLIM	708	5	1
CESS	FIX	CTL	EPRV	231	0	0	8760	0	NOLIM	87	4	0
CIOP	FIX	CTL	CSA	0	17976	0	17976	0	NOLIM	22162	0	0
DBWP/DMBW	VAR	DLS	ECSA	231	0	0	672	2	24576	N/A	N/A	N/A
EMHB	FIX	CTL	EPRV	231	0	0	0	0	NOLIM	0	0	0
EPCB	VAR	CTL	ECSA	231	0	0	0	0	12288	N/A	N/A	N/A
FPWP	FIX	CTL	EPRV	0	0	0	0	0	NOLIM	0	0	0
HIOP	FIX	CTL	EPRV	0	283952	0	283952	0	NOLIM	9613	8	6
LUMC	FIX	CTL	ECSA	231	70096	0	70096	0	10000K	42072	6	2
MFBP	VAR	CTL	EPRV	0	0	0	0	0	49152	N/A	N/A	N/A

This area summarizes all pool allocation. The descriptions are arranged in alphabetical order.

%CU
: The current allocation size percentage:

```
CURR / MAX-SZ * 100
```

This value is 0 when the displayed pool has no limit.

%HI
: The high-water mark percentage:

```
HI-MRK / MAX-SZ * 100
```

This value is 0 when the displayed pool has no limit.

CURR
: The current total pool size allocation.

EXP+CMP
: The total number of block expansions and compressions for the pool. It applies only to fixed pools.

Tuning Tip

A high number could indicate some of the primary/secondary buffer allocations are too small. Use the DPOOL service to determine which buffer sizes have the problem.

EXP-CMP
: The difference of expansions and compressions (net expansions) of blocks for the pool. It applies only to fixed pools.

Tuning Tip

A high number could indicate some of the primary/secondary buffer allocations are too small. Primary blocks should be able to handle most workloads. Use the DPOOL service to determine which buffer sizes have the problem.

HI-MRK
: The high-water mark allocation size for both variable and fixed pools since IMS startup.

LOC
: The storage location of the pool can be:

  CSA
  : Common storage area

  ECSA
  : Extended CSA

  EPRV
  : Extended private

  PRV
  : Private

  MAX-SZ
  : The total pool size in bytes. The fixed pool can have unlimited size, which is displayed as `NOLIM`.

NAME
: The pool identification can be:

  `pppp/dddd`

  or

  `pppp`

  where:

  dddd Is a pool descriptor.

  pppp Is the valid IMS pool ID.

  Pool IDs are defined in the IBM, *IMS System Definition Reference* manual. The descriptor added to the pool ID in the POOLS display is a more common term than the pool ID.

  AOIP
  : A fixed automated operator interface buffer pool.

  CESS
  : A fixed external subsystem work pool.

  CIOP
  : A fixed pool for terminal buffers.

DBWP/DMBW
: The DBWP (DMBW) pool is the pool for the DMB work areas.

DLDP/DMBP
: The DLDP (DMBP) pool holds DMBs.

DLMP/PSBC
: The DLMP (PSBC) pool is the total PSB pool in the:

- Control region (CTL) when the IMS option LSO is not S.
- CSA partition of the PSB pool when `LSO=S`.

DPSB/PSBD
: The DPSB pool is the DL/I SAS private partition of the PSB pool. This appears only when `LSO=S`.

EMHB
: A fixed pool for IFP message-driven regions.

EPCB
: This pool is required for Fast Path database access.

FPWP
: Fast Path fixed work pool.

HIOP
: A fixed communication I/O buffer pool.

LUMC
: A fixed pool for the APPC/IMS LU6.2 function.

LUMP
: A fixed pool for the APPC/IMS LU6.2 function.

MAIN/WKAP
: The MAIN (WKAP) pool is the general work pool.

MFBP
: MFS pool.

PSBW
: PSB work pool.

QBUF
: QMGR buffer pool.

RGN
: The ownership of the pool by region:

CTL
: Control region.

DLS
: DLISAS address space.

SP

The OS/390 subpool number where this pool is allocated.

TYP

The type of pool:

FIX

Fixed pools.

An asterisk indicates at least one overflow buffer is allocated.

VAR

Variable pools.

WASTED

The accumulated wasted space for all the buffer sizes in the pool since IMS started. It applies only to fixed pools.

Tuning Tip

Since the buffers in a fixed pool are of fixed sizes (there are 32 maximum buffer sizes allowed), some of the space in the buffers would be wasted. A small amount of wasted space is unavoidable. However, a large amount of wasted storage should be avoided because it can impact performance. If the value is large, use the DPOOL service to determine which buffer sizes can be adjusted (if any). If a buffer size uses only a few buffers (for example, 1), the primary buffer count per block can be reduced.

Chapter 15. OS/390 System Displays

This chapter describes the displays that show the status, activity, and performance of IMS resources when IMS interacts with OS/390 and the resources under OS/390 control.

DSPST - Dispatcher Statistics

```
BMC SOFTWARE  ------------- DISPATCHER STATISTICS   -------------  RX AVAILABLE
SERV ==> DSPST  INPUT    14:00:54  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==>       RA0600I - ENTER FIRST REGION NUMBER       SCROLL=> N/A
******OS DISPATCHER******                          *GOAL MODE ACTIVE*
REGION  TYPE  ASID   DSP       SRV.UNITS   TCB CPU
       BBI-SS     15   195          12,413        13
  0    CONTROL    33   184         219,421        18
  0    DLIS      123   178          11,345         0
  1    DBT        62   180         293,161        20
  2    MPP        42   185          93,227        17
  3    BMP       101   190          81,522        12



      ******IMS DISPATCHER******
         3 DYNAMIC SAPS

         3 DEPENDENT REGIONS
   1 ACTIVE BMP    0 ACTIVE MDP
   1 ACTIVE MPP    0 ACTIVE NDP              317 TOTAL ITASKS DISPATCHED
   1 ACTIVE DBT    0 ACTIVE FPU
```

Description: This display summarizes OS/390 and IMS dispatching. It shows the status of the IMS regions as seen by OS/390 and provides statistics about internal IMS multitasking.

Select Code: DSPST

Parameter: No entry or enter 1 to display the control region and dependent regions 1 through 8.

Enter n to display the control region and dependent regions n through n+7, where n is a valid region identification number within the range of defined regions.

This service shows eight regions at a time. Changing the region ID number in the PARM field displays another range of eight regions.

Field Descriptions: Each of the fields is shown and described below by display area.

```
Area 1

******OS DISPATCHER******
  REGION  TYPE    ASID   DSP       SRV.UNITS   TCB CPU   DOMAIN   PFGR  PFPD
          BBI-SS    15   195 12,413        13       72    108     1
    0     CONTROL   33   184 219,421 18 72    108     1
    0     DLIS 123  178   11,345       0       72    308     1
    1     DBT       62   180         293,161        20       71    307     1
    2     MPP       42   185          93,227        17       71    307     1
    3     BMP      101   190          81,522        12       71    309     1
```

This area displays OS/390 data about the IMS control and dependent regions. The descriptions are arranged in alphabetical order.

Note: If `*GOAL MODE ACTIVE*` is shown in the upper-right portion of this area of the display, SRM information does not apply and the DOMAIN, PFGR, and PFPD fields are not displayed.

ASID — OS/390 address space identification.

DOMAIN — SRM domain.

DSP — Current priority of the address space on the dispatch queue when this address space is swapped in.

PFGR — SRM performance group.

PFPD — SRM performance period.

REGION — Region ID, 0 for the control region and DL/1 SAS region, 1-31 for dependent regions.

SRV.UNITS — Total weighted service units for this address space.

TCB CPU — Total region TCB CPU time expressed in seconds.

TYPE — Region type:

BBI-SS PAS	BBI-SS product address space
BMP	Batch message processing
BMP-WFI	BMP wait-for-input (IMS DB/DC only)
CONTROL	Control region
DBT	DBCTL thread
FPU	Fast Path utility
MDP	Fast Path message-driven program (IMS DB/DC only)
MPP	Message processing (IMS DB/DC only)
MPP-WFI	MPP wait-for-input (IMS DB/DC only)
NDP	Fast Path nonmessage-driven program (IMS DB/DC only)

```
Area 2

******IMS DISPATCHER******
         3 DYNAMIC SAPS
```

This area shows the number of save area prefixes (SAPs). SAPs are used to control the internal multitasking of IMS ITASKS. A SAP display SAP is needed for each active event control block (ECB) or ITASK. IMS preassigns SAPs for logging functions or the dependent regions for example.

DYNAMIC SAPS
: SAPs are set up to control communications I/O processing. The number depends on the MAXIO statement in the IMS generation or on the SAV parameter specification at execution time (this limits the amount of concurrent communication-related processing.) A differentiation is made between privileged and nonprivileged ITASKS. If selective dispatching becomes necessary (for example, if there is a CIOP pool space shortage), only privileged ITASKS are assigned a SAP and dispatched until the condition clears.

```
Area 3

         3 DEPENDENT REGIONS
     1 ACTIVE BMP    0 ACTIVE MDP
     1 ACTIVE MPP    0 ACTIVE NDP
     1 ACTIVE DBT    0 ACTIVE FPU
```

This area displays the current activity in the IMS system. The descriptions are arranged in alphabetical order.

ACTIVE BMP
: The number of BMP regions scheduled currently.

ACTIVE DBT
: The number of active DBCTL threads

ACTIVE MPP (IMS DB/DC only)
: The number of MPP regions that are scheduled currently (idle message regions are not included).

ACTIVE FPU, ACTIVE MDP, ACTIVE NDP (IMS DB/DC only)
: If Fast Path is installed, these fields contain the number of FPU (Fast Path utility), MDP (message-driven program), and NDP (nonmessage-driven program) regions scheduled currently.

DEPENDENT REGIONS
: The number of regions started.

```
Area 4

                                                  317 TOTAL ITASKS DISPATCHED
```

This area shows the work performed by the IMS dispatcher since restart:

TOTAL ITASKS DISPATCHED
: The number of ITASKs dispatched.

Note: The difference between ITASKS created and ITASKs dispatched is approximately the number of IWAITs.

RS - Real Storage

```
BMC SOFTWARE --------------      REAL STORAGE       -----------PERFORMANCE MGMT
SERV ==> RS                INPUT   12:30:50  INTVL=> 3  LOG=> N  TGT==> IMS71X
PARM ==>                                                           SCROLL=> N/A
            TOTAL   AVAIL   LOCAL    LSQA     CSA     LPA     SQA
TOTAL      258302    1086  225166   21654   15015    2466   14569
PAGEABLE   194049          198763           14573    2367
FIXED       63167           26403   21654     442      99   14569
FIXEDB        943             924

IMS ADDRESS SPACES                TOTAL LSQA NLSQA PAGE FIXED FIXB   SLOTS
 IMS CONTROL                       1680  100   112 1468   212   99
 DBRC                               365   35     2  328    37
 DL/I SAS                           445   43    52  350    95    2

REGION  TYPE  PROGRAM   TRANSACT  TOTAL LSQA NLSQA PAGE FIXED FIXB   SLOTS
  1     MDP   DFSIVP4               123   32     2   89    34
  2     MPP                         120   33     2   85    35
```

Description: This service summarizes the usage of page frames in the total system by the IMS control region and nine dependent regions.

Select Code: RS

Parameter: No entry or enter 1 to display dependent regions 1 through 9.

Enter n to display dependent regions n through n+8, where n is a valid region identification number within the range of defined regions.

This service shows nine regions at a time. Changing the region ID number in the PARM field displays another range of nine regions.

Field Descriptions: Each of the fields is shown and described below by display area.

```
Area 1

            TOTAL   AVAIL   LOCAL    LSQA     CSA     LPA     SQA
TOTAL      258302    1086  225166   21654   15015    2466   14569
PAGEABLE   194049          198763           14573    2367
FIXED       63167           26403   21654     442      99   14569
FIXEDB        943             924
```

This area shows the usage of the real storage page frames in the system. It is a matrix where each line represents a state the frame is in: TOTAL, PAGEABLE, FIXED, and FIXEDB. Each column indicates page frame usage.

The descriptions are arranged in alphabetical order by page frame state (row) then by page frame usage (column).

Page Frame State:

FIXED Number of fixed page frames in the system.

FIXEDB Fixed page frames below the 16MB line.

PAGEABLE Number of pageable page frames in the system.

TOTAL Total number of pageable, fixed, and long-term fixed page frames in the system, excluding the OS/390 nucleus.

Page Frame Usage:

AVAIL Number of currently unassigned page frames that can be used.

CSA Number of page frames used by the common service area (CSA).

LPA Number of page frames used by the link pack area (LPA).

LOCAL For regions running `VIRTUAL=VIRTUAL`, this column shows the number of page frames currently used by the working set.

LSQA Number of page frames used by the local system queue area (LSQA).

SQA Number of page frames used by the system queue area (SQA).

TOTAL The total number of page frames that can be used.

```
Area 2

 IMS ADDRESS SPACES                TOTAL LSQA NLSQA PAGE FIXED FIXB   SLOTS
  IMS CONTROL                       1680  100   112 1468   212   99
  DBRC                               365   35     2  328    37
  DL/I SAS                           445   43    52  350    95    2
```

This area shows page frame usage by the IMS and DB control and DL/I SAS regions. The descriptions are arranged in alphabetical order.

FIXB
Number of fixed page frames below the 16MB line currently used by the working set for regions running `VIRTUAL=VIRTUAL`.

FIXED
Number of short- and long-term fixed page frames currently used by the working set for regions running `VIRTUAL=VIRTUAL`.

IMS ADDRESS SPACES
Indicates the page frames used by the:

DBRC DB control region

DLI/SAS DL/I SAS region

IMS control IMS control region

LSQA
Number of LSQA page frames required by the operating system for the dependent region.

NLSQA
: Non-SQA page frames required by the operating system for the dependent region.

PAGE
: Number of pageable page frames currently used by the working set for regions running `VIRTUAL=VIRTUAL`.

SLOTS
: Number of slots reserved on the page data sets for the dependent region.

TOTAL
: Total number of page frames used by the dependent region. This includes both local and LSQA page frames.

```
Area 3

 REGION  TYPE  PROGRAM   TRANSACT  TOTAL LSQA NLSQA PAGE FIXED FIXB   SLOTS
   1     MDP   DFSIVP4               123   32     2   89    34
   2     MPP                         120   33     2   85    35
```

This area summarizes the usage of real storage page frames for the first nine IMS dependent regions. The descriptions are arranged in alphabetical order.

FIXB
: Number of fixed page frames below the 16MB line currently used by the working set for regions running `VIRTUAL=VIRTUAL`.

FIXED
: Number of short- and long-term fixed page frames currently used by the working set for regions running `VIRTUAL=VIRTUAL`.

LSQA
: Number of LSQA page frames required by the operating system for the dependent region.

NLSQA
: Non-SQA page frames required by the operating system for the dependent region.

PAGE
: Number of pageable page frames currently used by the working set for regions running `VIRTUAL=VIRTUAL`.

PROGRAM
: Contains the PSB name, if scheduled.

REGION
: Region ID.

SLOTS
: Number of slots reserved on the page data sets for the dependent region.

TOTAL
: Total number of page frames used by the dependent region. This includes both local and LSQA page frames.

TRANSACT

Contains the transaction code if the transaction is scheduled.

TYPE

Region type:

BMP	Batch message processing
DBT	DBCTL thread
FPU	Fast Path utility
MDP	Fast Path message-driven program (IMS DB/DC only)
MPP	Message processing program (IMS DB/DC only)
NDP	Fast Path nonmessage-driven program (IMS DB/DC only)

Chapter 16. IRLM Displays

This chapter describes services that analyze IMS database locking when IRLM is used.

IRLM - IRLM IMS Status (IRLM 1.5)

```
BMC SOFTWARE  ---------------- IRLM IMS STATUS ----------------PERFORMANCE MGMT
SERV ==> IRLM            INPUT    14:16:10  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==>                                        LINE 0001 OF 0018 SCROLL=> CSR

SSID: IR15(2)    REL: 150  SYSTEM ACTIVITY:          REQUEST COUNTERS:
PC(XMEM).............YES    GLOBAL LOCK..........2    IDENTIFY...............1
RULES.............COMPAT    PTB LOCK............0    LOCK..................59
SCOPE...............LOCAL    RH LOCK.............0    UNLOCK................49
                            RH NOTIFY...........0    SNAP..................0
                                                     CHANGE................0
GLOBAL STATUS:             EXIT ROUTINES CALLED:     SYNC NOTIFY...........1
  INTERNAL TRACE ACTIVE      SUSPEND.............0    ASYNC NOTIFY..........0
                             RESUME..............0    VERIFY................0
                             STATUS..............0    PURGE.................1
                             NOTIFY..............0    QUERY.................0
                             DEADLOCK............0    QUIT..................0
IMS STATUS:                  TIMEOUT.............0    TAKEOVER..............0
  NORMAL
                           TYPE:                     RATIOS:
                             UPDATE                    SUSPEND/LOCK.......0.00%
                             SHARE                     DEADLOCK/SUSPEND...0.00%
                             PRIMARY                   PTB-LOCK/LOCK......0.00%
****************************** END OF DISPLAY ******************************
```

Description: The IRLM service shows statistics and status information from the IRLM to which the target IMS is identified. Request counters, IMS wait counts, and status are for the target IMS only. IMSPLEX contention and exit routine counts are for all IMSs using this IRLM.

Select Code: IRLM

Parameter: None

Scrolling: This display is scrollable.

Field Descriptions: Each of the fields is shown and described below by display area.

Area 1

```
SSID: IRLM(1)    REL: 150
PC(XMEM)............YES
RULES.............COMPAT
SCOPE.............LOCAL
```

This area shows IRLM statistics. The descriptions are arranged in alphabetical order.

PC(XMEM)
: YES or NO (specified in DXRJPROC) defines whether IRLM uses the cross-memory program call (PC) service.

REL:
: The IRLM release number (for example, 150).

RULES
: AVAIL or COMPAT (specified in DXRJPROC) defines the recovery procedure for this IRLM when it is the surviving partner in an interprocessor data sharing complex.

SCOPE
: Specified in DXRJPROC.

  LOCAL
  : Indicates that IRLM can only be used as the local lock manager (all sharing subsystems must use the same IRLM on the same OS/390).

  GLOBAL
  : Indicates that the IRLM can participate with other IRLMs in an intraprocessor or interprocessor environment.

SSID:
: The IRLM subsystem name and ID (specified in the IRLM startup procedure DXRJPROC with the parameters IRLMNM and IRLMID).

Area 2

```
SYSTEM ACTIVITY:
  GLOBAL LOCK..........2
  PTB LOCK.............0
  RH LOCK..............0
  RH NOTIFY............0
```

The fields in this area display system activity. The descriptions are arranged in alphabetical order.

GLOBAL LOCK
: Total global lock requests.

PTB LOCK
: Total RH (Request Handler) to PTB (Pass The Buck) lock requests.

RH LOCK
: RH (Request Handler) to RH lock requests.

RH NOTIFY
: RH (Request Handler) to RH notify requests.

```
Area 3

                                                REQUEST COUNTERS:
                                                  IDENTIFY...............1
                                                  LOCK..................59
                                                  UNLOCK................49
                                                  SNAP..................0
                                                  CHANGE................0
                                                  SYNC NOTIFY...........1
                                                  ASYNC NOTIFY..........0
                                                  VERIFY................0
                                                  PURGE.................1
                                                  QUERY.................0
                                                  QUIT..................0
                                                  TAKEOVER..............0
```

This area shows the number of requests from the target IMS to this IRLM. The descriptions are in alphabetical order.

ASYNC NOTIFY
: The number of asynchronous notifies from this subsystem to other subsystems (database buffer invalidate or extension and I/O error for example).

CHANGE
: Number of lock state change requests by this subsystem.

IDENTIFY
: Number of times this subsystem identified itself to IRLM.

LOCK
: Number of resource lock requests by this subsystem.

PURGE
: Number of times this subsystem requested IRLM to purge its locks or responded to an IRLM status exit.

QUERY
: Number of query requests by this subsystem.

QUIT
: Number of requests by this subsystem to quit using IRLM.

SNAP
: Number of requests by this subsystem to SNAP IRLM storage.

SYNC NOTIFY
: Number of synchronous notify requests by this subsystem.

TAKEOVER
: Number of XRF backup requests to take over processing.

UNLOCK
: Number of resource unlock requests by this subsystem.

VERIFY
: Number of times this subsystem requested IRLM to verify the status of other subsystems with which it shares databases.

```
Area 4

GLOBAL STATUS:
INTERNAL TRACE ACTIVE
```

This area shows the status of IRLM global mode. The descriptions are arranged in alphabetical order.

The following status messages can be displayed:

COMMUNICATION FAILURE
: IRLM enters this state after an operator issues `SETSTATE,COMM`. The processing IRLM tells its IMS to quiesce all activity against all global block level shared databases to preserve data integrity since it is unsure of the status of the other IRLM. The processing IRLM prevents further transaction scheduling until an operator issues `SETSTATE,INIT` to set the INITIAL state.

INTERNAL TRACE (NOT) ACTIVE
: Internal trace is (not) active. This status always appears.

SYSTEM FAILURE
: IRLM enters this state after an operator issues `SETSTATE,SYSTEM`, which means its partner IRLM has failed. This IRLM keeps the locks of the failing IRLM on the potentially updated but uncommitted data. To ensure data integrity, this data cannot be accessed. Access to all other shared resources is still permitted. IRLM goes from this state to INITIAL state when the failed IRLM comes back to report it has completed its cleanup or when the retained locks are purged manually.

TAKEOVER IN PROGRESS
: An XRF (Extended Recovery Facility) takeover is in progress.

```
Area 5

                          EXIT ROUTINES CALLED:
                            SUSPEND.............0
                            RESUME..............0
                            STATUS..............0
                            NOTIFY..............0
                            DEADLOCK............0
                            TIMEOUT.............0
```

This area shows the number of times an exit routine is called by this IRLM for any IMS. The descriptions are arranged in alphabetical order.

DEADLOCK
: This exit is entered by IRLM during a deadlock detection cycle if an IMS is involved in a deadlock. DFSDLKX0 calculates a worth value for each of its work units involved in the deadlock. IRLM then uses the value to select a candidate to break the deadlock.

NOTIFY
: IRLM drives the notify exit to provide notification of certain events. For IMS, it calls DFSNOTX0 to handle these events. An example of an event requiring notification is data set extension by another IMS.

RESUME
: IRLM calls the resume exit when a work unit can access the lock it is waiting for. For IMS, it calls DFSRESX0 to IPOST the work unit (ITASK) out of IWAIT.

STATUS
: IRLM drives the status exit when it is told about a communication failure or a system failure of the partner IRLM.

SUSPEND
: IRLM calls the suspend exit when a work unit must wait for a lock. For IMS, it calls DFSSUSX0 to IWAIT the work unit (ITASK).

```
Area 6

IMS STATUS:
NORMAL
```

This area shows the status of the target IMS in response to the activity of its partner IRLM. The descriptions are arranged in alphabetical order.

NORMAL
: This IMS is in a normal state which can be qualified if any of the other status messages appear.

ONLY ALLOW QUIT
: No other request for this IMS is accepted except quit.

PURGE REQUIRED
: `QUIT HELD=RETAIN` was issued to keep all the locks held by this IMS. A purge is required to release the locks.

QUIT ISSUED
: A quit was issued for this IMS. Any work unit still in progress within this IMS is cancelled. All locks held by this IMS are released if `HELD=RELEASE` is issued or retained if `HELD=RETAIN` is issued. This information also is sent to the other IRLM in the data sharing group to update its ISL (Identified Subsystem List).

SUBSYS LOCKS RETAINED
: A `QUIT HELD=RETAIN` was issued for this IMS to stop all of its work in progress but to keep all its locks. This is usually an abnormal state (something is wrong with this IMS or its related IRLM).

```
Area 7

                        TYPE:
                          UPDATE
                          SHARE
                          PRIMARY
```

This area displays the type of data sharing that this IMS does. The descriptions are arranged in alphabetical order.

BACKUP
: IMS is the backup system in the XRF complex.

NO SHARE
: IMS does not share its databases with other IMS environments.

PRIMARY
: IMS is the primary system in the XRF complex. A non-XRF IMS is also considered primary.

READ ONLY
: IMS can only read its databases.

SHARE
: IMS shares its databases with other IMS environments.

UPDATE
: IMS can update its databases.

```
Area 8

                                                RATIOS:
                                                  SUSPEND/LOCK...........0.00%
                                                  DEADLOCK/SUSPEND.......0.00%
                                                  PTB-LOCK/LOCK..........0.00%
```

This area shows percentages of lock requests that are in suspension or a potential deadlock. The descriptions are arranged in alphabetical order.

DEADLOCK/SUSPEND

The percentage of suspends detected in a potential deadlock condition during a deadlock cycle. This ratio is computed as follows:

```
100 x calls to deadlock exit routines / calls to suspend exit
```

PTB-LOCK/LOCK

The percentage of lock requests that require a PTB process. This ratio is computed as follows:

```
100 x PTB lock / lock results
```

SUSPEND/LOCK

The percentage of lock requests that result in the suspend state. This ratio is computed as follows:

```
100 x calls to suspend exit / lock requests
```

IRLMG - IRLM GLOBAL STATUS (IRLM 1.5)

```
BMC SOFTWARE  --------------- IRLM GLOBAL STATUS --------------PERFORMANCE MGMT
SERV ==> IRLMG           INPUT    14:16:17  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==>                                        LINE 0001 OF 0030 SCROLL=> CSR

SSID: IR15(2)    REL: 150  SYSTEM ACTIVITY:          REQUEST COUNTERS:
PC(XMEM)..............YES    GLOBAL LOCK..........4    IDENTIFY...............7
RULES.............COMPAT    PTB LOCK............0    LOCK...............1,187
SCOPE...............LOCAL    RH LOCK.............0    UNLOCK...............560
                            RH NOTIFY...........0    SNAP..................0
                                                     CHANGE................18
GLOBAL STATUS:             EXIT ROUTINES CALLED:     SYNC NOTIFY...........1
  INTERNAL TRACE ACTIVE      SUSPEND............26    ASYNC NOTIFY..........0
                             RESUME.............24    VERIFY................2
                             STATUS.............0    PURGE.................1
                             NOTIFY.............0    QUERY.................0
                             DEADLOCK...........0    QUIT..................1
                             TIMEOUT............0    TAKEOVER..............0
VTAM INFORMATION:
  COMCYCL...........500MS DEADLOCK.........(15S,4)  RATIOS:
  VTAM SENDS............0   LOCAL..............0    SUSPEND/LOCK........2.2%
  AVG BUCK SIZE.........0   GLOBAL.............0    DEADLOCK/SUSPEND....0.0%
                           MAXCSA.........4,096,000    PTB-LOCK/LOCK.......0.0%
                             CURRENT........11,392
                             HIGHEST........11,392

============================ IDENTIFIED SUBSYSTEMS ============================
SUBSYSID     STATE     TYPE      INTENT       OTHER STATUS
--------     --------  --------  ----------   --------------------------------
DB2D         ACTIVE    DB2       UPDATE       NORMAL
             PRIMARY   LOCAL     NO SHARE
X16H         ACTIVE    ONLINE    UPDATE       PURGE ISSUED
             PRIMARY   LOCAL     SHARE
CIR11RLM     ACTIVE    BATCH     UPDATE       NORMAL
             PRIMARY   REMOTE    SHARE
****************************** END OF DISPLAY ******************************
```

Description: The IRLMG service shows statistics and status information from the IRLM to which the target subsystem is identified. It includes information related to all subsystems using this IRLM.

Select Code: IRLMG

Parameter: None

Scrolling: This display is scrollable.

Field Descriptions: Each of the fields is shown and described below by display area.

```
Area 1



SSID: IR15(2)    REL: 150
PC(XMEM).............YES
RULES.............COMPAT
SCOPE...............LOCAL
```

This area shows IRLM statistics. The descriptions are arranged in alphabetical order.

PC(XMEM)
: YES or NO (specified in DXRJPROC) defines whether IRLM uses the cross-memory program call (PC) service.

REL:
: The IRLM release number.

RULES
: AVAIL or COMPAT (specified in DXRJPROC) defines the recovery procedure for this IRLM when it is the surviving partner in an interprocessor data sharing complex.

SCOPE
: Specified in DXRJPROC.

  LOCAL
  : Indicates that IRLM can only be used as the local lock manager (all sharing subsystems must use the same IRLM on the same OS/390).

  GLOBAL
  : Indicates that the IRLM can participate with other IRLMs in an intraprocessor or interprocessor environment.

SSID:
: The IRLM subsystem name and ID (specified in the IRLM startup procedure DXRJPROC with the parameters IRLMNM and IRLMID).

Area 2

```
SYSTEM ACTIVITY:
  GLOBAL LOCK..........4
  PTB LOCK.............0
  RH LOCK..............0
  RH NOTIFY............0
```

The fields in this area display system activity. The descriptions are arranged in alphabetical order.

GLOBAL LOCK
: Total global lock requests.

PTB LOCK
: Total RH (Request Handler) to PTB (Pass The Buck) lock requests.

RH LOCK
: RH (Request Handler) to RH lock requests.

RH NOTIFY
: RH (Request Handler) to RH notify requests.

Area 3

```
REQUEST COUNTERS:
  IDENTIFY...............7
  LOCK...............1,187
  UNLOCK...............560
  SNAP..................0
  CHANGE................18
  SYNC NOTIFY...........1
  ASYNC NOTIFY..........0
  VERIFY................2
  PURGE.................1
  QUERY.................0
  QUIT..................1
  TAKEOVER..............0
```

This area shows the number of requests from any subsystem (IMS or CICS for example) to this IRLM. The descriptions are in alphabetical order.

ASYNC NOTIFY
: Number of asynchronous notifies from IRLM or the subsystems shown by this IRLMG service to other subsystems (database buffer invalidate, extension and I/O error, or IRLM failure for example).

CHANGE
: Number of lock state change requests by subsystems.

IDENTIFY
: Number of subsystem identifies to IRLM.

LOCK
: Number of resource lock requests by subsystems.

PURGE
: Number of times IRLM was requested to purge and the number of responses to IRLM status exits.

QUERY
: Number of query requests by subsystems.

QUIT
: Number of requests by subsystems to quit using IRLM.

SNAP
: Number of requests by subsystems to SNAP IRLM storage.

SYNC NOTIFY
: Number of synchronous notify requests by subsystems.

TAKEOVER
: Number of XRF backup requests to take over processing.

UNLOCK
: Number of resource unlock requests by subsystems.

VERIFY
: Number of times IRLM was requested by a subsystem to verify the status of other subsystems sharing databases with the requesting subsystem.

```
Area 4


GLOBAL STATUS:
  INTERNAL TRACE ACTIVE
```

This area shows the status of IRLM global mode. The descriptions are arranged in alphabetical order.

The following status messages can be displayed:

COMMUNICATION FAILURE
: IRLM enters this state after an operator issues `SETSTATE,COMM`. The processing IRLM tells its IMS to quiesce all activity against all global block level shared databases to preserve data integrity since it is unsure of the status of the other IRLM. The processing IRLM prevents further transaction scheduling until an operator issues `SETSTATE,INIT` to set the INITIAL state.

INTERNAL TRACE (NOT) ACTIVE
: Internal trace is (not) active. This status always appears.

SYSTEM FAILURE

IRLM enters this state after an operator issues `SETSTATE,SYSTEM`, which means its partner IRLM has failed. This IRLM keeps the locks of the failing IRLM on the potentially updated but uncommitted data. To ensure data integrity, this data cannot be accessed. Access to all other shared resources is still permitted. IRLM goes from this state to INITIAL state when the failed IRLM comes back to report it has completed its cleanup or when the retained locks are purged manually.

TAKEOVER IN PROGRESS

An XRF (Extended Recovery Facility) takeover is in progress.

```
Area 5

                          EXIT ROUTINES CALLED:
                            SUSPEND............26
                            RESUME.............24
                            STATUS.............0
                            NOTIFY.............0
                            DEADLOCK...........0
                            TIMEOUT............0
```

This area shows the number of times an exit routine is called by this IRLM for any IMS. The descriptions are arranged in alphabetical order.

DEADLOCK

This exit is entered by IRLM during a deadlock detection cycle if an IMS is involved in a deadlock. DFSDLKX0 calculates a worth value for each of its work units involved in the deadlock. IRLM then uses the value to select a candidate to break the deadlock.

NOTIFY

IRLM drives the notify exit to provide notification of certain events. For IMS, it calls DFSNOTX0 to handle these events. An example of an event requiring notification is data set extension by another IMS.

RESUME

IRLM calls the resume exit when a work unit can access the lock it is waiting for. For IMS, it calls DFSRESX0 to IPOST the work unit (ITASK) out of IWAIT.

STATUS

IRLM drives the status exit when it is told about a communication failure or a system failure of the partner IRLM.

SUSPEND

IRLM calls the suspend exit when a work unit must wait for a lock. For IMS, it calls DFSSUSX0 to IWAIT the work unit (ITASK).

```
Area 6

VTAM INFORMATION:
  COMCYCL............500MS
  VTAM SENDS.............0
  AVG BUCK SIZE..........0
```

This area shows VTAM statistics for this partner IRLM of the target IMS. The descriptions are arranged in alphabetical order.

APPLS
: The VTAM APPL names of this IRLM and its partner. It defines the primary session as specified in DXRJPROC APPLS. This field is displayed only for `SCOPE=GLOBAL`.

APPL2
: The VTAM APPL names of this IRLM and its partner. It defines the alternative session between two IRLMs as specified in DXRJPROC APPL2. This field is displayed only for an XRF complex with `SCOPE=GLOBAL`. If APPL2 is specified, APPLS is not applicable.

APPL3
: The VTAM APPL names of this IRLM and its partner. It defines another backup session between two IRLMs as specified in DXRJPROC APPL3. This field is displayed only for an XRF complex with `SCOPE=GLOBAL`.

AVG BUCK SIZE
: The average size of the buck being passed between the IRLMs.

COMCYCL
: The time the IRLM delays before processing its inter-IRLM requests (specified in COMCYCL of the IRLM startup procedure DXRJPROC).

VTAM SENDS
: The total VTAM SENDs by this IRLM.

```
Area 7

                        DEADLOCK..........(15S,4)
                          LOCAL................0
                          GLOBAL...............0
```

This area provides deadlock mode statistics. The descriptions are arranged in alphabetical order.

DEADLOCK
: The first number is the time in seconds between IRLM local deadlock cycles. The second number represents the number of local deadlock cycles before global deadlock detection is performed (defined in DEADLOCK of DXRJPROC).

GLOBAL
: Total number of global deadlocks.

LOCAL
: Total number of local deadlocks.

```
Area 8

                        MAXCSA.........4,096,000
                          CURRENT.........11,392
                          HIGHEST.........11,392
```

This area shows CSA/ECSA usage by IRLM. The descriptions are arranged in alphabetical order.

CURRENT
: Current CSA/ECSA usage.

HIGHEST
: CSA/ECSA usage high-water mark.

MAXCSA
: The maximum amount of CSA/ECSA that the IRLM can use for its dynamic control blocks (specified in MAXCSA of DXRJPROC).

```
Area 9

                                          RATIOS:
                                             SUSPEND/LOCK........2.2%
                                             DEADLOCK/SUSPEND......0%
                                             PTB-LOCK/LOCK.........0%
```

This area shows percentages of lock requests that are in suspension or a potential deadlock. The descriptions are arranged in alphabetical order.

DEADLOCK/SUSPEND
: Percentage of suspends detected in a potential deadlock condition during a deadlock cycle. This ratio is computed as follows:

```
100 x calls to deadlock exit routines / calls to suspend exit
```

PTB-LOCK/LOCK
: Percentage of lock requests that require a PTB process. This ratio is computed as follows:

```
100 x PTB lock / lock requests
```

SUSPEND/LOCK
: Percentage of lock requests that result in suspend state. This ratio is computed as follows:

```
100 x calls to suspend exit / lock requests
```

Area 10

```
============================ IDENTIFIED SUBSYSTEMS ============================
SUBSYSID     STATE     TYPE      INTENT       OTHER STATUS
--------     --------  --------  ----------   --------------------------------
DB2D         ACTIVE    DB2       UPDATE       NORMAL
             PRIMARY   LOCAL     NO SHARE
X16H         ACTIVE    ONLINE    UPDATE       PURGE ISSUED
             PRIMARY   LOCAL     SHARE
CIR11RLM     ACTIVE    BATCH     UPDATE       NORMAL
             PRIMARY   REMOTE    SHARE
****************************** END  OF  DISPLAY ******************************
```

This area shows the subsystems that have identified themselves to IRLM. The descriptions are arranged in alphabetical order.

INTENT
: The subsystem data sharing intent:

NO SHARE|SHARE
: The subsystem either participates in data sharing or does not participate.

READ ONLY|UPDATE
: The subsystem intent is update or read only.

OTHER STATUS
: Other subsystem status indicators:

NORMAL
: The subsystem state is normal and none of the following occur.

PURGE ISSUED
: The subsystem issued a PURGE to release all locks.

QUIT ISSUED
: The subsystem issued a quit to stop all of its work in progress.

SUBSYS LOCKS RETAINED
: A quit was issued with `HELD=RETAIN` to keep all of its locks on updated but uncommitted data.

STATE

State of the subsystem:

ACTIVE|INACTIVE

The subsystem is active or inactive.

BACKUP|PRIMARY

The subsystem is the primary or the backup in the XRF complex. A non-XRF subsystem is also considered primary.

SUBSYSID

Subsystem name. For online IMS or DB2, this is the 4-byte subsystem ID. For IMS batch and CICS local DL/I, this is the jobname or started task name.

TYPE

Subsystem type:

BATCH

The subsystem is IMS batch (including CICS local DL/I).

DB2

The subsystem is DB2.

LOCAL

The subsystem is connected to this IRLM (local).

ONLINE

The subsystem is an IMS online system.

REMOTE

The subsystem is connected to its partner IRLM (IMS block level sharing only).

LCRES - IRLM Lock Contention by Resource (IRLM 1.5)

```
BMC SOFTWARE  ------------ IRLM LOCK CONT BY RESRC ------------PERFORMANCE MGMT
SERV ==> LCRES           INPUT    16:56:54  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==>                                       LINE    1 OF    1 SCROLL=> CSR
                                                                  << EXPAND >>
----------LOCK---------------- CUR              WAIT
DATABASE DCB/AREA RBA/TYPE F G STA     HOLDERS   CNT      WAITERS
-------- -------- -------- - - --- ------------- --- --------------------------
CUSTHDAM        1 0000615C P G SHR  003-I16XBMPW   1  002-I16XBMPW
******************************** END OF DATA *********************************
```

Description: The LCRES service locates the partner IRLM of the target IMS. It then locates, identifies, and displays a list of the locks related to the target IMS that are in lock contention (being waited for).

Select Code: LCRES

Parameter: None

Expand: You can use the cursor to select a pop-up scrollable window, which lists the work units in contention for the selected lock.

Scrolling: The list of locks is scrollable.

Field Descriptions: Each of the fields is shown and described below. The descriptions are arranged in alphabetical order.

CUR STA

Current state of the lock. The state can be:

EXC	Exclusive
RO	Read-only
SHR	Share
UNK	Unknown (lock state in transition)
UPD	Update

HOLDERS

Identifies the holder of the lock on a resource as:

`*nnn - xxxxxxxx`	Online IMS region of another local IMS using the same IRLM, where to another IMS, nnn is the region number, and `xxxxxxxx` is the region name.
`nnn - xxxxxxxx`	Online IMS region of the target IMS, where `nnn` is the region number and `xxxxxxxx` is the region name.
L - `xxxxxxxx`	Local DL/I batch or CICS local DL/I job using the same IRLM, where `xxxxxxxx` is the name of the job or started task.
S - `xxxxxxxx`	IMS internal process, where `xxxxxxxx` is the internal task field name; for example, XFP for Fast Path internal task.

X - xxxxxxxx
: Online or batch IMS on a partner IRLM, where xxxxxxxx is the subsystem ID of an online IMS or the name of the job or started task for a batch IMS.

If the lock is being held by more than one region, the count of the holders is shown.

LOCK
: Resource waited on or held.

DATABASE
: Database name.

DCB/AREA
: DCB number of a full function DL/I database data set or the area name for a Fast Path DEDB.

F
: Fast Path indicator:

blank	Non-Fast Path lock
B	B-lock for share level greater than 2, DS-BUSY, DATASET, and COMMAND
F	Fast Path lock
N	Non-updatable Fast Path Area lock
P	P-lock for share level greater than 2, EXTEND, and BID

G
: Global indicator:

blank	Local lock
G	Global lock

RBA/TYPE
: In case of an RID (record lock) or BID (block lock), this field contains an identifier IMS uses to control access to the resource. The rules IMS uses to construct the ID are listed below to help in problem determination.

FP DEDB
: The ID is the high-order three bytes of the RBA of the VSAM control interval containing the segment.

FP MSDB
: The ID is the address of the segment prefix in the IMS control region's private virtual storage.

Note: This is not an RBA; it is an address that may change each time IMS is started.

HDAM OSAM
: The ID is the RBA of the block containing the segment.

Other OSAM
: The ID is the RBN of the block containing the segment. In addition, bit 1 (`X'40'`) of the high order byte is turned on.

VSAM ESDS
: The ID is the RBA of the VSAM control interval containing the segment.

VSAM KSDS
: If the key is four bytes or less, the ID is the actual key. Otherwise, the ID is the hashed key, using the algorithm in DFSHASH0.

There are many types of locks to serialize various resources. The most common ones are block lock (BID) and record lock (RID). Block lock is used to serialize the update to a block or CI. Record lock is used to deny access to uncommitted data. In some cases, this service uses resource ID values that do not represent a relative byte address. In these cases, the following text is displayed in place of the actual ID:

COMMAND
: Used for global commands, IDENTIFY to IRLM, or IRLM NOTIFY.

DATASET
: Used at data set open for buffer invalidation notifies.

DS-BUSY
: Data set busy. Used to ensure no CI or CA split during a read.

EXTEND
: Used to serialize a data set extension.

The following locks are Fast Path only:

AREA
: Used by Fast Path to lock an entire area. This is used mostly during /STOP AREA processing and XRF takeovers.

BFROVFL
: Buffer Overflow (Fast Path only). This is used when a region has to use the overflow buffers (OBA parameter). IMS allows only one region at a time to use the overflow buffers, so it uses program isolation to serialize the process.

DUMMY
: Force release of all global locks.

NONDBRC
: Database is not registered with DBRC.

WAIT CNT
: Total number of waiters on the lock.

WAITERS
: Identifies the first two waiters for that locked resource as:

`*nnn - xxxxxxxx`	`Online IMS region of another local IMS using the same IRLM, where to another IMS, nnn` is the region number, and `xxxxxxxx` is the region name.
`nnn - xxxxxxxx`	Online IMS region of the target IMS, where `nnn` is the region number and `xxxxxxxx` is the region name.

L - xxxxxxxx — Local DL/I batch or CICS local DL/I job using the same IRLM, where xxxxxxxx is the name of the job or started task.

S - xxxxxxxx — IMS internal process, where xxxxxxxx is the internal task field name; for example, XFP for Fast Path internal task.

X - xxxxxxxx — Online or batch IMS on a partner IRLM, where xxxxxxxx is the subsystem ID of an online IMS or the name of the job or started task for a batch IMS.

Selected Lock Pop-Up

```
BMC SOFTWARE  ------------ IRLM LOCK CONT BY RESRC ------------PERFORMANCE MGMT
SERV ==> LCRES           INPUT    16:57:02  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==>                                       LINE    1 OF    1 SCROLL=> CSR

----------LOCK---------------- CUR              WAIT
DATABASE DCB/AREA RBA/TYPE F G STA     HOLDERS   CNT      WAITERS
-------- -------- -------- - - --- ------------- --- --------------------------
CUSTHDAM        1 0000615C P G SHR  003-I16XBMPW   1  002-I16XBMPW
==============================================================================
-----------HOLDERS---------------       -----------WAITERS-------REQ
 RGN T STC/JOB  PSB      STATUS          RGN T STC/JOB  PSB      STAT
---- - -------- -------- --------       ---- - -------- -------- ----
 003 B I16XBMPW PTEST01  ACTV-USR        002 B I16XBMPW PTEST02  UPD
****************************** END OF DATA ********************************
```

This pop-up shows the work units in contention for the selected lock. It is an EXPAND of a lock by cursor selection from the LCRES service.

HOLDERS

Lists all the holders of the lock.

PSB

The Program Specification Block that is being processed in the online IMS region.

RGN

Region (PST) number of the online IMS region; otherwise, the field is left blank. The region number is prefixed by an * character if the region belongs to another IMS.

STATUS

Region status:

ACTIVE — Active in a nonspecific process.

ACTV-BKO — Region in dynamic backout.

ACTV-DB2 — Active in DB2 (the Event Collector must be active).

ACTV-DBR — Region active in DBRC.

ACTV-DLI — Region active in DL/I.

ACTV-SCH	Region active in nonspecific CREATE THREAD process.
ACTV-USR	Region active in the application program.
IDLE	Region waiting for non-WFI input to process.
IDLE-HOT	Pseudo-WFI region waiting for input from the same transaction.
IDLE-WFI	Region waiting for WFI or Fast Path BALG input to process.
INACTIVE	Region defined but not started (not yet signed on).
OPENING	Region in first CREATE THREAD process.
SCH-BLR	Region in scheduling (active in block loader latch).
SCH-BLKM	Region in scheduling (active in block mover).
SCHDULE	Region in scheduling (CREATE THREAD).
TERMINAT	Region in region termination or abend.
WAIT-AOI	Region waiting for an AO message. Await for AO occurs when a region issues a GMSG call with the wait option and DFSAOE00 has no message to return to it at that time.
WAIT-BKO	Region currently in wait, but dynamic backout in progress.
WAIT-BLKM	Region waiting in block mover.
WAIT-BML	Region in scheduling (waiting for block mover latch). **Note:** The block mover latch comprises several smaller latches. To find which BML latch a region is waiting for, use the LATCH service.
WAIT-DLI	Region waiting for DL/I.
WAIT-INT	Region in scheduling (waiting for database intent).
WAITING	Region in nonspecific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see "LATCH - Latch Summary" on page 278.
WT-CMDP	Region waiting for a pending /DBD or /DBR command to complete.
WT-DBRC	Region waiting for DBRC.

WT-DMBP	Region in scheduling (waiting for DMB pool).
WT-EPCB	Region in scheduling (waiting for EPCB pool).
WT-IRLM	Region waiting for IRLM.
WT-ISWCH	Region did ISWITCH and is waiting in IMS dispatcher.
WT-NTFY	Region waiting for asynchronous notify(s) to complete (IRLM must be active). An asynchronous notify could be buffer invalidation, for example.
WT-OSAM	Region waiting for OSAM.
WT-PI	Region waiting for a program isolation lock to be freed.
WT-PSBP	Region waiting for PSB pool.
WT-PSBW	Region waiting for PSBW pool.
WT-SCHD	Region waiting in a nonspecific CREATE THREAD process.
WT-VSAM	Region waiting in VSAM.
WTF-ADSC	Region waiting in Fast Path for ADSC directory latch (DEDB area data sets).
WTF-AREA	Region waiting in Fast Path for DEDB area lock.
WTF-DEDB	Region waiting in Fast Path for DEDB ownership.
WTF-DMSH	Region waiting in Fast Path for DMAC share latch (DEDB area).
WTF-DMSY	Region waiting in Fast Path for DMAC synchronization latch (DEDB area).
WTF-FBFR	Region waiting in Fast Path for FIX buffer (DEDB).
WTF-FCMD	Region waiting in Fast Path for FNCB (Fast Path command) latch.
WTF-MSDB	Region waiting in Fast Path for MSDB latch.
WTF-OBA	Region waiting in Fast Path for overflow buffer interlock.
WTF-OCL	Region waiting in Fast Path for open/close latch.
WTF-RSL	Region waiting in Fast Path for resource latch.
WTF-SEG	Region waiting in Fast Path for MSDB segment.
WTF-SYNC	Region waiting in Fast Path for synchronization latch.

Note: A # character in place of the - character in a status indicates activity resulted from an IMS data capture exit (user exit for data propagation and site requirements) instead of the application program. For example, if a data capture exit made a request that is waiting for a program isolation lock, the STATUS field shows WT#PI rather than WT-PI. For more information about data capture exits, see the IBM System Administration Guide publication.

The Event Collector must be active to obtain the data capture exit status when the exit issues a DB2 call.

STC/JOB

Name of the job or started task. For an online IMS on a partner IRLM, this is the subsystem ID of that IMS. For an IMS internal task, this is the 3-byte field task ID (for example, XFP for Fast Path internal task).

T

Region type. Possible types:

B	BMP (Batch Message Processing Region)
D	DBCTL thread
F	IFP (Fast Path Region)
L	Local batch IMS region
M	MPR (Message Processing Region)
S	IMS internal task
T	TPI (explicit APPC program)
X	External source (from a partner IRLM)

WAITERS

Lists all the waiters for the lock.

REQ STAT

Requested lock state:

EXC	Exclusive
RO	Read-only
SHR	Share
UNK	Unknown (lock state in transition)
UPD	Update

LCUSR - IRLM Lock Contention by User (IRLM 1.5)

```
BMC SOFTWARE  ------------ IRLM LOCK CONT BY USER ------------PERFORMANCE MGMT
SERV ==> LCUSR           INPUT    14:14:54  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==>                                        LINE    1 OF    2 SCROLL=> CSR
                                                                   << EXPAND >>
------------USER---------------- -------HOLDING-----          --WAITING FOR-
 RGN T STC/JOB  PSB      TRANCODE   RO  SHR  UPD  EXC WAITERS   RGN T STC/JOB
---- - -------- -------- -------- ---- ---- ---- ---- -------  ---- - --------
 001 B I16XBMPW PTEST01              0    1    0    0       1
 002 B I16XBMPW PTEST02              0    0    2    0       0   001 L CIR11RLM
****************************** END OF DATA ********************************
```

Description: The LCUSR service locates the partner IRLM of the target IMS. It then locates, identifies, and displays a list of the target IMS work units (dependent regions) that are involved in lock contentions (waiting or holding resources that someone is waiting for). The regions are displayed in sequence by region number.

The user causing a lock contention is highlighted.

Select Code: LCUSR

Parameter: None

Expand: You can select a detailed display (LUSRD) of any listed region, which identifies the resource(s) being waited for or held by that region. Position the cursor on the line for that region and press ENTER as indicated on the display by `<<EXPAND>>`. Pressing the PF3 (END) key from that display returns to this list.

Scrolling: The list of regions is scrollable.

Field Descriptions: Each of the fields is shown and described below. The descriptions are arranged in alphabetical order.

HOLDING

The locks being held by this region:

EXC	Number of EXCLUSIVE level locks being held
RO	Number of READ-ONLY level locks being held
SHR	Number of SHARE level locks being held
UPD	Number of UPDATE level locks being held

USER

Identifies the target online IMS work units.

PSB	The name of the PSB (Program Specification Block) being processed in this online region.
RGN	Region (PST) number.
STC/JOB	Name of the job or started task.

T — Region type. Possible types:

B	BMP (Batch Message Processing Region)
D	DBCTL thread
F	IFP (Fast Path Region)
M	MPR (Message Processing Region)
T	TPI (explicit APPC program)

TRANCODE — The transaction code being processed by the online region, if the application is message driven.

WAITERS

Number of other regions waiting for one or more locks held by this region.

WAITING FOR

The region that this region is waiting for. There can be more than one region waiting, but only one is listed here.

RGN — Region (PST) number. If the region is not an online IMS region, this field is blank. If the region belongs to another IMS (different subsystem ID), the region number is prefixed by an * character; for example, *001.

STC/JOB — The name of the job or started task. For an online IMS on a partner IRLM, this is the subsystem ID of that IMS. For an IMS internal process, this is the 3-byte IMS internal task field name; for example, XFP for Fast Path internal task.

T — Region type. Possible types:

B	BMP (Batch Message Processing Region)
D	DBCTL thread
F	IFP (Fast Path Region)
L	Local batch IMS regions
M	MPR (Message Processing Region)
S	IMS internal process
T	TPI (explicit APPC program)
X	External source (from a partner IRLM)

LHRES - IRLM Locks Held by Resources (IRLM 1.5)

```
BMC SOFTWARE  ------------ IRLM LOCKS HELD BY RESRC -----------PERFORMANCE MGMT
SERV ==> LHRES           INPUT    16:57:09  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==>                                       LINE    1 OF    6 SCROLL=> CSR
                                                                  << EXPAND >>
----------LOCK---------------- CUR              WAIT
DATABASE DCB/AREA RBA/TYPE F G STA     HOLDERS   CNT      WAITERS
-------- -------- -------- - - --- ------------- --- --------------------------
                  COMMAND  B G RO     S-DLI
                  COMMAND  F G RO     S-DLI
CUSTHDAM        1 DATASET  B G RO     S-DLI
CUSTHDAM        1 0000490E P G UPD  002-I16XBMPW
CUSTHDAM        1 0000615C P G SHR  003-I16XBMPW   1  002-I16XBMPW
DBFSAMD3 CUSDB    AREA     N G RO     S-XFP
******************************** END OF DATA *********************************
```

Description: The LHRES service locates the partner IRLM of the target IMS. It then locates, identifies, and displays a list of all the locks related to the target IMS that are being held (in contention or not).

Select Code: LHRES

Parameter: None

Expand: You can use the cursor to select a pop-up scrollable window, which lists all the work units in contention for the selected lock.

Scrolling: The list of locks is scrollable.

Field Descriptions: Each of the fields is shown and described below. The descriptions are arranged in alphabetical order.

CUR STA

Current state of the lock. The state can be:

EXC	Exclusive
RO	Read-only
SHR	Share
UNK	Unknown (lock state in transition)
UPD	Update

HOLDERS

Identifies the holder of the lock on a resource as:

*nnn - xxxxxxxx	Online IMS region of another local IMS using the same IRLM, where to another IMS, nnn is the region number, and xxxxxxxx is the region name.
nnn - xxxxxxxx	Online IMS region of the target IMS, where nnn is the region number and xxxxxxxx is the region name.
L - xxxxxxxx	Local DL/I batch or CICS local DL/I job using the same IRLM, where xxxxxxxx is the name of the job or started task.

S - xxxxxxxx — IMS internal process, where xxxxxxxx is the internal task field name; for example, XFP for Fast Path internal task.

X - xxxxxxxx — Online or batch IMS on a partner IRLM, where xxxxxxxx is the subsystem ID of an online IMS or the name of the job or started task for a batch IMS.

SHR CNT — If the lock is being held by more than one region, the count of the holders is shown.

LOCK

Resource waited on or held.

DATABASE

Database name.

DCB/AREA

DCB number of a full function DL/I database data set or the area name for a Fast Path DEDB.

F

Fast Path indicator:

blank	Non-Fast Path lock
B	B-lock for share level greater than 2, DS-BUSY, DATASET, and COMMAND
F	Fast Path lock
N	Non-updatable Fast Path Area lock
P	P-lock for share level greater than 2, EXTEND, and BID

G

Global indicator:

blank	Local lock
G	Global lock

RBA/TYPE

In case of an RID (record lock) or BID (block lock), this field contains an identifier IMS uses to control access to the resource. The rules IMS uses to construct the ID are listed below to help in problem determination.

FP DEDB

The ID is the high-order three bytes of the RBA of the VSAM control interval containing the segment.

FP MSDB

The ID is the address of the segment prefix in the IMS control region's private virtual storage.

Note: This is not an RBA; it is an address that may change each time IMS is started.

HDAM OSAM

The ID is the RBA of the block containing the segment.

Other OSAM
: The ID is the RBN of the block containing the segment. In addition, bit 1 (`X'40'`) of the high order byte is turned on.

VSAM ESDS
: The ID is the RBA of the VSAM control interval containing the segment.

VSAM KSDS
: If the key is four bytes or less, the ID is the actual key. Otherwise, the ID is the hashed key, using the algorithm in DFSHASH0.

There are many types of locks to serialize various resources. The most common ones are block lock (BID) and record lock (RID). Block lock is used to serialize the update to a block or CI. Record lock is used to deny access to uncommitted data. In some cases, this service uses resource ID values that do not represent a relative byte address. In these cases, the following text is displayed in place of the actual ID:

COMMAND
: Used for global commands, IDENTIFY to IRLM, or IRLM NOTIFY.

DATASET
: Used at data set open for buffer invalidation notifies.

DS-BUSY
: Data set busy. Used to ensure no CI or CA split during a read.

EXTEND
: Used to serialize a data set extension.

The following locks are Fast Path only:

AREA
: Used by Fast Path to lock an entire area. This is used mostly during /STOP AREA processing and XRF takeovers.

BFROVFL
: Buffer Overflow (Fast Path only). This is used when a region has to use the overflow buffers (OBA parameter). IMS allows only one region at a time to use the overflow buffers, so it uses program isolation to serialize the process.

DUMMY
: Force release of all global locks.

NONDBRC
: Database is not registered with DBRC.

WAIT CNT
: Total number of waiters on the lock.

WAITERS
: Identifies the first two waiters for that locked resource as:

*nnn - xxxxxxxx — Online IMS region of another local IMS using the same IRLM, where to another IMS, nnn is the region number, and xxxxxxxx is the region name.

nnn - xxxxxxxx — Online IMS region of the target IMS, where nnn is the region number and xxxxxxxx is the region name.

L - xxxxxxxx — Local DL/I batch or CICS local DL/I job using the same IRLM, where xxxxxxxx is the name of the job or started task.

S - xxxxxxxx — IMS internal process, where xxxxxxxx is the internal task field name; for example, XFP for Fast Path internal task.

X - xxxxxxxx — Online or batch IMS on a partner IRLM, where xxxxxxxx is the subsystem ID of an online IMS or the name of the job or started task for a batch IMS Selected Lock Pop-up

```
BMC SOFTWARE  ------------ IRLM LOCKS HELD BY RESRC -----------PERFORMANCE MGMT
SERV ==> LHRES           INPUT    16:57:18  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==>                                       LINE    1 OF    1 SCROLL=> CSR

----------LOCK---------------- CUR              WAIT
DATABASE DCB/AREA RBA/TYPE F G STA     HOLDERS   CNT      WAITERS
-------- -------- -------- - - --- ------------- --- --------------------------
CUSTHDAM        1 0000490E P G UPD  002-I16XBMPW
==============================================================================
-----------HOLDERS---------------       -----------WAITERS-------REQ
 RGN T STC/JOB  PSB      STATUS          RGN T STC/JOB  PSB      STAT
---- - -------- -------- --------       ---- - -------- -------- ----
 002 B I16XBMPW PTEST02   WT-IRLM
******************************** END OF DATA *********************************
```

This pop-up shows a scrollable list of all the work units in contention for the selected lock. It is an EXPAND of a lock by cursor selection from the LHRES service.

HOLDERS

Lists all the holders of the lock.

PSB

The Program Specification Block that is being processed in the online IMS region.

RGN

Region (PST) number of the online IMS region; otherwise, the field is left blank. The region number is prefixed by an * character if the region belongs to another IMS.

STATUS

Region status:

ACTIVE — Active in a nonspecific process.

ACTV-BKO — Region in dynamic backout.

ACTV-DB2 — Active in DB2 (the Event Collector must be active).

ACTV-DBR	Region active in DBRC.
ACTV-DLI	Region active in DL/I.
ACTV-SCH	Region active in nonspecific CREATE THREAD process.
ACTV-USR	Region active in the application program.
IDLE	Region waiting for non-WFI input to process.
IDLE-HOT	Pseudo-WFI region waiting for input from the same transaction.
IDLE-WFI	Region waiting for WFI or Fast Path BALG input to process.
INACTIVE	Region defined but not started (not yet signed on).
OPENING	Region in first CREATE THREAD process.
SCH-BLR	Region in scheduling (active in block loader latch).
SCH-BLKM	Region in scheduling (active in block mover).
SCHDULE	Region in scheduling (CREATE THREAD).
TERMINAT	Region in region termination or abend.
WAIT-AOI	Region waiting for an AO message. Await for AO occurs when a region issues a GMSG call with the wait option and DFSAOE00 has no message to return to it at that time.
WAIT-BKO	Region currently in wait, but dynamic backout in progress.
WAIT-BLKM	Region waiting in block mover.
WAIT-BML	Region in scheduling (waiting for block mover latch). **Note:** The block mover latch comprises several smaller latches. To find which BML latch a region is waiting for, use the LATCH service.
WAIT-DLI	Region waiting for DL/I.
WAIT-INT	Region in scheduling (waiting for database intent).
WAITING	Region in nonspecific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see "LATCH - Latch Summary" on page 278.

WT-CMDP	Region waiting for a pending /DBD or /DBR command to complete.
WT-DBRC	Region waiting for DBRC.
WT-DMBP	Region in scheduling (waiting for DMB pool).
WT-EPCB	Region in scheduling (waiting for EPCB pool).
WT-IRLM	Region waiting for IRLM.
WT-ISWCH	Region did ISWITCH and is waiting in IMS dispatcher.
WT-NTFY	Region waiting for asynchronous notify(s) to complete (IRLM must be active). An asynchronous notify could be buffer invalidation, for example.
WT-OSAM	Region waiting for OSAM.
WT-PI	Region waiting for a program isolation lock to be freed.
WT-PSBP	Region waiting for PSB pool.
WT-PSBW	Region waiting for PSBW pool.
WT-SCHD	Region waiting in a nonspecific CREATE THREAD process.
WT-VSAM	Region waiting in VSAM.
WTF-ADSC	Region waiting in Fast Path for ADSC directory latch (DEDB area data sets).
WTF-AREA	Region waiting in Fast Path for DEDB area lock.
WTF-DEDB	Region waiting in Fast Path for DEDB ownership.
WTF-DMSH	Region waiting in Fast Path for DMAC share latch (DEDB area).
WTF-DMSY	Region waiting in Fast Path for DMAC synchronization latch (DEDB area).
WTF-FBFR	Region waiting in Fast Path for FIX buffer (DEDB).
WTF-FCMD	Region waiting in Fast Path for FNCB (Fast Path command) latch.
WTF-MSDB	Region waiting in Fast Path for MSDB latch.
WTF-OBA	Region waiting in Fast Path for overflow buffer interlock.
WTF-OCL	Region waiting in Fast Path for open/close latch.

WTF-RSL Region waiting in Fast Path for resource latch.

WTF-SEG Region waiting in Fast Path for MSDB segment.

WTF-SYNC Region waiting in Fast Path for synchronization latch.

Note: A # character in place of the - character in a status indicates activity resulted from an IMS data capture exit (user exit for data propagation and site requirements) instead of the application program. For example, if a data capture exit made a request that is waiting for a program isolation lock, the STATUS field shows WT#PI rather than WT-PI. For more information about data capture exits, see the IBM System Administration Guide publication.

The Event Collector must be active to obtain the data capture exit status when the exit issues a DB2 call.

STC/JOB
Name of the job or started task. For an online IMS on a partner IRLM, this is the subsystem ID of that IMS. For an IMS internal task, this is the 3-byte field task ID (for example, XFP for Fast Path internal task).

T
Region type. Possible types:

B	BMP (Batch Message Processing Region)
D	DBCTL thread
F	IFP (Fast Path Region)
L	Local batch IMS region
M	MPR (Message Processing Region)
S	IMS internal task
T	TPI (explicit APPC program)
X	External source (from a partner IRLM)

WAITERS
Lists all the waiters for the lock.

REQ STAT Requested lock state:

EXC	Exclusive
RO	Read-only
SHR	Share
UNK	Unknown (lock state in transition)
UPD	Update

LHUSR - IRLM Locks Held by User (IRLM 1.5)

```
BMC SOFTWARE  ------------- IRLM LOCK HELD BY USER -----------PERFORMANCE MGMT
SERV ==> LHUSR           INPUT    14:25:00  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==>                                       LINE    1 OF    1 SCROLL=> CSR
                                                                  << EXPAND >>
------------USER----------------- -------HOLDING-----          --WAITING FOR-
 RGN T STC/JOB  PSB      TRANCODE   RO  SHR  UPD  EXC WAITERS   RGN T STC/JOB
---- - -------- -------- -------- ---- ---- ---- ---- -------  ---- - --------
 002 B I16XBMPW PTEST02              0    0    1    0       1
****************************** END OF DATA *********************************
```

Description: The LHUSR service locates the partner IRLM of the target IMS. It then locates, identifies, and displays a list of the target IMS work units (dependent regions) that are holding and/or waiting for a lock. The regions are displayed in sequence by region number.

The user causing a lock contention is highlighted.

This service displays a superset of the regions shown in LCUSR. LCUSR lists only contentions, but LHUSR also includes any target IMS regions holding lock(s) with no one waiting.

Select Code: LHUSR

Parameter: None

Expand: You can select a detailed display (LUSRD) of any listed region, which identifies the resource(s) being waited for or held by that region. Position the cursor on the line for that region and press ENTER as indicated on the display by `<<EXPAND>>`. Pressing the PF3 (END) key from that display returns to this list.

Scrolling: The list of regions is scrollable.

Field Descriptions: Each of the fields is shown and described below. The descriptions are arranged in alphabetical order.

HOLDING

The locks being held by this region:

EXC	Number of EXCLUSIVE level locks being held
RO	Number of READ-ONLY level locks being held
SHR	Number of SHARE level locks being held
UPD	Number of UPDATE level locks being held

USER

Identifies the target online IMS work units.

PSB	Name of the PSB (Program Specification Block) being processed in this online region.
RGN	Region (PST) number.
STC/JOB	Name of the job or started task.

T
: Region type, which can be one of the following:

  B BMP (Batch Message Processing Region)
  D DBCTL thread
  F IFP (Fast Path Region)
  M MPR (Message Processing Region)
  T TPI (explicit APPC program)

TRANCODE
: The transaction code being processed by this online region, if the application is message driven.

WAITERS
: The number of other regions waiting for one or more locks held by this region.

WAITING FOR
: The region that this region is waiting for. There can be more than one region waiting, but only one is listed here.

RGN
: Region (PST) number. If the region is not an online IMS region, this field is blank. If the region belongs to another IMS (different SSID), the region number is prefixed by an asterisk (*); for example, *001.

STC/JOB
: The name of the job or started task. For an online IMS on a partner IRLM, this is the subsystem ID of that IMS. For an IMS internal process, this is the 3-byte IMS internal task field name; for example, XFP for Fast Path internal task.

T
: Region type, which can be one of the following:

  B BMP (Batch Message Processing Region)
  D DBCTL thread
  F IFP (Fast Path Region)
  L Local batch IMS regions
  M MPR (Message Processing Region)
  T TPI (explicit APPC program)
  S IMS internal process
  X External source (from a partner IRLM)

LUSRD - IRLM Lock User Detail (IRLM 1.5)

```
BMC SOFTWARE  ------------- IRLM LOCK USER DETAIL -------------PERFORMANCE MGMT
SERV ==> LUSRD           INPUT    14:15:02  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> 001                                LINE     1 OF     1 SCROLL=> CSR
                                                               << EXPAND >>
  RGN: 001  TYPE: BMP     STC: I16XBMPW     PSB: PTEST01       TRAN:
IMSID: X16H            STATUS: ACTV-USR     PGM: PIWAIT       LTERM:

----------LOCK----------------  -STATE-  --COUNT--
DATABASE DCB/AREA RBA/TYPE F G  CUR REQ  HOLD WAIT
----WAITING FOR-------------------------------------HOLDERS-----------------
CUSTHDAM        1 00001000      SHR EXC     2    1   004-IMSMSG04  005-IMSMSG05
------HOLDING-----------------------------------------WAITERS----------------
DEDB0001  AREA0001         F G  SHR SHR    10    0
********************************* END OF DATA *********************************
```

Description: The LUSRD service locates the partner IRLM of the target IMS. It then locates, identifies, and displays the locks the selected online IMS dependent region is holding or waiting for.

This display can be selected directly from the list of regions displayed by the LCUSR or LHUSR service by positioning the cursor on the line for the region and pressing ENTER.

Select Code: LUSRD

Parameter: Region number of a dependent region of the target online IMS.

Expand: The LUSRD display can be EXPANDed to the DLIST display for this region, which shows the current DL/I call in detail, including call function, PCB, and SSAs. Position the cursor on any LUSRD display line (line 5 or greater) and press ENTER.

Scrolling: The list of locks in the HOLDING area of the display is scrollable.

Field Descriptions: Each of the fields is shown and described below by display area.

Area 1

```
  RGN: 001  TYPE: BMP   STC: I16XBMPW  PSB: PTEST01  TRAN:

IMSID: X16H          STATUS: ACTV-USR  PGM: PIWAIT   LTERM:
```

This area shows processing statistics about the selected region. If there is no lock activity, LUSRD shows this information only. The descriptions are arranged in alphabetical order.

IMSID The IMS subsystem ID.

LTERM If the application program is message driven and if the message originated from a terminal, this field shows the LTERM name of the terminal that submitted the transaction.

PGM The application program being executed for the PSB in the region. This can be different from the PSB if the region is a BMP.

PSB The Program Specification Block being processed in this region.

RGN The online region (PST) number.

STATUS Region status:

ACTIVE	Active in a nonspecific process.
ACTV-BKO	Region in dynamic backout.
ACTV-DB2	Active in DB2 (the Event Collector must be active).
ACTV-DBR	Region active in DBRC.
ACTV-DLI	Region active in DL/I.
ACTV-SCH	Region active in nonspecific CREATE THREAD process.
ACTV-USR	Region active in the application program.
IDLE	Region waiting for non-WFI input to process.
IDLE-HOT	Pseudo-WFI region waiting for input from the same transaction.
IDLE-WFI	Region waiting for WFI or Fast Path BALG input to process.
INACTIVE	Region defined but not started (not yet signed on).
OPENING	Region in first CREATE THREAD process.
SCH-BLR	Region in scheduling (active in block loader latch).
SCH-BLKM	Region in scheduling (active in block mover).
SCHDULE	Region in scheduling (CREATE THREAD).
TERMINAT	Region in region termination or abend.
WAIT-AOI	Region waiting for an AO message. Await for AO occurs when a region issues a GMSG call with the wait option and DFSAOE00 has no message to return to it at that time.
WAIT-BKO	Region currently in wait, but dynamic backout in progress.
WAIT-BLKM	Region waiting in block mover.

WAIT-BML	Region in scheduling (waiting for block mover latch). **Note:** Tthe block mover latch comprises several smaller latches. To find which BML latch a region is waiting for, use the LATCH service.
WAIT-DLI	Region waiting for DL/I.
WAIT-INT	Region in scheduling (waiting for database intent).
WAITING	Region in nonspecific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see "LATCH - Latch Summary" on page 278.
WT-CMDP	Region waiting for a pending /DBD or /DBR command to complete.
WT-DBRC	Region waiting for DBRC.
WT-DMBP	Region in scheduling (waiting for DMB pool).
WT-EPCB	Region in scheduling (waiting for EPCB pool).
WT-IRLM	Region waiting for IRLM.
WT-ISWCH	Region did ISWITCH and is waiting in IMS dispatcher.
WT-NTFY	Region waiting for asynchronous notify(s) to complete (IRLM must be active). An asynchronous notify could be buffer invalidation, for example.
WT-OSAM	Region waiting for OSAM.
WT-PI	Region waiting for a program isolation lock to be freed.
WT-PSBP	Region waiting for PSB pool.
WT-PSBW	Region waiting for PSBW pool.
WT-SCHD	Region waiting in a nonspecific CREATE THREAD process.
WT-VSAM	Region waiting in VSAM.
WTF-ADSC	Region waiting in Fast Path for ADSC directory latch (DEDB area data sets).
WTF-AREA	Region waiting in Fast Path for DEDB area lock.
WTF-DEDB	Region waiting in Fast Path for DEDB ownership.
WTF-DMSH	Region waiting in Fast Path for DMAC share latch (DEDB area).

WTF-DMSY Region waiting in Fast Path for DMAC synchronization latch (DEDB area).

WTF-FBFR Region waiting in Fast Path for FIX buffer (DEDB).

WTF-FCMD Region waiting in Fast Path for FNCB (Fast Path command) latch.

WTF-MSDB Region waiting in Fast Path for MSDB latch.

WTF-OBA Region waiting in Fast Path for overflow buffer interlock.

WTF-OCL Region waiting in Fast Path for open/close latch.

WTF-RSL Region waiting in Fast Path for resource latch.

WTF-SEG Region waiting in Fast Path for MSDB segment.

WTF-SYNC Region waiting in Fast Path for synchronization latch.

Note: A # character in place of the - character in a status indicates activity resulted from an IMS data capture exit (user exit for data propagation and site requirements) instead of the application program. For example, if a data capture exit made a request that is waiting for a program isolation lock, the STATUS field shows WT#PI rather than WT-PI. For more information about data capture exits, see the IBM System Administration Guide publication.

The Event Collector must be active to obtain the data capture exit status when the exit issues a DB2 call.

STC (JOB) The online region started task name (or job name).

TRAN If the application program is message driven, this field shows the transaction code being processed by the region.

TYPE Region type:

BMP	Batch message processing
DBT	DBCTL thread
FPU	Fast Path utility
MDP	Message-driven Fast Path
MPP	Message processing
NDP	Nonmessage-driven Fast Path
TPI	TPI (explicit APPC program)

Area 2

```
----------LOCK----------------  -STATE-  --COUNT--
DATABASE DCB/AREA RBA/TYPE F G  CUR REQ  HOLD WAIT
------WAITING FOR(    34.6 MINUTES)--------------------HOLDERS-----------------
CUSTHDAM        1 00001000      SHR EXC     2    3*  004-IMSMSG04  005-IMSMSG05
```

This area shows locked resources that this region is waiting for, lock state, a total count of the lock's concurrent holders or waiters, and the holders of the locked resources. The descriptions are arranged in alphabetical order.

COUNT

The total number of concurrent holders or waiters for the lock.

HOLD The total number of concurrent holders of the lock.

WAIT The total number of concurrent waiters on the lock.

LOCK

Resource waited on or held.

DATABASE

Database name.

DCB/AREA

DCB number of a full function DL/I database data set or the area name for a Fast Path DEDB.

F

Fast Path indicator:

blank	Non-Fast Path lock
B	B-lock for share level greater than 2, DS-BUSY, DATASET, and COMMAND
F	Fast Path lock
N	Non-updatable Fast Path Area lock
P	P-lock for share level greater than 2, EXTEND, and BID

G

Global indicator:

blank	Local lock
G	Global lock

RBA/TYPE

In case of an RID (record lock) or BID (block lock), this field contains an identifier IMS uses to control access to the resource. The rules IMS uses to construct the ID are listed below to help in problem determination.

FP DEDB

The ID is the high-order three bytes of the RBA of the VSAM control interval containing the segment.

FP MSDB

The ID is the address of the segment prefix in the IMS control region's private virtual storage.

Note: This is not an RBA; it is an address that may change each time IMS is started.

HDAM OSAM

The ID is the RBA of the block containing the segment.

Other OSAM
: The ID is the RBN of the block containing the segment. In addition, bit 1 (`X'40'`) of the high order byte is turned on.

VSAM ESDS
: The ID is the RBA of the VSAM control interval containing the segment.

VSAM KSDS
: If the key is four bytes or less, the ID is the actual key. Otherwise, the ID is the hashed key, using the algorithm in DFSHASH0.

There are many types of locks to serialize various resources. The most common ones are block lock (BID) and record lock (RID). Block lock is used to serialize the update to a block or CI. Record lock is used to deny access to uncommitted data. In some cases, this service uses resource ID values that do not represent a relative byte address. In these cases, the following text is displayed in place of the actual ID:

COMMAND
: Used for global commands, IDENTIFY to IRLM, or IRLM NOTIFY.

DATASET
: Used at data set open for buffer invalidation notifies.

DS-BUSY
: Data set busy. Used to ensure no CI or CA split during a read.

EXTEND
: Used to serialize a data set extension.

The following locks are Fast Path only:

AREA
: Used by Fast Path to lock an entire area. This is used mostly during /STOP AREA processing and XRF takeovers.

BFROVFL
: Buffer Overflow (Fast Path only). This is used when a region has to use the overflow buffers (OBA parameter). IMS allows only one region at a time to use the overflow buffers, so it uses program isolation to serialize the process.

DUMMY
: Force release of all global locks.

NONDBRC
: Database is not registered with DBRC.

STATE

State of the lock.

CUR Current state of the lock.

REQ State of the lock requested by this region, which can be:

EXC	Exclusive
RO	Read-only
SHR	Share
UNK	Unknown (lock state in transition)
UPD	Update

HOLDERS

Identifies the first two holders of the lock on a resource as:

`*nnn - xxxxxxxx`	Online IMS region of another local IMS using the same IRLM, where to another IMS, nnn is the region number, and `xxxxxxxx` is the region name.
`nnn - xxxxxxxx`	Online IMS region of the target IMS, where `nnn` is the region number and `xxxxxxxx` is the region name.
L - `xxxxxxxx`	Local DL/I batch or CICS local DL/I job using the same IRLM, where `xxxxxxxx` is the name of the job or started task.
S - `xxxxxxxx`	IMS internal process, where `xxxxxxxx` is the internal task field name; for example, XFP for Fast Path internal task.
X - `xxxxxxxx`	Online or batch IMS on a partner IRLM, where `xxxxxxxx` is the subsystem ID of an online IMS or the name of the job or started task for a batch IMS.

WAITING FOR

Identifies the locked resource (see LOCK description) that this region is waiting for, the lock state (see STATE description), and a count (see COUNT description) of the holders of that resource. If there is a lock, it is highlighted. If the region is not waiting for a lock, this area of the display is not shown.

Area 3

```
----------LOCK----------------  -STATE-  --COUNT--
DATABASE DCB/AREA RBA/TYPE F G  CUR REQ  HOLD WAIT
:
------HOLDING----------------------------------------LONGEST WAITER---MINUTES--
CUSTHDAM        1 00002000 F G  SHR SHR    10    1   003-IMSMSG03        34.5
******************************** END OF DATA ***************************
```

This area shows the locked resources held by a region, the lock state, a total count of the lock's concurrent holders or waiters, and the waiters for those locked resources. The descriptions are arranged in alphabetical order.

HOLDING

Shows a scrollable list of the locked resources, as described for “Area 2” above (see LOCK, STATE, and COUNT), held by this region. The locked resources are displayed in alphabetical order.

WAITERS

Identifies the first two waiters for that locked resource as:

*nnn - xxxxxxxx	Online IMS region of another local IMS using the same IRLM, where to another IMS, nnn is the region number, and xxxxxxxx is the region name.
nnn - xxxxxxxx	Online IMS region of the target IMS, where nnn is the region number and xxxxxxxx is the region name.
L - xxxxxxxx	Local DL/I batch or CICS local DL/I job using the same IRLM, where xxxxxxxx is the name of the job or started task.
S - xxxxxxxx	IMS internal process, where xxxxxxxx is the internal task field name; for example, XFP for Fast Path internal task.
X - xxxxxxxx	Online or batch IMS on a partner IRLM, where xxxxxxxx is the subsystem ID of an online IMS or the name of the job or started task for a batch IMS.

IRLM - IRLM IMS Status (IRLM 2.1 and Later)

```
BMC SOFTWARE  ---------------- IRLM IMS STATUS ----------------PERFORMANCE MGMT
SERV ==> IRLM            INPUT    14:16:10  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==>                                        LINE    1 OF   19 SCROLL=> CSR

SSID: IR21(001)  REL: 210  IMSPLEX CONTENTION        IMS WAIT COUNT..........0
PC(XMEM)...............NO    LOCAL................0
SCOPE...............LOCAL    GLOBAL...............0  REQUEST COUNTERS:
GROUP.................N/A      REAL................0    LOCAL LOCK.............3
LOCK TBL..............N/A      FALSE SLM..........0    GLOBAL LOCK...........26
OSAM TBL..............N/A      FALSE IRLM.........0    UNLOCK................24
VSAM TBL..............N/A                              CHANGE................0
                           EXIT ROUTINES CALLED:       SENT TO SLM...........0
IRLM STATUS:                 SUSPEND.............80    SYNC NOTIFY......
  INTERNAL TRACE NOT ACITVE  RESUME..............80    ASYNC NOTIFY.....
                             STATUS..............0    XCF NOTIFY.......
                             NOTIFY..............0    VERIFY...........
                             DEADLOCK............0    PURGE............
                                                      QUERY............
                                                      TAKEOVER.........
IMS STATUS:                TYPE:
  NORMAL                     UPDATE
                             SHARE
 ****************************** END OF DISPLAY *******************************
```

Description: The IRLM service shows statistics and status information from the IRLM to which the target IMS is identified. Request counters, IMS wait counts, and status are for the target IMS only. IMSPLEX contention and exit routine counts are for all IMSs using this IRLM.

Select Code: IRLM

Parameter: None

Scrolling: This display is scrollable.

Field Descriptions: Each of the fields is shown and described below by display area.

Area 1

```
SSID: IR21(001)  REL: 210
PC(XMEM)...............NO
SCOPE...............LOCAL
GROUP.................N/A
LOCK TBL..............N/A
OSAM TBL..............N/A
VSAM TBL..............N/A
```

This area shows IRLM statistics. The descriptions are arranged in alphabetical order.

GROUP
: Name of the data sharing group this IRLM is a member of.

LOCK TBL
: Name of the XES lock structure used by this data sharing group.

OSAM TBL
: Name of the OSAM cache structure used by this data sharing group.

PC(XMEM)
: YES or NO (specified in DXRJPROC) defines whether IRLM uses the cross-memory program call (PC) service.

REL:
: IRLM release number (for example, 210).

SCOPE
: Specified in DXRJPROC.

  LOCAL
  : Indicates that IRLM can be used only as the local lock manager (all sharing subsystems must use the same IRLM on the same OS/390).

  GLOBAL
  : Indicates that the IRLM can participate with other IRLMs in an intraprocessor or interprocessor environment.

SSID:
: IRLM subsystem name and ID (specified in the IRLM startup procedure DXRJPROC with the parameters IRLMNM and IRLMID).

VSAM TBL
: Name of the VSAM cache structure used by this data sharing group.

Area 2

```
IMSPLEX CONTENTION
  LOCAL................0
  GLOBAL...............0
    REAL...............0
    FALSE SLM..........0
    FALSE IRLM.........0
```

The fields in this area show the amount and type of contention the IMSs using this IRLM have experienced since this IRLM was started. The contention counts are based solely on the number of suspended or rejected lock requests that originated from IMS subsystems using this IRLM. Suspended requests made to other IRLMs in the data sharing group are not included in these numbers, even when the cause of the contention may be a holder of a resource using this IRLM.

The descriptions are arranged in alphabetical order.

GLOBAL
: A request to this IRLM for a global resource. A global resource is a shared level 2 or 3 database.

  FALSE IRLM
  : Number of times a global request to this IRLM was granted by IRLM after SLM indicated contention. This is the longest code path length to grant a global request.

  FALSE SLM
  : Number of times a global request to this IRLM was granted by SLM after the lock table indicated contention. If the lock table is too small, many resources share the same entry in the lock table.

  REAL
  : Number of times a request to this IRLM for a global resource was suspended or rejected because of contention with another request to this IRLM or another IRLM in the IMSPLEX.

LOCAL
: Number of times a request to this IRLM for a local resource was suspended or rejected because of contention with another request to this IRLM.

```
Area 3

                                                IMS WAIT COUNT...........0

                                                REQUEST COUNTERS:
                                                  LOCAL LOCK.............3
                                                  GLOBAL LOCK...........26
                                                  UNLOCK................24
                                                  CHANGE................0
                                                  SENT TO SLM...........0
                                                  SYNC NOTIFY...........1
                                                  ASYNC NOTIFY..........0
                                                  XCF NOTIFY............0
                                                  VERIFY................0
                                                  PURGE.................0
                                                  QUERY.................0
                                                  TAKEOVER..............0
```

This area shows the number of requests from the target IMS to this IRLM. The first field is:

IMS WAIT COUNT
: Number of IMS regions or threads in the target IMS waiting for an IRLM request to be granted.

The following descriptions for REQUEST COUNTERS are in alphabetical order.

ASYNC NOTIFY
: Number of asynchronous notifies from this subsystem to other subsystems. Database buffer invalidate, data set extension, and I/O errors are examples of when asynchronous notifies are sent.

CHANGE
: Number of lock state change requests by this subsystem.

GLOBAL LOCK
: Number of requests for global resource locks.

LOCAL LOCK
: Number of requests for local resource locks.

PURGE
: Number of times this subsystem requested IRLM to purge its locks or responded to an IRLM status exit.

QUERY
: Number of query requests by this subsystem.

SENT TO SLM
: Number of lock, unlock, and change requests sent to SLM.

SYNC NOTIFY
: Number of synchronous notify requests by this subsystem.

TAKEOVER
: Number of XRF backup requests to take over processing.

UNLOCK
: Number of resource unlock requests by this subsystem.

VERIFY
: Number of times this subsystem requested IRLM to verify the status of other subsystems with which it shares databases.

XCF NOTIFY
: Number of notifies that required XCF (cross system coupling facility) communication.

```
Area 4

IRLM STATUS:
  INTERNAL TRACE NOT ACTIVE
```

This area shows the status of this IRLM. The descriptions are arranged in alphabetical order.

The following status messages can be displayed:

DISCONNECTED FROM GROUP
: This IRLM is disconnected from the global sharing group.

GLOBAL CONNECTION COMPLT
: Connection to global sharing environment completed.

GLOBAL INIT IN PROGRESS
: Initialization of global sharing environment started.

GLOBAL TERM IN PROGRESS
: Termination of global sharing environment started.

INTERNAL TRACE (NOT) ACTIVE
: Internal trace is (not) active. This status always appears.

```
Area 5

                          EXIT ROUTINES CALLED:
                            SUSPEND.............0
                            RESUME..............0
                            STATUS..............0
                            NOTIFY..............0
                            DEADLOCK............0
```

This area shows the number of times an exit routine is called by this IRLM for any IMS. The descriptions are arranged in alphabetical order.

DEADLOCK
: This exit is entered by IRLM during a deadlock detection cycle if an IMS is involved in a deadlock. DFSDLKX0 calculates a worth value for each of its work units involved in the deadlock. IRLM then uses the value to select a candidate to break the deadlock.

NOTIFY
: IRLM drives the notify exit to provide notification of certain events. For IMS, it calls DFSNOTX0 to handle these events. An example of an event requiring notification is data set extension by another IMS.

RESUME
: IRLM calls the resume exit when a work unit can access the lock it is waiting for. For IMS, it calls DFSRESX0 to IPOST the work unit (ITASK) out of IWAIT.

STATUS
: IRLM drives the status exit when it is told about a communication failure or a system failure of the partner IRLM.

SUSPEND
: IRLM calls the suspend exit when a work unit must wait for a lock. For IMS, it calls DFSSUSX0 to IWAIT the work unit (ITASK).

```
Area 6

IMS STATUS:
NORMAL
```

This area shows the status of the target IMS in response to the activity of its partner IRLM. The descriptions are arranged in alphabetical order.

NORMAL
: This IMS is in a normal state which can be qualified if any of the other status messages appear.

ONLY ALLOW QUIT
: No other request for this IMS is accepted except quit.

PURGE REQUIRED
: `QUIT HELD=RETAIN` was issued to keep all the locks held by this IMS. A purge is required to release the locks.

QUIT ISSUED
: A quit was issued for this IMS. Any work unit still in progress within this IMS is cancelled. All locks held by this IMS are released if `HELD=RELEASE` is issued or retained if `HELD=RETAIN` is issued. This information also is sent to the other IRLM in the data sharing group to update its ISL (Identified Subsystem List).

SUBSYS LOCKS RETAINED
: A `QUIT HELD=RETAIN` was issued for this IMS to stop all of its work in progress but to keep all its locks. This is usually an abnormal state (something is wrong with this IMS or its related IRLM).

```
Area 7

                    TYPE:
                      UPDATE
                      SHARE
```

This area displays the type of data sharing that this IMS does. The descriptions are arranged in alphabetical order.

NO SHARE
: IMS does not share its databases with other IMS environments.

READ ONLY
: IMS can only read its databases.

SHARE
: IMS shares its databases with other IMS environments.

UPDATE
: IMS can update its databases.

IRLMG - IRLM GLOBAL STATUS (IRLM 2.1 and Later)

```
BMC SOFTWARE  --------------- IRLM GLOBAL STATUS --------------PERFORMANCE MGMT
SERV ==> IRLMG           INPUT    14:16:17  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==>                                        LINE    1 OF   31 SCROLL=> CSR

SSID: IR21(001)  REL: 210  IRLM CONTENTION COUNTS:   LOCAL IMS REQUEST COUNTS:
PC(XMEM).............YES    LOCAL................0    LOCAL LOCK.............0
SCOPE..............GLOBAL    GLOBAL...............0    GLOBAL LOCK............2
GROUP.............IMSNWAY      REAL................0    UNLOCK.................0
LOCK TBL....IMS_LOCKTAB01      FALSE SLM..........0    CHANGE.................0
OSAM TBL.......IMS_OSAM01      FALSE IRLM.........0    SENT TO SLM............2
VSAM TBL.......IMS_VSAM01                              SYNC NOTIFY............0
                           EXIT ROUTINES CALLED:       ASYNC NOTIFY...........0
IRLM STATUS:                 SUSPEND..............2    XCF NOTIFY.............0
  GLOBAL CONNECTION CMPLT    RESUME...............2    VERIFY.................0
  INTERNAL TRACE NOT ACTIVE  STATUS...............0    PURGE..................0
                             NOTIFY...............0    QUERY..................0
                             DEADLOCK.............0    TAKEOVER...............0

                           ---------------SYSPLEX XES STATISTICS---------------
DEADLOCK PARMS....(5S,1)   CURRENT XES REQUESTS:     CURRENT LOCK STRUCTURE:
  LOCAL................0     TOTAL................8    REQUESTS/SLOT..........0
  GLOBAL...............0     CONTENTION DELAY....0%    SLOTS USED.............0
MAXCSA PARM....3,072,000     FALSE CONT. DELAY...0%    RECORD AREA USAGE.....0%
  CURRENT........183,296     SERVICE DELAY.......0%
  HIGHEST........183,296

============================ IDENTIFIED SUBSYSTEMS ============================
SUBSYSID     STATE     TYPE      INTENT       OTHER STATUS              IRLM ID
--------     --------  --------  ----------   ------------------------  -------
X19H         ACTIVE    ONLINE    UPDATE       NORMAL                       001
             PRIMARY   LOCAL     SHARE

Y19H         ACTIVE    REMOTE    UPDATE       NORMAL                       002
             PRIMARY   LOCAL     SHARE

****************************** END OF DISPLAY ******************************
```

Description: The IRLMG service shows statistics and status information from the IRLM to which the target IMS is identified. It includes information related to all subsystems using this IRLM. It also shows the status of all IMS subsystems in the IMSPLEX (N-way sharing group) and which IRLM they use.

Select Code: IRLMG

Parameter: None

Scrolling: This display is scrollable.

Field Descriptions: Each of the fields is shown and described below by display area.

```
Area 1

SSID: IR21(001)  REL: 210
PC(XMEM)..............YES
SCOPE..............GLOBAL
GROUP.............IMSNWAY
LOCK TBL....IMS_LOCKTAB01
OSAM TBL.......IMS_OSAM01
VSAM TBL.......IMS_VSAM01
```

This area shows IRLM statistics. The descriptions are arranged in alphabetical order.

GROUP
: Name of the data sharing group this IRLM is a member of.

LOCK TBL
: Name of the XES lock structure used by this data sharing group.

OSAM TBL
: Name of the OSAM cache structure used by this data sharing group.

PC(XMEM)
: YES or NO (specified in DXRJPROC) defines whether IRLM uses the cross-memory program call (PC) service.

REL:
: IRLM release number (for example, 210).

SCOPE
: Specified in DXRJPROC.

  LOCAL
  : Indicates that IRLM can be used only as the local lock manager (all sharing subsystems must use the same IRLM on the same OS/390).

  GLOBAL
  : Indicates that the IRLM can participate with other IRLMs in an intraprocessor or interprocessor environment.

SSID:
: IRLM subsystem name and ID (specified in the IRLM startup procedure DXRJPROC with the parameters IRLMNM and IRLMID).

VSAM TBL
: Name of the VSAM cache structure used by this data sharing group.

```
Area 2

                        IRLM CONTENTION COUNTS:
                          LOCAL................0
                          GLOBAL...............0
                            REAL...............0
                            FALSE SLM..........0
                            FALSE IRLM.........0
```

The fields in this area show the amount and type of contention the IMSs using this IRLM have experienced since this IRLM was started. The contention counts are based solely on the number of suspended or rejected lock requests that originated from IMS subsystems using this IRLM. Suspended requests made to other IRLMs in the data sharing group are not included in these numbers, even when the cause of the contention may be a holder of a resource using this IRLM.

The descriptions are arranged in alphabetical order.

GLOBAL
: A request to this IRLM for a global resource. A global resource is a shared level 2 or 3 database.

  FALSE IRLM
  : Number of times a global request to this IRLM was granted by IRLM after SLM indicated contention. This is the longest code path length to grant a global request.

  FALSE SLM
  : Number of times a global request to this IRLM was granted by SLM after the lock table indicated contention. If the lock table is too small, many resources share the same entry in the lock table.

  REAL
  : Number of times a request to this IRLM for a global resource was suspended or rejected because of contention with another request to this IRLM or another IRLM in the IMSPLEX.

LOCAL
: Number of times a request to this IRLM for a local resource was suspended or rejected because of contention with another request to this IRLM.

Area 3

```
                                                LOCAL IMS REQUEST COUNTS:
                                                  LOCAL LOCK............0
                                                  GLOBAL LOCK...........2
                                                  UNLOCK................0
                                                  CHANGE................0
                                                  SENT TO SLM...........2
                                                  SYNC NOTIFY...........0
                                                  ASYNC NOTIFY..........0
                                                  XCF NOTIFY............0
                                                  VERIFY................0
                                                  PURGE.................0
                                                  QUERY.................0
                                                  TAKEOVER..............0
```

This area shows the number of requests from any subsystem (IMS or CICS for example) to this IRLM.

The following descriptions for REQUEST COUNTERS are in alphabetical order.

ASYNC NOTIFY
: Number of asynchronous notifies from this subsystem to other subsystems. Database buffer invalidate, data set extension, and I/O errors are examples of when asynchronous notifies are sent.

CHANGE
: Number of lock state change requests by this subsystem.

GLOBAL LOCK
: Number of requests for global resource locks.

LOCAL LOCK
: Number of requests for local resource locks.

PURGE
: Number of times this subsystem requested IRLM to purge its locks or responded to an IRLM status exit.

QUERY
: Number of query requests by this subsystem.

SENT TO SLM
: Number of lock, unlock, and change requests sent to SLM.

SYNC NOTIFY
: Number of synchronous notify requests by this subsystem.

TAKEOVER
: Number of XRF backup requests to take over processing.

UNLOCK
: Number of resource unlock requests by this subsystem.

VERIFY
: Number of times this subsystem requested IRLM to verify the status of other subsystems with which it shares databases.

XCF NOTIFY
: Number of notifies that required XCF (cross system coupling facility) communication.

```
Area 4

IRLM STATUS:
  GLOBAL CONNECTION COMPLT
  INTERNAL TRACE NOT ACTIVE
```

This area shows the status of this IRLM. The descriptions are arranged in alphabetical order.

The following status messages can be displayed:

DISCONNECTED FROM GROUP
: This IRLM is disconnected from the global sharing group.

GLOBAL CONNECTION COMPLT
: Connection to global sharing environment completed.

GLOBAL INIT IN PROGRESS
: Initialization of global sharing environment started.

GLOBAL TERM IN PROGRESS
: Termination of global sharing environment started.

INTERNAL TRACE (NOT) ACTIVE
: Internal trace is (not) active. This status always appears.

```
Area 5

                          EXIT ROUTINES CALLED:
                            SUSPEND.............2
                            RESUME..............2
                            STATUS..............0
                            NOTIFY..............0
                            DEADLOCK............0
```

This area shows the number of times an exit routine is called by this IRLM for any IMS. The descriptions are arranged in alphabetical order.

DEADLOCK
: This exit is entered by IRLM during a deadlock detection cycle if an IMS is involved in a deadlock. DFSDLKX0 calculates a worth value for each of its work units involved in the deadlock. IRLM then uses the value to select a candidate to break the deadlock.

NOTIFY
: IRLM drives the notify exit to provide notification of certain events. For IMS, it calls DFSNOTX0 to handle these events. An example of an event requiring notification is data set extension by another IMS.

RESUME
: IRLM calls the resume exit when a work unit can access the lock it is waiting for. For IMS, it calls DFSRESX0 to IPOST the work unit (ITASK) out of IWAIT.

STATUS
: IRLM drives the status exit when it is told about a communication failure or a system failure of the partner IRLM.

SUSPEND
: IRLM calls the suspend exit when a work unit must wait for a lock. For IMS, it calls DFSSUSX0 to IWAIT the work unit (ITASK).

```
Area 6


DEADLOCK PARMS.....(5S,1)
  LOCAL................0
  GLOBAL...............0
```

This area provides deadlock mode statistics. The descriptions are arranged in alphabetical order.

DEADLOCK
: The first number is the time in seconds between IRLM local deadlock cycles. The second number represents the number of local deadlock cycles before global deadlock detection is performed (defined in DEADLOCK of DXRJPROC).

GLOBAL
: Total number of global deadlocks.

LOCAL
: Total number of local deadlocks.

```
Area 7

MAXCSA PARM....3,072,000
  CURRENT........183,296
  HIGHEST........183,296
```

This area shows CSA/ECSA usage by IRLM. The descriptions are arranged in alphabetical order.

CURRENT
: Current CSA/ECSA usage.

HIGHEST
: CSA/ECSA usage high-water mark.

MAXCSA PARM
: Maximum amount of CSA/ECSA that the IRLM can use for its dynamic control blocks (specified in MAXCSA of DXRJPROC).

```
Area 8

---------------SYSPLEX XES STATISTICS---------------
CURRENT XES REQUESTS:     CURRENT LOCK STRUCTURE:
  TOTAL................8    REQUESTS/SLOT..........0
  CONTENTION DELAY....0%    SLOTS USED.............0
  FALSE CONT. DELAY...0%    RECORD AREA USAGE.....0%
  SERVICE DELAY.......0%
```

This area shows information about current requests made to the XES locking structure by members of the IMS n-way sharing group. It also shows information about lock structure usage and capacity.

CURRENT XES REQUESTS:

The following descriptions are arranged in alphabetical order:

CONTENTION DELAY
: Percentage of current requests not granted immediately because of contention for the resource.

Tuning Tip

To reduce high contention delay, evaluate the application workload to determine if job scheduling can be altered to reduce contention between jobs. Application redesign may be necessary.

FALSE CONT. DELAY

Percentage of current requests not granted immediately because of false contention. This occurs when more than one resource hashes to the same lock table slot.

Tuning Tip

False contention causes increased locking overhead and should be minimized. Increasing the size of the lock structure allows for more slots, thus reducing false contentions.

SERVICE DELAY

Percentage of current requests not granted immediately because of internal XES service delays.

TOTAL

Total number of requests currently registered in the lock structure. This includes requests granted (lock is still held) or suspended (lock request not granted).

CURRENT LOCK STRUCTURE:

The following descriptions are arranged in alphabetical order:

RECORD AREA USAGE

Percentage of available lock structure capacity currently in use by the sharing group. As the percentage in use reaches certain thresholds, data sharing capabilities are restricted. See IRLM message, DXR142I, in the *IMS Messages and Codes* manual provided by IBM.

REQUESTS/SLOT

Ratio of current requests to number of lock table slots that are allocated.

SLOTS USED

Number of lock table slots that currently have a resource mapped to them.

```
Area 9

==============================IDENTIFIED SUBSYSTEMS==============================
SUBSYSID     STATE     TYPE         INTENT       OTHER STATUS         IRLM ID
--------     --------  --------     ----------   -------------------  ---------
X19H         ACTIVE    ONLINE       UPDATE       NORMAL                   001
             PRIMARY   LOCAL        SHARE        NORMAL

Y19H         ACTIVE    REMOTE       UPDATE       NORMAL                   002
             PRIMARY                SHARE
***********************************END OF DISPLAY*******************************
```

This area shows the subsystems that have identified themselves to IRLM. The description are arranged in alphabetical order.

INTENT
: The subsystem data sharing intent:

  NO SHARE|SHARE
  : The subsystem either participates in data sharing or does not participate.

  READ ONLY|UPDATE
  : The subsystem intent is update or read only.

IRLM ID
: ID of the IRLM to which this subsystem is identified. It is a unique value across the N-way sharing group.

OTHER STATUS
: Other subsystem status indicators:

  NORMAL
  : Subsystem state is normal and none of the following occur.

  PURGE ISSUED
  : Subsystem issued a PURGE to release all locks.

  QUIT ISSUED
  : Subsystem issued a quit to stop all of its work in progress.

  SUBSYS LOCKS RETAINED
  : A quit was issued with `HELD=RETAIN` to keep all of its locks on updated but uncommitted data.

STATE
: State of the subsystem:

  ACTIVE|INACTIVE
  : Subsystem is active or inactive.

  BACKUP|PRIMARY
  : Subsystem is the primary or the backup in the XRF complex. A non-XRF subsystem also is considered primary.

SUBSYSID

Subsystem name. For online IMS or DB2, this is the 4-byte subsystem ID. For IMS batch and CICS local DL/I, this is the jobname or started task name.

TYPE

Subsystem type:

BATCH

Subsystem is IMS batch (including CICS local DL/I).

DB2

Subsystem is DB2.

LOCAL

Subsystem is connected to this IRLM (local).

ONLINE

Subsystem is an IMS online system.

REMOTE

Subsystem is connected to its partner IRLM (IMS block level sharing only).

LCRES - IRLM Lock Contention by Resource (IRLM 2.1)

```
BMC SOFTWARE  ------------ IRLM LOCK CONT BY RESRC ------------PERFORMANCE MGMT
SERV ===> LCRES          INPUT    16:56:54  INTVL=> 3  LOG>=N   TGT==> IMSA
PARM ===>                                     LINE    1 OF    1 SCROLL=> CSR
EXPAND: LINESEL(DETAIL)
----------LOCK---------------- CUR              WAIT -----LONGEST WAIT------
DATABASE DCB/AREA RBA/TYPE F G STA    HOLDERS    CNT    WAITER       MINUTES
-------- -------- -------- - - --- ------------- --- -------------   -------
CUSTHDAM        1 0000615C P G SHR  003-I16XBMPW   3  002-I16XBMPW      21.2
******************************** END OF DATA ********************************
```

Description: The LCRES service locates the partner IRLM of the target IMS. It then locates, identifies, and displays a list of the locks related to the target IMS that are in lock contention (being waited for).

LCRES reports only lock wait conditions for requests that originated from an IMS identified to the same IRLM as the target IMS. If one of the local IMSs is waiting on a lock held by an external IMS, LCRES indicates that the lock is held externally, but does not provide any information about the holder.

Select Code: LCRES

Parameter: None

Expand: You can use the cursor to select a pop-up scrollable window, which lists the work units in contention for the selected lock.

Scrolling: The list of locks is scrollable.

Field Descriptions: Each of the fields is shown and described below. The descriptions are arranged in alphabetical order.

CUR STA

Current state of the lock. The state can be:

EXC	Exclusive
RO	Read-only
SHR	Share
UNK	Unknown (lock state in transition)
UPD	Update

HOLDERS

Identifies the holder of the lock on a resource as:

`*nnn - xxxxxxxx` Online IMS region of another local IMS using the same IRLM, where to another IMS, `nnn` is the region number, and `xxxxxxxx` is the region name.

`nnn - xxxxxxxx` Online IMS region of the target IMS, where `nnn` is the region number and `xxxxxxxx` is the region name.

L - xxxxxxxx — Local DL/I batch or CICS local DL/I job using the same IRLM, where xxxxxxxx is the name of the job or started task.

S - xxxxxxxx — IMS internal process, where xxxxxxxx is the internal task field name; for example, XFP for Fast Path internal task.

X - xxxxxxxx — Online or batch IMS on a partner IRLM, where xxxxxxxx is the subsystem ID of an online IMS or the name of the job or started task for a batch IMS.

X - UNKNOWN — The holder is not known to this IRLM. The holder is identified to another IRLM (IRLM 2.1 or later).

If the lock is being held by more than one region, the count of the holders is shown.

LOCK

Resource waited on or held.

DATABASE

Database name.

DCB/AREA

DCB number of a full function DL/I database data set or the area name for a Fast Path DEDB.

F

Fast Path indicator:

blank	Non-Fast Path lock
B	B-lock for share level greater than 2, DS-BUSY, DATASET, and COMMAND
F	Fast Path lock
N	Non-updatable Fast Path Area lock
P	P-lock for share level greater than 2, EXTEND, and BID

G

Global indicator:

blank	Local lock
G	Global lock

RBA/TYPE

In case of an RID (record lock) or BID (block lock), this field contains an identifier IMS uses to control access to the resource. The rules IMS uses to construct the ID are listed below to help in problem determination.

FP DEDB

The ID is the high-order three bytes of the RBA of the VSAM control interval containing the segment.

FP MSDB
: The ID is the address of the segment prefix in the IMS control region's private virtual storage.

  Note: This is not an RBA; it is an address that may change each time IMS is started.

HDAM OSAM
: The ID is the RBA of the block containing the segment.

Other OSAM
: The ID is the RBN of the block containing the segment. In addition, bit 1 (`X'40'`) of the high order byte is turned on.

VSAM ESDS
: The ID is the RBA of the VSAM control interval containing the segment.

VSAM KSDS
: If the key is four bytes or less, the ID is the actual key. Otherwise, the ID is the hashed key, using the algorithm in DFSHASH0.

There are many types of locks to serialize various resources. The most common ones are block lock (BID) and record lock (RID). Block lock is used to serialize the update to a block or CI. Record lock is used to deny access to uncommitted data. In some cases, this service uses resource ID values that do not represent a relative byte address. In these cases, the following text is displayed in place of the actual ID:

COMMAND
: Used for global commands, IDENTIFY to IRLM, or IRLM NOTIFY.

DATASET
: Used at data set open for buffer invalidation notifies.

DS-BUSY
: Data set busy. Used to ensure no CI or CA split during a read.

EXTEND
: Used to serialize a data set extension.

The following locks are Fast Path only:

AREA
: Used by Fast Path to lock an entire area. This is used mostly during /STOP AREA processing and XRF takeovers.

BFROVFL
: Buffer Overflow (Fast Path only). This is used when a region has to use the overflow buffers (OBA parameter). IMS allows only one region at a time to use the overflow buffers, so it uses program isolation to serialize the process.

DUMMY
: Force release of all global locks.

NONDBRC
: Database is not registered with DBRC.

-LONGEST WAIT-

WAITER

Identifies the waiter waiting the longest number of minutes for a suspended lock on this resource. This does not include waiters in IMS subsystems that are identified to another IRLM. The waiter is identified as:

*nnn - xxxxxxxx Online IMS region of another local IMS using the same IRLM, where to another IMS, nnn is the region number, and xxxxxxxx is the region name.

nnn - xxxxxxxx Online IMS region of the target IMS, where nnn is the region number and xxxxxxxx is the region name.

L - xxxxxxxx Local DL/I batch or CICS local DL/I job using the same IRLM, where xxxxxxxx is the name of the job or started task.

S - xxxxxxxx IMS internal process, where xxxxxxxx is the internal task field name; for example, XFP for Fast Path internal task.

X - xxxxxxxx Online or batch IMS on a partner IRLM, where xxxxxxxx is the subsystem ID of an online IMS or the name of the job or started task for a batch IMS.

MINUTES

Number of minutes the lock request has been suspended.

WAIT CNT

Total number of waiters on the lock. This does not include waiters in IMS subsystems identified to another IRLM.

Selected Lock Pop-Up

```
BMC SOFTWARE  ------------ IRLM LOCK CONT BY RESRC ------------PERFORMANCE MGMT
SERV ===> LCRES          INPUT    16:56:54  INTVL=> 3  LOG>=N   TGT==> IMSA
PARM ===>                                      LINE    1 OF    1 SCROLL=> CSR

----------LOCK-----------------CUR              WAIT -----LONGEST WAIT------
DATABASE DCB/AREA RBA/TYPE F G STA    HOLDERS    CNT    WAITER       MINUTES
-------- -------- -------- - - --- ------------- --- --------------- -------
CUSTHDAM        1 0000615C P G SHR  003-I16XBMPW   3  002-I16XBMPW      21.2
==============================================================================
-----------HOLDERS----------------      ------WAITERS-----------REQ--- WAIT-
 RGN T STC/JOB  PSB      STATUS         RGN T STC/JOB  PSB      STAT MINUTES
---- - -------- -------- --------       --- - -------- -------- ---- -------
 003 B I16XBMPW PTEST01  ACTV-USR       002 B I16XMPBW PTEST02  UPD     21.2
                                        004 B I16XMPBW PTEST04  UPD      1.3
****************************** END OF DATA ********************************
```

This pop-up shows the work units in contention for the selected lock. It is an EXPAND of a lock by cursor selection from the LCRES service.

HOLDERS

Lists all the holders of the lock on IMSs identified to this IRLM.

PSB

Program Specification Block being processed in the online IMS region. This is unknown when the holder is identified to another IRLM.

RGN

Region (PST) number of the online IMS region; otherwise, the field is left blank. The region number is prefixed by an * character if the region belongs to another IMS.

STATUS

Region status:

Note: This is always unknown when the holder is an IMS identified to another IRLM.

ACTIVE	Active in a nonspecific process.
ACTV-BKO	Region in dynamic backout.
ACTV-DB2	Active in DB2 (the Event Collector must be active).
ACTV-DBR	Region active in DBRC.
ACTV-DLI	Region active in DL/I.
ACTV-SCH	Region active in nonspecific CREATE THREAD process.
ACTV-USR	Region active in the application program.
IDLE	Region waiting for non-WFI input to process.
IDLE-HOT	Pseudo-WFI region waiting for input from the same transaction.
IDLE-WFI	Region waiting for WFI or Fast Path BALG input to process.
INACTIVE	Region defined but not started (not yet signed on).
OPENING	Region in first CREATE THREAD process.
SCH-BLR	Region in scheduling (active in block loader latch).
SCH-BLKM	Region in scheduling (active in block mover).
SCHDULE	Region in scheduling (CREATE THREAD).
TERMINAT	Region in region termination or abend.
WAIT-AOI	Region waiting for an AO message. Await for AO occurs when a region issues a GMSG call with the wait option and DFSAOE00 has no message to return to it at that time.

WAIT-BKO	Region currently in wait, but dynamic backout in progress.
WAIT-BLKM	Region waiting in block mover.
WAIT-BML	Region in scheduling (waiting for block mover latch). **Note:** The block mover latch comprises several smaller latches. To find which BML latch a region is waiting for, use the LATCH service.
WAIT-DLI	Region waiting for DL/I.
WAIT-INT	Region in scheduling (waiting for database intent).
WAITING	Region in nonspecific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see "LATCH - Latch Summary" on page 278.
WT-CMDP	Region waiting for a pending /DBD or /DBR command to complete.
WT-DBRC	Region waiting for DBRC.
WT-DMBP	Region in scheduling (waiting for DMB pool).
WT-EPCB	Region in scheduling (waiting for EPCB pool).
WT-IRLM	Region waiting for IRLM.
WT-ISWCH	Region did ISWITCH and is waiting in IMS dispatcher.
WT-NTFY	Region waiting for asynchronous notify(s) to complete (IRLM must be active). An asynchronous notify could be buffer invalidation, for example.
WT-OSAM	Region waiting for OSAM.
WT-PI	Region waiting for a program isolation lock to be freed.
WT-PSBP	Region waiting for PSB pool.
WT-PSBW	Region waiting for PSBW pool.
WT-SCHD	Region waiting in a nonspecific CREATE THREAD process.
WT-VSAM	Region waiting in VSAM.
WTF-ADSC	Region waiting in Fast Path for ADSC directory latch (DEDB area data sets).
WTF-AREA	Region waiting in Fast Path for DEDB area lock.

WTF-DEDB Region waiting in Fast Path for DEDB ownership.

WTF-DMSH Region waiting in Fast Path for DMAC share latch (DEDB area).

WTF-DMSY Region waiting in Fast Path for DMAC synchronization latch (DEDB area).

WTF-FBFR Region waiting in Fast Path for FIX buffer (DEDB).

WTF-FCMD Region waiting in Fast Path for FNCB (Fast Path command) latch.

WTF-MSDB Region waiting in Fast Path for MSDB latch.

WTF-OBA Region waiting in Fast Path for overflow buffer interlock.

WTF-OCL Region waiting in Fast Path for open/close latch.

WTF-RSL Region waiting in Fast Path for resource latch.

WTF-SEG Region waiting in Fast Path for MSDB segment.

WTF-SYNC Region waiting in Fast Path for synchronization latch.

Note: A # character in place of the - character in a status indicates activity resulted from an IMS data capture exit (user exit for data propagation and site requirements) instead of the application program. For example, if a data capture exit made a request that is waiting for a program isolation lock, the STATUS field shows WT#PI rather than WT-PI. For more information about data capture exits, see the IBM System Administration Guide publication.

The Event Collector must be active to obtain the data capture exit status when the exit issues a DB2 call.

STC/JOB

Name of the job or started task. This is unknown when the holder is identified to another IRLM. For an IMS internal task, this is the 3-byte field task ID (for example, XFP for Fast Path internal task).

T

Region type. Possible types:

B BMP (Batch Message Processing Region)
D DBCTL thread
F IFP (Fast Path Region)
L Local batch IMS region
M MPR (Message Processing Region)
S IMS internal task
T TPI (explicit APPC program)
X The holder is not known to this IRLM; holder is identified to another IRLM

WAITERS

Lists all the waiters for the lock. This does not include waiters in IMSs identified to another IRLM.

REQ STAT Requested lock state:

EXC	Exclusive
RO	Read-only
SHR	Share
UNK	Unknown (lock state in transition)
UPD	Update

WAIT MINUTES

Number of minutes the lock request has been suspended.

LCUSR - IRLM Lock Contention by User (IRLM 2.1)

```
BMC SOFTWARE  ------------ IRLM LOCK CONT BY USER -------------PERFORMANCE MGMT
SERV ===> LCUSR          INPUT    14:14:54  INTVL=> 3  LOG>=N   TGT==> IMSA
PARM ===>                                     LINE    1 OF    1 SCROLL=> CSR
EXPAND: LINESEL(LUSRD)
------------USER-----------------  LOCKS ---WAITERS----- ------WAITING FOR-----
 RGN T STC/JOB  PSB      TRANCODE  HELD  TOTAL  LONGEST  RGN T STC/JOB  MINUTES
---- - -------- -------- --------  ----- -----  -------  --- - -------- -------
 001 B I16XBMPW PTEST01               10    03*    34.4
 002 B I16XBMPW PTEST04                5    01     30.9  001 B I16XBMPW    34.4
 003 B I16XBMPW PTEST03                3    01     11.6  002 B I16XBMPW    30.9
 004 B I16XBMPW PTEST02                1    00           003 B I16XBMPW    11.6
******************************** END OF DATA ***********************************
```

Description: The LCUSR service locates the partner IRLM of the target IMS. It then locates, identifies, and displays a list of the target IMS work units (dependent regions) that are involved in lock contentions (waiting or holding resources that someone is waiting for). The regions are displayed in sequence by region number.

Color: If you have a color monitor, the user causing a lock contention is highlighted in red.

Select Code: LCUSR

Parameter: None

Expand: You can select a detailed display (LUSRD) of any listed region, which identifies the resource(s) being waited for or held by that region. Position the cursor on the line for that region and press ENTER, as indicated on the display by `EXPAND`. Pressing the PF3 (END) key from that display returns to this list.

Scrolling: The list of regions is scrollable.

Field Descriptions: Each of the fields is shown and described below. The descriptions are arranged in alphabetical order.

LOCKS HELD
: Total number of locks held by this user

USER
: Identifies the target online IMS work units that wait on resources locked by other users or held resources waited on by other users.

  PSB — Name of the PSB (Program Specification Block) being processed in this online region.

  RGN — Region (PST) number.

  STC/JOB — Name of the job or started task.

T — Region type. Possible types:

- B — BMP (Batch Message Processing Region)
- D — DBCTL thread
- F — IFP (Fast Path Region)
- M — MPR (Message Processing Region)
- T — TPI (explicit APPC program)

TRANCODE — Transaction code being processed by the online region, if the application is message driven.

WAITERS

Number of other regions waiting for one or more locks held by this region and the longest time waiting:

TOTAL — Total waiters for resources held by this user. This does not include waiters identified to a different IRLM even when the other IRLM is part of the same N-way sharing group (the sharing of databases by more than two OS/390s).

An * following this total indicates one or more of the total waiters is from a different IMS than the target IMS. These waiters from other IMSs, although included in this count, are not identified by this service.

LONGEST — Longest wait time of all local waiters for locks held by this user. There may be external waiters that have waited longer.

WAITING FOR

Region this region is waiting for. There can be more than one region waited for, but only one is listed here.

MINUTES — Time this user has been waiting for a lock.

RGN — Region (PST) number. This is unknown when the wait is for a holder identified to another IRLM. If the region is not an online IMS region, this field is blank. If the region belongs to another IMS (different subsystem ID), the region number is prefixed by an * character; for example, STC/JOB Name of the job or started task. This is unknown when the wait is for a holder identified to another IRLM. For an online IMS on a partner IRLM, this is the subsystem ID of that IMS. For an IMS internal process, this is the 3-byte IMS internal task field name; for example, XFP for Fast Path internal task.

T — Region type. Possible types:

- B — BMP (Batch Message Processing Region)
- D — DBCTL thread
- F — IFP (Fast Path Region)
- L — Local batch IMS regions
- M — MPR (Message Processing Region)
- S — IMS internal process
- T — TPI (explicit APPC program)
- X — The holder is not known to this IRLM; holder is identified to another IRLM

LHRES - IRLM Locks Held by Resources (IRLM 2.1)

```
BMC SOFTWARE  ------------- IRLM LOCKS HELD BY RESRC ------------PERFORMANCE MGM
SERV ===> LHRES           INPUT    16:57:09  INTVL=>  3  LOG=> N  TGT==> IMSA
PARM ===>                                        LINE     1 OF    6 SCROLL=> CSR
EXPAND: LINESEL(DETAIL)
----------LOCK---------------- CUR              WAIT -----LONGEST WAIT------
DATABASE DCB/AREA RBA/TYPE F G STA    HOLDERS    CNT    WAITER       MINUTES
-------- -------- -------- - - --- ------------- --- -------------   -------
CUSTHDAM        1 0000615C P G SHR  003-I16XBMPW   3  002-I16XBMPW      21.2
                  COMMAND  B G RO     S-DLI
                  COMMAND  F G RO     S-DLI
CUSTHDAM        1 DATASET  B G RO     S-DLI
CUSTHDAM        1 0000490E P G UPD  002-I16XBMPW
CUSTHDAM        1 0000615C P G SHR  003-I16XBMPW   1  002-I16XBMPW
DBFSAMD3 CUSDB    AREA     N G RO     S-XFP
 ****************************** END OF DATA *********************************
```

Description: The LHRES service locates the partner IRLM of the target IMS. It then locates, identifies, and displays a list of all the locks related to the target IMS that are being held (in contention or not).

Select Code: LHRES

Parameter: None

Expand: You can use the cursor to select a pop-up scrollable window, which lists all the work units in contention for the selected lock.

Scrolling: The list of locks is scrollable.

Field Descriptions: Each of the fields is shown and described below. The descriptions are arranged in alphabetical order.

CUR STA

Current state of the lock. The state can be:

EXC	Exclusive
RO	Read-only
SHR	Share
UNK	Unknown (lock state in transition)
UPD	Update

HOLDERS

Identifies the holder of the lock on a resource as:

*nnn - xxxxxxxx	Online IMS region of another local IMS using the same IRLM, where to another IMS, nnn is the region number, and xxxxxxxx is the region name.
nnn - xxxxxxxx	Online IMS region of the target IMS, where nnn is the region number and xxxxxxxx is the region name.
L - xxxxxxxx	Local DL/I batch or CICS local DL/I job using the same IRLM, where xxxxxxxx is the name of the job or started task.

S - xxxxxxxx — IMS internal process, where xxxxxxxx is the internal task field name; for example, XFP for Fast Path internal task.

X - xxxxxxxx — Online or batch IMS on a partner IRLM, where xxxxxxxx is the subsystem ID of an online IMS or the name of the job or started task for a batch IMS.

X - UNKNOWN — The holder is not known to this IRLM. The holder is identified to another IRLM (IRLM 2.1 or later).

SHR CNT — If the lock is being held by more than one region, the count of the holders is shown.

LOCK

Resource waited on or held.

DATABASE

Database name.

DCB/AREA

DCB number of a full function DL/I database data set or the area name for a Fast Path DEDB.

F

Fast Path indicator:

blank	Non-Fast Path lock
B	B-lock for share level greater than 2, DS-BUSY, DATASET, and COMMAND
F	Fast Path lock
N	Non-updatable Fast Path Area lock
P	P-lock for share level greater than 2, EXTEND, and BID

G

Global indicator:

blank	Local lock
G	Global lock

RBA/TYPE

In case of an RID (record lock) or BID (block lock), this field contains an identifier IMS uses to control access to the resource. The rules IMS uses to construct the ID are listed below to help in problem determination.

FP DEDB

The ID is the high-order three bytes of the RBA of the VSAM control interval containing the segment.

FP MSDB

The ID is the address of the segment prefix in the IMS control region's private virtual storage.

Note: This is not an RBA; it is an address that may change each time IMS is started.

HDAM OSAM
: The ID is the RBA of the block containing the segment.

Other OSAM
: The ID is the RBN of the block containing the segment. In addition, bit 1 (`X'40'`) of the high order byte is turned on.

VSAM ESDS
: The ID is the RBA of the VSAM control interval containing the segment.

VSAM KSDS
: If the key is four bytes or less, the ID is the actual key. Otherwise, the ID is the hashed key, using the algorithm in DFSHASH0.

There are many types of locks to serialize various resources. The most common ones are block lock (BID) and record lock (RID). Block lock is used to serialize the update to a block or CI. Record lock is used to deny access to uncommitted data. In some cases, this service uses resource ID values that do not represent a relative byte address. In these cases, the following text is displayed in place of the actual ID:

COMMAND
: Used for global commands, IDENTIFY to IRLM, or IRLM NOTIFY.

DATASET
: Used at data set open for buffer invalidation notifies.

DS-BUSY
: Data set busy. Used to ensure no CI or CA split during a read.

EXTEND
: Used to serialize a data set extension.

The following locks are Fast Path only:

AREA
: Used by Fast Path to lock an entire area. This is used mostly during /STOP AREA processing and XRF takeovers.

BFROVFL
: Buffer Overflow (Fast Path only). This is used when a region has to use the overflow buffers (OBA parameter). IMS allows only one region at a time to use the overflow buffers, so it uses program isolation to serialize the process.

DUMMY
: Force release of all global locks.

NONDBRC
: Database is not registered with DBRC.

-LONGEST WAIT-

Identifies the waiter waiting the longest number of minutes for a suspended lock on this resource. This does not include waiters in IMS subsystems that are identified to another IRLM. The waiter is identified as:

*nnn - xxxxxxxx	Online IMS region of another local IMS using the same IRLM, where to another IMS, nnn is the region number, and xxxxxxxx is the region name.
nnn - xxxxxxxx	Online IMS region of the target IMS, where nnn is the region number and xxxxxxxx is the region name.
L - xxxxxxxx	Local DL/I batch or CICS local DL/I job using the same IRLM, where xxxxxxxx is the name of the job or started task.
S - xxxxxxxx	IMS internal process, where xxxxxxxx is the internal task field name; for example, XFP for Fast Path internal task.
MINUTES	Number of minutes the lock request has been suspended.
WAIT CNT	Total number of waiters on the lock. This does not include waiters in IMS subsystems identified to another IRLM.

Selected Lock Pop-up

```
BMC SOFTWARE  ------------- IRLM LOCKS HELD BY RESRC -----------PERFORMANCE MGMT
SERV ===> LHRES           INPUT    16:57:18   INTVL=> 3 LOG=> N  TGT==> IMSA
PARM ===>                                       LINE    1 OF    1 SCROLL=> CSR

----------LOCK---------------- CUR              WAIT -----LONGEST WAIT------
DATABASE DCB/AREA RBA/TYPE F G STA    HOLDERS    CNT    WAITER       MINUTES
-------- -------- -------- - - --- ------------- --- --------------- -------
CUSTHDAM        1 0000615C P G SHR  003-I16XBMPW   3  002-I16XBMPW      21.2
===============================================================================
-----------HOLDERS----------------      ------WAITERS-----------REQ--- WAIT-
 RGN T STC/JOB  PSB      STATUS         RGN T STC/JOB  PSB      STAT MINUTES
---- - -------- -------- --------       --- - -------- -------- ---- -------
 003 B I16XBMPW PTEST01  ACTV-USR       002 B I16XMPBW PTEST02  UPD     21.2
                                        004 B I16XMPBW PTEST04  UPD      1.3
******************************** END OF DATA *********************************
```

This pop-up shows a scrollable list of all the work units in contention for the selected lock. It is an EXPAND of a lock by cursor selection from the LHRES service.

HOLDERS

Lists all the holders of the lock.

PSB

Program Specification Block being processed in the online IMS region. This is unknown when the holder is identified to another IRLM.

RGN

Region (PST) number of the online IMS region; otherwise, the field is left blank. The region number is prefixed by an * character if the region belongs to another IMS.

STATUS

Region status:

Note: This will always be unknown when the holder is an IMS identified to another IRLM.

ACTIVE	Active in a nonspecific process.
ACTV-BKO	Region in dynamic backout.
ACTV-DB2	Active in DB2 (the Event Collector must be active).
ACTV-DBR	Region active in DBRC.
ACTV-DLI	Region active in DL/I.
ACTV-SCH	Region active in nonspecific CREATE THREAD process.
ACTV-USR	Region active in the application program.
IDLE	Region waiting for non-WFI input to process.
IDLE-HOT	Pseudo-WFI region waiting for input from the same transaction.
IDLE-WFI	Region waiting for WFI or Fast Path BALG input to process.
INACTIVE	Region defined but not started (not yet signed on).
OPENING	Region in first CREATE THREAD process.
SCH-BLR	Region in scheduling (active in block loader latch).
SCH-BLKM	Region in scheduling (active in block mover).
SCHDULE	Region in scheduling (CREATE THREAD).
TERMINAT	Region in region termination or abend.
WAIT-AOI	Region waiting for an AO message. Await for AO occurs when a region issues a GMSG call with the wait option and DFSAOE00 has no message to return to it at that time.
WAIT-BKO	Region currently in wait, but dynamic backout in progress.
WAIT-BLKM	Region waiting in block mover.
WAIT-BML	Region in scheduling (waiting for block mover latch). **Note:** The block mover latch comprises several smaller latches. To find which BML latch a region is waiting for, use the LATCH service.
WAIT-DLI	Region waiting for DL/I.

WAIT-INT	Region in scheduling (waiting for database intent).
WAITING	Region in nonspecific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see "LATCH - Latch Summary" on page 278.
WT-CMDP	Region waiting for a pending /DBD or /DBR command to complete.
WT-DBRC	Region waiting for DBRC.
WT-DMBP	Region in scheduling (waiting for DMB pool).
WT-EPCB	Region in scheduling (waiting for EPCB pool).
WT-IRLM	Region waiting for IRLM.
WT-ISWCH	Region did ISWITCH and is waiting in IMS dispatcher.
WT-NTFY	Region waiting for asynchronous notify(s) to complete (IRLM must be active). An asynchronous notify could be buffer invalidation, for example.
WT-OSAM	Region waiting for OSAM.
WT-PI	Region waiting for a program isolation lock to be freed.
WT-PSBP	Region waiting for PSB pool.
WT-PSBW	Region waiting for PSBW pool.
WT-SCHD	Region waiting in a nonspecific CREATE THREAD process.
WT-VSAM	Region waiting in VSAM.
WTF-ADSC	Region waiting in Fast Path for ADSC directory latch (DEDB area data sets).
WTF-AREA	Region waiting in Fast Path for DEDB area lock.
WTF-DEDB	Region waiting in Fast Path for DEDB ownership.
WTF-DMSH	Region waiting in Fast Path for DMAC share latch (DEDB area).
WTF-DMSY	Region waiting in Fast Path for DMAC synchronization latch (DEDB area).
WTF-FBFR	Region waiting in Fast Path for FIX buffer (DEDB).
WTF-FCMD	Region waiting in Fast Path for FNCB (Fast Path command) latch.

WTF-MSDB Region waiting in Fast Path for MSDB latch.

WTF-OBA Region waiting in Fast Path for overflow buffer interlock.

WTF-OCL Region waiting in Fast Path for open/close latch.

WTF-RSL Region waiting in Fast Path for resource latch.

WTF-SEG Region waiting in Fast Path for MSDB segment.

WTF-SYNC Region waiting in Fast Path for synchronization latch.

Note: A # character in place of the - character in a status indicates activity resulted from an IMS data capture exit (user exit for data propagation and site requirements) instead of the application program. For example, if a data capture exit made a request that is waiting for a program isolation lock, the STATUS field shows WT#PI rather than WT-PI. For more information about data capture exits, see the IBM System Administration Guide publication.

The Event Collector must be active to obtain the data capture exit status when the exit issues a DB2 call.

STC/JOB
Name of the job or started task. This is always unknown when the holder is identified to another IRLM. For an IMS internal task, this is the 3-byte field task ID (for example, XFP for Fast Path internal task).

T
Region type. Possible types:

B BMP (Batch Message Processing Region)
D DBCTL thread
F IFP (Fast Path Region)
L Local batch IMS region
M MPR (Message Processing Region)
S IMS internal task
T TPI (explicit APPC program)
X The holder is not known to this IRLM; holder is identified to another IRLM

WAITERS
Lists all the waiters for the lock. This does not include waiters in IMS subsystems identified to another IRLM.

REQ STAT Requested lock state:

EXC Exclusive
RO Read-only
SHR Share
UNK Unknown (lock state in transition)
UPD Update

WAIT MINUTES
Number of minutes the lock request has been suspended.

LHUSR - IRLM Locks Held by User (IRLM 2.1)

```
BMC SOFTWARE  ------------ IRLM LOCK HELD BY USER -------------PERFORMANCE MGMT
SERV ===> LHUSR          INPUT    14:14:54  INTVL=> 3  LOG>=N   TGT==> IMSA
PARM ===>                                      LINE    1 OF    1 SCROLL=> CSR
EXPAND: LINESEL(LUSRD)
------------USER-----------------  LOCKS ---WAITERS----- ------WAITING FOR-----
 RGN T STC/JOB  PSB      TRANCODE  HELD  TOTAL  LONGEST  RGN T STC/JOB  MINUTES
---- - -------- -------- --------  ----- -----  -------  --- - -------- -------
 001 B I16XBMPW PTEST01               10    03*    34.4
```

Description: The LHUSR service locates the partner IRLM of the target IMS. It then locates, identifies, and displays a list of the target IMS work units (dependent regions) that are holding and/or waiting for a lock. The regions are displayed in sequence by region number.

This service displays a superset of the regions shown in LCUSR. LCUSR lists only contentions, but LHUSR also includes any target IMS regions holding lock(s) with no regions waiting.

Color: If you have a color monitor, the user causing a lock contention is highlighted in red.

Select Code: LHUSR

Parameter: None

Expand: You can select a detailed display (LUSRD) of any listed region, which identifies the resource(s) being waited for or held by that region. Position the cursor on the line for that region and press ENTER as indicated on the display by `EXPAND`. Pressing the PF3 (END) key from that display returns to this list.

Scrolling: The list of regions is scrollable.

Field Descriptions: Each of the fields is shown and described below. The descriptions are arranged in alphabetical order.

LOCKS HELD
: Total number of locks held by this user

USER
: Identifies the target online IMS work units that wait on resources locked by other users or hold resources waited on by other users.

PSB	Name of the PSB (Program Specification Block) being processed in this online region.
RGN	Region (PST) number.
STC/JOB	Name of the job or started task.

T — Region type. Possible regions:

- B — BMP (Batch Message Processing Region)
- D — DBCTL thread
- F — IFP (Fast Path Region)
- M — MPR (Message Processing Region)
- T — TPI (explicit APPC program)

TRANCODE — Transaction code being processed by this online region, if the application is message driven.

WAITERS

Number of other regions waiting for one or more locks held by this region and the longest time waiting:

TOTAL — Total waiters for resources held by this user. This does not include waiters identified to a different IRLM even when the other IRLM is part of the same N-way sharing group (the sharing of databases by more that two OS/390s).

An * following this total indicates one or more of the total waiters is from a different IMS than the target IMS. These waiters from other IMSs, although included in this count, are not identified by this service.

LONGEST — Longest wait time of all local waiters for locks held by this user. There may be external waiters that have waited longer.

WAITING FOR

Region this region is waiting for. There can be more than one region waited for, but only one is listed here.

MINUTES — Time this user has been waiting for a lock.

RGN — Region (PST) number. This is unknown when the wait is for a holder identified to another IRLM. If the region is not an online IMS region, this field is blank. If the region belongs to another IMS (different SSID), the region number is prefixed by an asterisk (*); for example, *001.

STC/JOB — Name of the job or started task. This is unknown when the wait is for a holder identified to another IRLM. For an online IMS on a partner IRLM, this is the subsystem ID of that IMS. For an IMS internal process, this is the 3-byte IMS internal task field name; for example, XFP for Fast Path internal task.

T — Region type. Possible types:

- B — BMP (Batch Message Processing Region)
- D — DBCTL thread
- F — IFP (Fast Path Region)
- L — Local batch IMS regions
- M — MPR (Message Processing Region)
- T — TPI (explicit APPC program)

S IMS internal process

X The holder is not known to this IRLM; holder is identified to another IRLM

LUSRD - IRLM Lock User Detail (IRLM 2.1)

```
BMC SOFTWARE  ------------ IRLM LOCK USER DETAIL --------------PERFORMANCE MGMT
SERV ===> LUSRD          INPUT    14:15:02  INTVL=> 3  LOG>=N   TGT==> IMSA
PARM ===> 001                                  LINE    1 OF    1 SCROLL=> CSR
EXPAND: DLIST
  RGN: 001  TYPE: BMP     STC: I6XBMPW      PSB: PTEST01       TRAN:
IMSID: X16H            STATUS: WT-IRLM      PGM: PIWAIT       LTERM:

----------LOCK----------------  -STATE-  --COUNT--
DATABASE DCB/AREA RBA/TYPE F G  CUR REQ  HOLD WAIT
------WAITING FOR(    34.6 MINUTES)--------------------HOLDERS-----------------
CUSTHDAM        1 00001000      SHR EXC     2    3*  004-IMSMSG04  005-IMSMSG05
------HOLDING----------------------------------------LONGEST WAITER---MINUTES--
CUSTHDAM        1 00002000 F G  SHR SHR    10    1   003-IMSMSG03        34.5
********************************** END OF DATA ********************************
```

Description: The LUSRD service locates the partner IRLM of the target IMS. It then locates, identifies, and displays the locks the selected online IMS dependent region is holding or waiting for. It shows how long the selected region has waited for a lock and the wait time of the longest local waiter for each lock held by that region.

This display can be selected directly from the list of regions displayed by the LCUSR or LHUSR service by positioning the cursor on the line for the region and pressing ENTER.

Color: If you have a color monitor, a locked resource and the holders of the lock are highlighted in red.

Select Code: LUSRD

Parameter: Region number of a dependent region of the target online IMS.

Expand: The LUSRD display can be EXPANDed to the DLIST display for this region, which shows the current DL/I call in detail, including call function, PCB, and SSAs. Position the cursor on any LUSRD display line (line 5 or greater) and press ENTER.

Scrolling: The list of locks in the HOLDING area of the display is scrollable.

Field Descriptions: Each of the fields is shown and described below by display area.

Area 1

```
  RGN: 001  TYPE: BMP   STC: I16XBMPW  PSB: PTEST01  TRAN:

IMSID: X16H          STATUS: ACTV-USR  PGM: PIWAIT   LTERM:
```

This area shows processing statistics about the selected region. If there is no lock activity, LUSRD shows this information only. The descriptions are arranged in alphabetical order.

IMSID IMS subsystem ID.

LTERM If the application program is message driven and if the message originated from a terminal, this field shows the LTERM name of the terminal that submitted the transaction.

PGM Application program being executed for the PSB in the region. This can be different from the PSB if the region is a BMP.

PSB Program Specification Block being processed in this region.

RGN Online region (PST) number.

STATUS Region status:

Note: This will always be unknown when the holder is an IMS identified to another IRLM.

ACTIVE Active in a nonspecific process.

ACTV-BKO Region in dynamic backout.

ACTV-DB2 Active in DB2 (the Event Collector must be active).

ACTV-DBR Region active in DBRC.

ACTV-DLI Region active in DL/I.

ACTV-SCH Region active in nonspecific CREATE THREAD process.

ACTV-USR Region active in the application program.

IDLE Region waiting for non-WFI input to process.

IDLE-HOT Pseudo-WFI region waiting for input from the same transaction.

IDLE-WFI Region waiting for WFI or Fast Path BALG input to process.

INACTIVE Region defined but not started (not yet signed on).

OPENING Region in first CREATE THREAD process.

SCH-BLR Region in scheduling (active in block loader latch).

SCH-BLKM Region in scheduling (active in block mover).

SCHDULE Region in scheduling (CREATE THREAD).

TERMINAT Region in region termination or abend.

WAIT-AOI	Region waiting for an AO message. Await for AO occurs when a region issues a GMSG call with the wait option and DFSAOE00 has no message to return to it at that time.
WAIT-BKO	Region currently in wait, but dynamic backout in progress.
WAIT-BLKM	Region waiting in block mover.
WAIT-BML	Region in scheduling (waiting for block mover latch). **Note:** The block mover latch comprises several smaller latches. To find which BML latch a region is waiting for, use the LATCH service.
WAIT-DLI	Region waiting for DL/I.
WAIT-INT	Region in scheduling (waiting for database intent).
WAITING	Region in nonspecific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see "LATCH - Latch Summary" on page 278.
WT-CMDP	Region waiting for a pending /DBD or /DBR command to complete.
WT-DBRC	Region waiting for DBRC.
WT-DMBP	Region in scheduling (waiting for DMB pool).
WT-EPCB	Region in scheduling (waiting for EPCB pool).
WT-IRLM	Region waiting for IRLM.
WT-ISWCH	Region did ISWITCH and is waiting in IMS dispatcher.
WT-NTFY	Region waiting for asynchronous notify(s) to complete (IRLM must be active). An asynchronous notify could be buffer invalidation, for example.
WT-OSAM	Region waiting for OSAM.
WT-PI	Region waiting for a program isolation lock to be freed.
WT-PSBP	Region waiting for PSB pool.
WT-PSBW	Region waiting for PSBW pool.
WT-SCHD	Region waiting in a nonspecific CREATE THREAD process.
WT-VSAM	Region waiting in VSAM.

WTF-ADSC	Region waiting in Fast Path for ADSC directory latch (DEDB area data sets).
WTF-AREA	Region waiting in Fast Path for DEDB area lock.
WTF-DEDB	Region waiting in Fast Path for DEDB ownership.
WTF-DMSH	Region waiting in Fast Path for DMAC share latch (DEDB area).
WTF-DMSY	Region waiting in Fast Path for DMAC synchronization latch (DEDB area).
WTF-FBFR	Region waiting in Fast Path for FIX buffer (DEDB).
WTF-FCMD	Region waiting in Fast Path for FNCB (Fast Path command) latch.
WTF-MSDB	Region waiting in Fast Path for MSDB latch.
WTF-OBA	Region waiting in Fast Path for overflow buffer interlock.
WTF-OCL	Region waiting in Fast Path for open/close latch.
WTF-RSL	Region waiting in Fast Path for resource latch.
WTF-SEG	Region waiting in Fast Path for MSDB segment.
WTF-SYNC	Region waiting in Fast Path for synchronization latch.

Note: A # character in place of the - character in a status indicates activity resulted from an IMS data capture exit (user exit for data propagation and site requirements) instead of the application program. For example, if a data capture exit made a request that is waiting for a program isolation lock, the STATUS field shows WT#PI rather than WT-PI. For more information about data capture exits, see the IBM System Administration Guide publication.

The Event Collector must be active to obtain the data capture exit status when the exit issues a DB2 call.

STC (JOB) Online region started task name (or job name).

TRAN If the application program is message driven, this field shows the transaction code being processed by the region.

TYPE Region type:

BMP	Batch message processing
DBT	DBCTL thread
FPU	Fast Path utility
MDP	Fast Path
MPP	Message processing
NDP	Nonmessage-driven Fast Path
TPI	TPI (explicit APPC program)

```
Area 2

----------LOCK----------------  -STATE-  --COUNT--
DATABASE DCB/AREA RBA/TYPE F G  CUR REQ  HOLD WAIT
------WAITING FOR(   34.6 MINUTES)--------------------HOLDERS---------------------
CUSTHDAM        1 00001000      SHR EXC    2    3*   004-IMSMSG04   005-IMSMG05
```

This area shows locked resources that this region is waiting for, lock state, a total count of the lock's concurrent holders or waiters, and the holders of the locked resources. The descriptions are arranged in alphabetical order.

COUNT
: Total number of concurrent holders or waiters for the lock.

  HOLD
  : Total number of concurrent holders of the lock. If any external holders exist, the total increases by one, regardless of how many external holders there may be.

  WAIT
  : Total number of concurrent waiters on the lock. This total does not include waiters identified to a different IRLM even when the other IRLM is part of the same N-way sharing group (the sharing of databases by more than two OS/390s). An * following this total indicates one or more waiters of this total is from a different IMS subsystem than the target IMS.

HOLDERS
: Identifies the first two holders of the lock, highlighted in red, on a resource as:

  `*nnn - xxxxxxxx`
  : Online IMS region of another local IMS using the same IRLM, where to another IMS, nnn is the region number, and `xxxxxxxx` is the region name.

  `nnn - xxxxxxxx`
  : Online IMS region of the target IMS, where `nnn` is the region number and `xxxxxxxx` is the region name.

  L - `xxxxxxxx`
  : Local DL/I batch or CICS local DL/I job using the same IRLM, where `xxxxxxxx` is the name of the job or started task.

  S - `xxxxxxxx`
  : IMS internal process, where `xxxxxxxx` is the internal task field name; for example, XFP for Fast Path internal task.

  X - `xxxxxxxx`
  : Online or batch IMS on a partner IRLM, where `xxxxxxxx` is the subsystem ID of an online IMS or the name of the job or started task for a batch IMS.

  X - UNKNOWN
  : Holder is not known to this IRLM, because it is identified to another IRLM.

LOCK

Resource waited on or held.

DATABASE

Database name.

DCB/AREA

DCB number of a full function DL/I database data set or the area name for a Fast Path DEDB.

F

Fast Path indicator:

blank	Non-Fast Path lock
B	B-lock for share level greater than 2, DS-BUSY, DATASET, and COMMAND
F	Fast Path lock
N	Non-updatable Fast Path Area lock
P	P-lock for share level greater than 2, EXTEND, and BID

G

Global indicator:

blank	Local lock
G	Global lock

RBA/TYPE

In case of an RID (record lock) or BID (block lock), this field contains an identifier IMS uses to control access to the resource. The rules IMS uses to construct the ID are listed below to help in problem determination.

FP DEDB

The ID is the high-order three bytes of the RBA of the VSAM control interval containing the segment.

FP MSDB

The ID is the address of the segment prefix in the IMS control region's private virtual storage.

Note: This is not an RBA; it is an address that may change each time IMS is started.

HDAM OSAM

The ID is the RBA of the block containing the segment.

Other OSAM

The ID is the RBN of the block containing the segment. In addition, bit 1 (`X'40'`) of the high order byte is turned on.

VSAM ESDS

The ID is the RBA of the VSAM control interval containing the segment.

VSAM KSDS

If the key is four bytes or less, the ID is the actual key. Otherwise, the ID is the hashed key, using the algorithm in DFSHASH0.

There are many types of locks to serialize various resources. The most common ones are block lock (BID) and record lock (RID). Block lock is used to serialize the update to a block or CI. Record lock is used to deny access to uncommitted data. In some cases, this service uses resource ID values that do not represent a relative byte address. In these cases, the following text is displayed in place of the actual ID:

COMMAND
: Used for global commands, IDENTIFY to IRLM, or IRLM NOTIFY.

DATASET
: Used at data set open for buffer invalidation notifies.

DS-BUSY
: Data set busy. Used to ensure no CI or CA split during a read.

EXTEND
: Used to serialize a data set extension.

The following locks are Fast Path only:

AREA
: Used by Fast Path to lock an entire area. This is used mostly during /STOP AREA processing and XRF takeovers.

BFROVFL
: Buffer Overflow (Fast Path only). This is used when a region has to use the overflow buffers (OBA parameter). IMS allows only one region at a time to use the overflow buffers, so it uses program isolation to serialize the process.

DUMMY
: Force release of all global locks.

NONDBRC
: Database is not registered with DBRC.

STATE
: State of the lock.

CUR
: Current state of the lock.

REQ
: State of the lock requested by this region, which can be:

EXC	Exclusive
RO	Read-only
SHR	Share
UNK	Unknown (lock state in transition)
UPD	Update

WAITING FOR
: Time this region has been waiting for a lock held by another region. It also identifies the locked resource (see LOCK description) this region is waiting for, the lock state (see STATE description), and a count (see COUNT description) of the holders of that resource. If there is a lock, it is highlighted in red. If the region is not waiting for a lock, this area of the display is not shown.

```
Area 3

----------LOCK----------------  -STATE-  --COUNT--
DATABASE DCB/AREA RBA/TYPE F G  CUR REQ  HOLD WAIT
:
------HOLDING----------------------------------------LONGEST WAITER---MINUTES--
CUSTHDAM        1 00002000 F G  SHR SHR    10    1   003-IMSMSG03        34.5
******************************** END OF DATA ***************************
```

This area shows the locked resources held by a region, the lock state, a total count of the lock's concurrent holders or waiters, and the waiters for those locked resources. The descriptions are arranged in alphabetical order.

HOLDING

Shows a scrollable list of the locked resources, as described for “Area 2” above (see LOCK, STATE, and COUNT), held by this region. The locked resources are displayed in alphabetical order.

LONGEST WAITER

Identifies the waiter waiting the longest time for that locked resource. The waiter is identified as:

Note: For IRLM 2.1 and later, MVIMS shows only waiters on IMSs identified to the same IRLM as the target IMS. This is because each IRLM in the sharing group does not have information about waiters using other IRLMs.

`*nnn - xxxxxxxx`	Online IMS region of another local IMS using the same IRLM, where to another IMS, nnn is the region number, and `xxxxxxxx` is the region name.
`nnn - xxxxxxxx`	Online IMS region of the target IMS, where `nnn` is the region number and `xxxxxxxx` is the region name.
L - `xxxxxxxx`	Local DL/I batch or CICS local DL/I job using the same IRLM, where `xxxxxxxx` is the name of the job or started task.
S - `xxxxxxxx`	IMS internal process, where `xxxxxxxx` is the internal task field name; for example, XFP for Fast Path internal task.
X - `xxxxxxxx`	Online or batch IMS on a partner IRLM, where `xxxxxxxx` is the subsystem ID of an online IMS or the name of the job or started task for a batch IMS.

MINUTES

Wait time of the oldest waiter for a lock held by the region. This does not include waiters identified to a different IRLM.

Chapter 17. WORKLOAD ANALYZER Displays (Quick Reference)

The following table shows the service select code and parameters for the Workload Analyzer displays of terminal, transaction, and user status and the workload wait services. It also lists the page where you can find a complete description of each service.

Table 4. Workload Analyzer Display Service Select Codes

Service Select Code	Parameter	See
DWAIT	[parm] {FORMAT=%|#} {FLOWCOMP=IC| IQ|OQ|OC| SC|AP|SP| COMP|ALL} {TRANS=ACTIVE|ALL }	Chapter 22, “Requesting Workload Wait Data Collection (MWAIT)” on page 439 DWAIT displays data collected by a corresponding MWAIT request. For a description of the keyword parameters that can be used with an MWAIT request, see Table 5 on page 442. Chapter 23, “Requesting Workload Wait Data Display (DWAIT)” on page 449 Chapter 24, “DWAIT - Workload Wait Display” on page 451
ISTAT	[LTERM|LT=name| ID=name| START=name]	Chapter 18, “ISTAT - Terminal Input Status Display” on page 401
OSTAT	[,LTERM|LT=name| ,ID=userid| ,START=name| ,COUNT>n| ,SEV1|SEV2| ,NONZERO|NZ]	Chapter 19, “OSTAT - Terminal Output Status Display” on page 413

Table 4. Workload Analyzer Display Service Select Codes (continued)

Service Select Code	Parameter	See

TRANQ	`[,START=name|`
	`,TRAN=name|`
	`,SEV1|SEV2|`
	`,SSQ|`
		Chapter 20, “TRANQ - Transaction Queue Status Display” on page 425

USER	`[,SORT|SO=cc`
	`,L=value|`
	`,USERID=id|`
	`,USER=user|`
	`,TRAN=trancode|`
	`,LTERM=lterm|`
	`,NODE=id|`
	`,NALLOC|`
	`,ALLOC|`
	`,DEADQ|`
	`,CONV|`
	`,HELD|`
	`,PRST|`
	`,STOP|`
	`,EXCL|`
	`,TST|`
	`,XON|`
	`,DYN|`
	`,STATIC|`
	`,RESP|`
	`,RESPINP=id|`
	`,NZ|`
	`,QCT>nnn]`
		Chapter 21, “USER - User Status Summary” on page 433

Chapter 18. ISTAT - Terminal Input Status Display

```
BMC SOFTWARE  ------------- TERMINAL INPUT STATUS   -----------PERFORMANCE MGMT
  SERV ==> ISTAT  INPUT    14:40:23  INTVL=> 3  LOG=> N  TGT==> IMSA
  PARM ==> BOLD10
   LTERM               NODE           LAST
   NAME     USER-ID  LINE/PTERM     TRAN/DEST    TERMINAL STATUS
  A1QAAI1A   NONE      NONE                   TERMINAL IS NOT ALLOCATED
  A1QAAO1A   NONE      NONE                   TERMINAL IS NOT ALLOCATED
  A1QBBI1A   NONE      NONE                   TERMINAL IS NOT ALLOCATED
  A1QBBO1A   NONE      NONE                   TERMINAL IS NOT ALLOCATED
  A1QCCI1A   NONE      NONE                   TERMINAL IS NOT ALLOCATED
  A1QCCO1A   NONE      NONE                   TERMINAL IS NOT ALLOCATED
  A1QDDI1A   NONE      NONE                   TERMINAL IS NOT ALLOCATED
  A1QDDO1A   NONE      NONE                   TERMINAL IS NOT ALLOCATED
  A1QEEI1A   NONE      NONE                   TERMINAL IS NOT ALLOCATED
  A1QEEO1A   NONE      NONE                   TERMINAL IS NOT ALLOCATED
  A1QFFI1A   NONE      NONE                   TERMINAL IS NOT ALLOCATED
  A1QFFO1A   NONE      NONE                   TERMINAL IS NOT ALLOCATED
  A1QGGI1A   NONE      NONE                   TERMINAL IS NOT ALLOCATED
  A1QGGO1A   NONE      NONE                   TERMINAL IS NOT ALLOCATED
  A1QHHI1A   NONE      NONE                   TERMINAL IS NOT ALLOCATED
  A1QHHO1A   NONE      NONE                   TERMINAL IS NOT ALLOCATED
  BOLD0      NONE     BOLD0          NONE    TERMINAL IS NOT CONNECTED
  BOLD1      NONE     BOLD1          NONE    TERMINAL IS NOT CONNECTED
  BOLD10     NONE     BOLD10         NONE    TERMINAL IS NOT CONNECTED
```

Description: The terminal input status display shows the input status of terminals in IMS. It can also show the number of transactions still in the input queue from any IMS terminal.

Note: For dynamic terminals created by the Extended Terminal Option (ETO):

ISTAT may not show the dynamic terminals immediately.

LTERMs are organized by a hashing algorithm. MVIMS and MAINVIEW AutoOPERATOR services present LTERMs and nodes alphabetically. To do this, they use an index table to sort them. The table is refreshed according to a specified refresh interval and only when LTERM/node displays are requested. The default refresh interval is 10 seconds. If the time since the last refresh is greater than 10 seconds, the table is updated. Service requests that occur prior to interval expiration do not show dynamic terminals created during the interval.

The refresh interval determines how soon dynamic terminals are displayed by ISTAT. Short refresh intervals allow them to be displayed sooner, but they may consume more resources because the table is updated more frequently. Longer refresh intervals may consume less resources, but they may delay the display of recently created dynamic terminals. The amount of resources consumed by sorting depends on the size of your site's terminal network. To change the refresh interval, use the CBSINTVL parameter in

BBPARM member BBIISP00. The new value takes effect when the BBI-SS PAS restarts.

By default, the index table uses 200K of BBI-SS PAS extended private area storage. You can use the CBSORTSZ in BBPARM member BBIISP00 to change this value. Each terminal entry requires 12 bytes (8 bytes for the terminal ID and 4 bytes for the address of either the CNT or the CLB control block).

Select Code: ISTAT

Parameter: The following parameters can be used with this service:

ID
: Enter an 8-character user ID or a qualified user ID; for example, ISTAT displays only those terminals that have a matching user ID.

LTERM|LT
: Enter an 8-character LTERM name or a qualified name. ISTAT displays only those terminals that have a matching name, for example LTERM=A*.

START
: Enter a starting LTERM to page through LTERMs starting with a particular LTERM, for example START=PAY+.

Scrolling: The START= field in the ISTAT display contains the name of the first terminal in the next list to be displayed. Use this field to scroll through the list either forward or backward. Entering A1QFFI1A puts that terminal name at the top of the next displayed list.

Pressing ENTER repetitively scrolls forward a page at a time. For example, if the START= field is BOLD10 as shown in the sample display above, pressing ENTER puts BOLD10 at the top of the next list of displayed terminal names.

To scroll to another place on the list, enter the name of a terminal in the START= field. The * qualifier can be used to indicate a generic terminal name. For example, enter A* to scroll to the beginning of the list.

Field Descriptions: Each of the display fields is described below. The descriptions are arranged in alphabetical order.

LAST TRAN/DEST
: This is the last transaction input from this terminal or the preset destination.

LTERM NAME
: The LTERM name of the terminal. The LTERMs are listed in alphabetical order.

NODE LINE/PTERM
: This is the node name if the terminal is a VTAM device. If it is a BTAM device, it is the line and PTERM number.

TERMINAL STATUS

This the status of the LTERM for inbound traffic (see "Input LTERM Status" on page 404 below).

USER-ID

The user ID signed on to the terminal, if this level of security is implemented.

Note: The user ID displayed is the security user ID, not the ETO structure name (SPQB).

Input LTERM Status

Terminals that are defined to IMS as input terminals can be in any one of a large number of states. The ISTAT service tests the input status of a terminal in a predefined sequence so that the most critical information is always displayed. If special conditions are not found, the message returned is:

TERMINAL IS AOK.

The following status messages are possible. They are arranged in alphabetical order for easy reference.

- **ASYNC ERR MSG IN PROCESS**

  For an LU6 session, the error message FMH is being sent.

- **BIND RECEIVED/SCHEDULED**

  IMS has received a request from the other LU6 half-session or IMS is attempting to establish a session.

- **BIND SENT**

  IMS has sent a BIND on this LU6 session.

- **BIS RECEIVED/SCHEDULED**

  IMS asked the other LU6 half-session to stop initiating new brackets and the partner has agreed to stop or vice versa.

- **BIS SENT**

  IMS has informed the other LU6 half-session that IMS will stop initiating new brackets on this session.

- **CANCEL RECEIVED/SCHEDULED**

  IMS has received a request from the other LU6 half-session partner to cancel the input in progress or vice versa.

- **/CHE DUMPQ QUIESCE ENTERED**

  IMS is shutting down as the result of a CHE DUMPQ QUIESCE command.

- **/CHE PURGE IN PROGRESS**

  IMS is shutting down as the result of a /CHE PURGE command.

- **/CHE FREEZE QUIESCE ENTERED**

  IMS is shutting down as the result of a /CHE FREEZE QUIESCE command.

- **/CHE DUMP QUEUES IN PROGRESS**

  IMS is shutting down as the result of a /CHE DUMPQ command.

- **/CHE PURGE QUIESCE ENTERED**

  IMS is shutting down as the result of a /CHE PURGE QUIESCE command.

- **CLEAR SENT**

  IMS has sent a CLEAR on this LU6 session.

- **CLOSE VTAM ACB PENDING**

  The IMS ACB is being closed so no communications using VTAM is possible. The non-VTAM terminals should work normally.

- **CLSDST REQUESTED**

  This terminal is requesting to terminate its session with IMS. This node will be disconnected.

- **CONTROL REGION IS ABENDING**

  IMS is shutting down as a result of an ABEND.

- **CONVERSATION HELD**

  The terminal has had a /HOLD command issued to suspend and save a conversation. Conversation will be resumed (/RELEASE command) or terminated (/EXIT command), sometime later.

- **DEQUE PURGE IN PROGRESS**

  The terminal has had a /DEQUEUE LINE or NODE PURGE command issued for it. All output will be cancelled.

- **/DEQUEUE PURGE ISSUED LTERM**

  The LTERM has had a /DEQUEUE LTERM PURGE command issued for it. All output will be cancelled.

- **DESTINATION NOT FOUND**

  The last input from this terminal was not a valid message switch, transaction code, or command.

- **DISCONNECT ALL LINES**

  IMS is shutting down all lines.

- **DO NOT SEND QUEUED MSG**

  The line or node associated with this LTERM has been /PSTOPped.

- **DYNAMIC TERMINAL NOT ALLOCATED**

  This terminal was created dynamically by ETO and is not allocated to a node. This can occur under several circumstances; for example:

  – Output was sent to this LTERM and ETO created the LTERM and user structure but not the node. If a node cannot be or is not created and allocated to this LTERM, messages are categorized as dead letters.

  – A user logged off the system, either intentionally or through a network failure, and the status was such that the user structure and LTERM could not be deleted. This can occur, for example, if there are messages still queued to the LTERM or the user has an active conversation.

- **ECHO CURRENT INPUT**

  IMS echoes back whatever is received from this terminal. A /TEST command causes IMS to echo everything from the terminal until a /END command is entered.

- **ERROR FOUND ON LAST INPUT SEG**

  The last input from this terminal resulted in an error message.

- **/EXCL ISSUED FOR TERMINAL**

  The terminal is in EXCLUSIVE mode. The terminal has been placed in EXCLUSIVE mode using the /EXCL command. The terminal remains in EXCLUSIVE mode until a /END is issued.

- **FATAL ERP**

  IMS has received or is scheduling an UNBIND to send on this LU6 ISC session.

- **/IDLE COMMAND**

  The terminal has had a /IDLE LINE x PTERM y command issued for it. All input and output is terminated. The system is in shutdown.

- **/IDLE WITHOUT SHUTDOWN**

  The terminal has had a /IDLE LINE x PTERM y NOSHUT command issued for it. All input and output is terminated. The terminal remains in IDLE until it is restarted.

- **IMS SHUTDOWN IN PROGRESS**

  IMS is shutting down.

- **IMS SHUTDOWN MSG BEING SENT**

  IMS is shutting down. A shutdown message has been sent to this terminal.

- **INBOUND RU DID NOT REQ DR1 RESP**

  The last input from this terminal did not request a DR1 response.

- **INBOUND RU REQUESTED DR2 RESP**

  The last input from this terminal requested a DR2 response.

- **INBOUND RU REQUESTED EXCP/DRX**

  The last input from this terminal requested exception DRx response only.

- **IN BRACKETS**

  This LU6 session is in the in-bracket state.

- **INPUT STOPPED ON THIS LINE**

  The terminal has had a /STOP LINE or NODE command issued against it. IMS will not accept input until a /START command is issued.

- **I/O ERROR OCCURRED ON QUEUE**

  Some of the messages queued to this terminal are unavailable for transmission because I/O errors have occurred on one or more of the queue data sets.

- **I/O POOL SHORT ON STORAGE**

  IMS is low on pool space.

- **IWAIT FOR POST=SCHED SEND**

  This LU6 terminal is in an IMS wait for the VTAM notification that a SEND has been initiated.

- **/LOCK ISSUED FOR TERMINAL**

  The terminal is LOCKed. The remote terminal user has locked the terminal using the /LOCK NODE or PTERM command. IMS does not receive and send messages to a terminal that is LOCKed; however, IMS continues to queue output traffic to a terminal in this state.

- **/LOOPTEST IN PROGRESS**

  The terminal has had a /LOOPTEST LINE x PTERM y command issued for it. The terminal is in an output write loop that continues until a /END command terminates the looptest mode.

- **LOOPTEST IS PENDING**

  The terminal has had a /LOOPTEST LINE x PTERM y command issued for it. The terminal is in an output write loop that continues until a /END command terminates the looptest mode.

- **LOST TERM**

  The IMS lost terminal exit was entered for this terminal because of the loss of communications with the terminal.

- **LTERM HAS PAGED MSG IN PROCESS**

  This LTERM is looking at a multi-page output message. The user may get to the end of the message or next message by using the PA1 and PA2 keys.

- **LTERM LOCKED FROM /LOCK**

  The LTERM is LOCKed. The remote terminal user has locked the terminal using the /LOCK LTERM command or the MTO has issued the /LOCK LTERM x. IMS does not receive and send messages to an LTERM that is LOCKed; however, IMS continues to queue output traffic to a terminal in this state.

- **MSC INVALID BLOCK**

  An invalid block has been received from the MSC partner.

- **NSPE CLEANUP RU**

  The IMS lost terminal exit was entered for this terminal to allow IMS to cleanup after a procedure error.

- **NSPE NOTIFY RU**

  The IMS lost terminal exit was entered for this terminal to inform IMS that a procedure error has occurred between VTAM and the terminal.

- **NSPE PROCEDURE ERROR RU**

  The IMS lost terminal exit was entered for this terminal to inform IMS that a procedure error has occurred between IMS and VTAM.

- **OUTPUT ONLY TERMINAL**

  This terminal is for output only. No input is possible from this device.

- **PARTNERS SEQ NO. ARE AVAILBLE**

  The sequence numbers used by the LU6 session partner are known to IMS session recovery is possible.

- **PROTECT FOR INPUT**

  No output will be sent to this terminal, because it is PROTECTED. Input is expected by IMS.

- **QRI REPONSE REQUIRED**

  IMS must notify the other half of this LU6 half-session that a response is queued.

- **QUEUE ERROR WITH SYSMSG**

  For LU6 sessions, an I/O error on the IMS queues is the cause of the SYSMSG FMH that was sent to the partner half-session.

- **QUEUING IS STOPPED**

  The terminal is stopped for queueing. No output will be queued for this device.

- **/QUIESCE ISSUED**

  The node associated with this LU6 session has been /QUIesced by the MTO.

- **RECOVERY REQUEST ON THIS NODE**

  For IMS SLU type P sessions (LU 0), IMS is attempting to resync the session after protocol errors occurred.

- **REJECT IF NOT INQUIRY TRAN**

  Terminal has been SYSGENed as non-checking and, therefore, inquiry-only. Update transactions are not allowed from this terminal.

- **RESPONSE OWED FOR BID**

  IMS has received a BID from this terminal and must send a response back to it.

- **RESPONSE OWED FOR BIS**

  IMS has received a bracket initiation stopped (BIS) from this terminal and must send a response back to it.

- **RESPONSE OWED FOR CANCEL**

  IMS has received a CANCEL from this terminal and must send a response back to it.

- **RESPONSE OWED FOR CHASE**

  IMS has received a CHASE from this terminal and must send a response back to it.

- **RESPONSE OWED FOR DATA**

  IMS has received data from this terminal and must send a response back to it.

- **RESPONSE OWED FOR LUS**

  IMS has received an LUS (LU status) from this terminal and must send a response back to it.

- **RESPONSE OWED FOR RTR**

  IMS has received a ready to receive (RTR) from this terminal and must send a response back to it.

- **RESTART RECEIVED/SCHEDULED**

  IMS is in the process of attempting to re-establish an LU6 session or the other half-session is attempting to restart the session with IMS.

- **RPLS CREATED AND INITIALIZED**

  The SNA control blocks for this LU6 session have been acquired and set up for communication on this session.

- **SBI RECEIVED/SCHEDULED**

  IMS has been asked by the other LU6 half-session partner to stop initiating new brackets or IMS has requested cessation of brackets.

- **SCHED/STACK LOGON**

  IMS has been asked to issue an open destination to this terminal.

- **SCHEDULE CANCEL**

  For LU6 sessions, a CANCEL FMH must be sent.

- **SDT RECEIVED/SCHEDULED**

  The other LU6 half-session partner has given the go ahead to start data traffic on the session or vice versa.

- **SDT SENT**

  IMS has requested that data traffic commence on this LU6 session.

- **SECONDARY HS FLAG**

  IMS is the secondary LU on this LU6 session.

- **SEL DSP - NO DYNAMIC SAPS**

  IMS is out of dynamic SAPs. The system has entered selective dispatching and only selective IMS communications work will be dispatched.

- **SIMLOGON REQUESTED**

  The other LU6 half-session is requesting to logon to IMS.

- **SNA NODE SENT QUIESCE**

  This terminal is requesting to terminate its session with IMS. This node will be disconnected.

- **SPECIAL IN-RCV-MODE FLAG**

  The LU6 session is waiting for specific protocol input from the partner half-session.

- **/STA DC NOT PERFORMED**

  The IMS ACB is not open so IMS can not communicate using VTAM. The non-VTAM terminals should work normally. If a /STA DC is done, the VTAM terminal should become available.

- **STSN SENT**

  IMS has sent a STSN on this LU6 session.

- **STSN RECEIVED/SCHEDULED**

  During the processing of traffic on this LU6 session, IMS has received a sequence number establishment request from the other half-session partner or vice versa.

- **SYSTEM NOT ACCEPTING LOGONS**

  IMS is not currently accepting logons so LOGON and /OPN commands do not work.

- **SYSTEM SHUT QUIESCE MSG RGN**

  IMS is shutting down; message regions are being quiesced.

- **SYSTEM SHUT STOP INPUT**

  IMS is shutting down; input has been stopped.

- **SYSTEM SHUT TERM MSG RGNS**

  IMS is shutting down; message regions are being terminated.

- **SYSTEM SHUTDOWN PENDING**

  IMS is shutting down; no more input is allowed from the terminal.

- **TERMINAL IN BRACKETS**

  This terminal is in the in-bracket state.

- **TERMINAL IN NOBB STATE**

  The LU6 session has no outstanding begin bracket.

- **TERMINAL IN RECEIVE MODE**

  IMS is in the process of receiving input on this LU6 session.

- **TERMINAL IN SEND MODE**

  IMS is in the process of sending output on this LU6 session.

- **TERMINAL IS AOK**

  The terminal has no detected status problems. It should be working normally.

- **TERMINAL IS AWAITING RESPONSE**

  This terminal has sent input to IMS and is waiting for acknowledgement. The terminal is defined as FORCRESP or TRANRESP, or a Fast Path transaction was entered.

- **TERMINAL IS IN A CONVERSATION**

  The terminal has entered a conversational transaction and is currently in the middle of that conversation.

- **TERMINAL IS INOPERABLE**

  The associated physical terminal is inoperable. IMS has detected some problem with the terminal and marked it inoperable; however, IMS continues to queue output traffic to a terminal in this state.

- **TERMINAL IS NOT ALLOCATED**

  The terminal is not allocated. This is a VTAM subpool LTERM that is subject to dynamic allocation and is not currently in session. The node and the user ID will both be set to NONE.

- **TERMINAL IS NOT CONNECTED**

  The terminal is not connected to IMS. The user may log on a VTAM terminal using LOGON APPLID(IMS), or the MTO can issue a /OPN NODE xxxx, or if a dial-up terminal, the user may call in to IMS.

- **TERMINAL IS STOPPED FOR INPUT**

  The terminal has had a /STOP LINE or NODE command issued against it. No input will be received by IMS until a /START command is issued.

- **TERMINAL IS WAITING FOR RESP**

  This terminal has sent input to IMS for a response mode transaction. IMS has not responded and so the LTERM remains unavailable.

- **TERMINAL NOT SIGNED ON**

  This terminal requires that the operator sign on before using it. The operator should do a /SIGN command.

- **/TEST ISSUED FOR TERMINAL**

  The terminal is in TEST. The terminal has been placed in TEST using the /TEST command. The TERMINAL will remain in TEST until a /END is issued.

- **THIS LINE IS INACTIVE**

  The line or node associated with this LTERM is inactive, because a session never started or there are no messages queued.

- **TPEND HALT CANCEL PENDING**

  VTAM is being shut down so IMS cannot communicate using VTAM. The non-VTAM terminals should work normally.

- **TPEND HALT NON-QUICK PENDING**

  VTAM is being shut down so IMS cannot communicate using VTAM. The non-VTAM terminals should work normally.

- **TPEND HALT QUICK PENDING**

  VTAM is being shut down so IMS cannot communicate using VTAM. The non-VTAM terminals should work normally.

- **UNBIND RECEIVED**

  This is a VTAM terminal that has sent an UNBIND to IMS. The terminal is disconnected from IMS. To get the terminal back, the MTO may issue a /OPN command or the terminal may log on again.

- **UNBIND RECEIVED/SCHEDULED**

  IMS has received or is scheduling an UNBIND to send on this LU6 half-session.

- **UNBIND SENT**

  This terminal is terminating its session with IMS. This node will be disconnected.

- **VTAM ACB NOT OPEN**

  The IMS ACB is not open so IMS can not communicate using VTAM. The non-VTAM terminals should work normally.

- **WAIT FOR LUS-ABORT**

  The LU6 session is in the process of being ABORTed. IMS is waiting for the LU ABORT status FMH.

- **WAIT FOR POOL SPACE - MFSP**

  This terminal is waiting for space to be freed in pool MFSP before IMS can continue servicing it.

- **WAIT FOR POOL SPACE - I/OP**

  This terminal is waiting for space to be freed in pool I/OP (CIOP) before IMS can continue servicing it.

- **WAITING FOR LOSTERM**

  IMS has lost communications with this VTAM terminal and is waiting for VTAM to invoke the lost terminal exit.

- **WE SPEAK FIRST**

  For this LU6 session, IMS is the primary half-session.

Chapter 19. OSTAT - Terminal Output Status Display

```
BMC SOFTWARE  ------------- TERMINAL OUTPUT STATUS  -----------PERFORMANCE
MGMT  SERV ==> OSTAT  INPUT    14:40:23  INTVL=> 3  LOG=> N  TGT==> IMSA  PARM
==> BOLD1   IMS-VTAM INTERFACE NORMAL  IMS STATUS NORMAL  -LTERM-- -SIGNON-
NODE/SP  TERM  OUTPUT   LAST  --NAME-- ---ID--- LN#/PTRM TYPE   MSG # TRN/DEST
TERMINAL STATUS---------------  A1QAAI1A   L1WA1I01 SUBPL      0    TERMINAL
IS NOT ALLOCATED  A1QAAO1A    L1WA1O01 SUBPL  0    TERMINAL IS NOT ALLOCATED
A1QBBI1A          L1WA1I02 SUBPL      0          TERMINAL IS NOT ALLOCATED
A1QBBO1A          L1WA1O02 SUBPL      0          TERMINAL IS NOT ALLOCATED
A1QCCI1A          L1WA1I03 SUBPL      0          TERMINAL IS NOT ALLOCATED
A1QCCO1A          L1WA1O03 SUBPL      0          TERMINAL IS NOT ALLOCATED
A1QDDI1A          L1WA1I04 SUBPL      0          TERMINAL IS NOT ALLOCATED
A1QDDO1A          L1WA1O04 SUBPL      0          TERMINAL IS NOT ALLOCATED
A1QEEI1A          L1WA1I05 SUBPL      0          TERMINAL IS NOT ALLOCATED
A1QEEO1A          L1WA1O05 SUBPL      0          TERMINAL IS NOT ALLOCATED
A1QFFI1A          L1WA1I06 SUBPL      0          TERMINAL IS NOT ALLOCATED
A1QFFO1A          L1WA1O06 SUBPL      0          TERMINAL IS NOT ALLOCATED
A1QGGI1A          L1WA1I07 SUBPL      0          TERMINAL IS NOT ALLOCATED
A1QGGO1A          L1WA1O07 SUBPL      0          TERMINAL IS NOT ALLOCATED
A1QHHI1A          L1WA1I08 SUBPL      0          TERMINAL IS NOT ALLOCATED
A1QHHO1A          L1WA1O08 SUBPL      0          TERMINAL IS NOT ALLOCATED
BOLD0             BOLD0    3270V      0          TERMINAL IS INOPERABLE
```

Description: The terminal output status display shows the status of terminals in IMS with outbound messages. It can also show the number of messages still in the output queue destined for an IMS terminal.

Note: For dynamic terminals created by the Extended Terminal Option (ETO):

OSTAT may not show the dynamic terminals immediately.

LTERMs are organized by a hashing algorithm. MVIMS and MAINVIEW AutoOPERATOR services present LTERMs and nodes alphabetically. To do this, they use an index table to sort them. The table is refreshed according to a specified refresh interval and only when LTERM/node displays are requested. The default refresh interval is 10 seconds. If the time since the last refresh is greater than 10 seconds, the table is updated. Service requests that occur prior to interval expiration do not show dynamic terminals created during the interval.

The refresh interval determines how soon dynamic terminals are displayed by OSTAT. Short refresh intervals allow them to be displayed sooner, but they may consume more resources because the table is updated more frequently. Longer refresh intervals may consume less resources, but they may delay the display of recently created dynamic terminals. The amount of resources consumed by sorting depends on the size of your site's terminal network. To

change the refresh interval, use the CBSINTVL parameter in BBPARM member BBIISP00. The new value takes effect when the BBI-SS PAS restarts.

By default, the index table uses 200K of BBI-SS PAS extended private area storage. You can use the CBSORTSZ in BBPARM member BBIISP00 to change this value. Each terminal entry requires 12 bytes (8 bytes for the terminal ID and 4 bytes for the address of either the CNT or the CLB control block).

Select Code: OSTAT

Parameter: The following parameters can be used with this service. Multiple parameters must be separated by a comma (,).

COUNT>n

Where n specifies the number of messages queued. This keyword is used to display only those transactions that have more messages queued than the number specified for COUNT; for example:

```
COUNT>5.
```

Only transactions having more than five queued messages are displayed.

ID

Enter an 8-character user ID or a qualified user ID. OSTAT displays only those terminals that have a matching user ID, for example `ID=U++D`.

LTERM|LT

Enter an 8-character LTERM name or a qualified name. OSTAT displays only those terminals that have a matching name, for example `LTERM=A1Q*`.

NONZERO|NZ

This keyword can be used to display only LTERMs with one or more messages queued for them. The format of this type of request is:

```
LTERM=L*,NONZERO.
```

This example shows all LTERMs whose name begins with L and that have a message queued for output.

SEV1|SEV2
: Shows only those terminals with the specified status; for example:

```
SEV1
```

Shows only terminals with SEV1 status.

START
: Enter a starting LTERM to page through LTERMs starting with a particular LTERM, for example `START=BOLD0`.

Scrolling: The `START=` field in the OSTAT display contains the name of the first terminal in the next list to be displayed. Use this field to scroll through the list either forward or backward. Entering A1QFFO1A, for example, puts that terminal name at the top of the next displayed list.

Pressing ENTER repetitively scrolls forward a page at a time. For example, if the `START=` field is BOLD1 as shown in the sample display above, pressing ENTER puts BOLD1 at the top of the next list of displayed terminal names.

To scroll to another place on the list, enter the name of a terminal in the `START=` field. A * qualifier can be used to indicate a generic terminal name. For example, enter A* to scroll to the beginning of the list.

Field Descriptions: Each of the fields is shown and described below by display area.

```
Area 1:   Line 5 of the OSTAT Display

IMS-VTAM INTERFACE NORMAL          IMS STATUS NORMAL
```

This area shows the status of the IMS-VTAM interface and IMS DC status. The descriptions are arranged in alphabetical order.

The IMS-VTAM interface status is shown in the left column. Possible statuses include:

- **CLOSE VTAM ACB PENDING**

  IMS VTAM ACB is being closed or is pending. IMS VTAM communication is impossible.

- **IMS-VTAM INTERFACE IS NORMAL**

  The IMS-VTAM interface status is normal.

- **SYSTEM NOT ACCEPTING LOGONS**

  IMS is not accepting LOGON or /OPNDST.

- **TPEND HALT CANCEL PENDING**

  Z NET,CANCEL for VTAM shutdown is pending and IMS VTAM communication is impossible.

- **TPEND HALT NON-QUICK PENDING**

  Z NET for VTAM shutdown is pending and IMS VTAM communication is impossible.

- **TPEND HALT QUICK PENDING**

  Z NET,QUICK for VTAM shutdown is pending and IMS VTAM communication is impossible.

- **VTAM ACB NOT OPEN**

  IMS VTAM ACB is not open and IMS VTAM communication is impossible.

The IMS DC status is shown in the right column of this area. Possible statuses include:

- **/CHE DUMP QUEUES IN PROGRESS**

  IMS is shutting down and /CHE DUMPQ is in progress.

- **/CHE DUMPQ QUIESCE ENTERED**

  /CHE DUMPQ QUIESCE was entered. IMS is preparing for shutdown.

- **/CHE FREEZE QUIESCE ENTERED**

  /CHE FREEZE QUIESCE was entered. IMS is preparing for shutdown.

- **/CHE PURGE IN PROGRESS**

  IMS is shutting down and /CHE PURGE is in progress.

- **/CHE PURGE QUIESCE ENTERED**

  /CHE PURGE QUIESCE was entered. IMS is preparing for shutdown.

- **CIOP POOL SHORT ON STORAGE**

  IMS is in selective dispatching because of CIOP pool shortage.

- **CONTROL REGION IS ABENDING**

  IMS is abending.

- **DISCONNECT ALL LINES**

  IMS is shutting down and disconnecting all lines.

- **IMS SHUTDOWN IN PROGRESS**

  IMS is shutting down and /CHE FREEZE is in progress.

- **IMS STATUS NORMAL**

  IMS is functioning normally.

- **SEL DSP - NO DYNAMIC SAPS**

  IMS is in selective dispatching because of dynamic SAP shortage.

- **/STA DC NOT PERFORMED**

  /STA DC was not performed. IMS logon is not possible.

- **SYSTEM SHUT - QUIESCE MSG RGN**

  IMS is shutting down and quiescing all MPP regions.

- **SYSTEM SHUT - STOP OUTPUT**

  IMS is shutting down and all message output is stopped.

- **SYSTEM SHUT - TERM MSG RGNS**

  IMS is shutting down and terminating all MPP regions.

- **SYSTEM SHUT - WAITING FOR DC**

  IMS is shutting down and waiting for IMS DC to complete all message output in progress.

```
Area 2:   Line 6 to the end of the OSTAT display

  -LTERM-- -SIGNON- NODE/SP  TERM  OUTPUT   LAST
 --NAME-- ---ID--- LN#/PTRM TYPE   MSG # TRN/DEST TERMINAL STATUS---------------
 A1QAAI1A          L1WA1I01 SUBPL      0          TERMINAL IS NOT ALLOCATED
 A1QAAO1A          L1WA1O01 SUBPL      0          TERMINAL IS NOT ALLOCATED
 A1QBBI1A          L1WA1I02 SUBPL      0          TERMINAL IS NOT ALLOCATED
```

This area shows the IMS LTERMs and their output status. The descriptions are arranged in alphabetical order.

LAST TRN/DEST
: The last input transaction code or preset destination name generated with the /SET command.

LTERM NAME
: The name of the logical terminal (LTERM/CNT).

NODE/SP LN#/PTERM
: The node name if the associated terminal is a VTAM device; the subpool name if the LTERM is part of a subpool and is not allocated yet; the line number and PTERM number if the associated terminal is a BTAM device.

OUTPUT MSG #
: The number of output messages currently queued to this LTERM.

SIGNON ID
: If a /SIGN ON command was entered at the terminal, this is the ID of the user.

  Note: The signon ID is the security user ID, not the ETO user structure name (SPQB).

TERM TYPE
: Device type of the associated terminal as defined in the Stage 1 system generation.

  For unallocated ETO devices, ETO is shown.

TERMINAL STATUS
: See “Output LTERM Status” on page 418.

Output LTERM Status

Workload Analyzer scans all LTERMs for output status and reports the LTERMs that match the user-specified search criteria. OSTAT sorts the LTERM status by severity and reports the most significant ones. If an LTERM passes all checks, the status message is:

```
TERMINAL STATUS NORMAL
```

The following LTERM status messages are listed alphabetically. The severity is shown in parentheses to the left of each message.

SEV1 is the most serious.

SEV2 is less critical.

SEV3 is usually informational only.

- **(SEV2) ASYNC ERR MSG IN PROCESS**

  For an LU6 session, the error message FMH is being sent.

- **(SEV2) CANCEL RECEIVED/SCHEDULED**

  IMS received a request from the other LU6 half-session partner to cancel the input in progress or vice versa.

- **(SEV2) CLB DECB INVALID**

  ECB for line is invalid. This is temporary while IMS is relocating the input message to the message queue.

- **(SEV2) CLSDST REQUESTED**

  This terminal is requesting to terminate its session with IMS. This node will be disconnected.

- **(SEV2) CONVERSATION HELD**

  The terminal had a /HOLD command issued to suspend and save a conversation. Conversation will be resumed (/RELEASE command) or terminated (/EXIT command) sometime later.

- **(SEV2) DEAD LETTER**

  Messages queued to this terminal exceeded the ETO dead letter timeout limit.

- **(SEV2) DEQUEUE COMMAND FOR MSG**

  The message IMS was preparing to send to the terminal was the target of a /DEQ command from the MTO.

- **(SEV2) DEQUEUE PURGE IN PROGRESS**

  The terminal had a /DEQUEUE LINE or NODE PURGE command issued against it. All output is cancelled.

- **(SEV2) /DEQUEUE PURGE ISSUED LTERM**

  A /DEQUEUE LTERM PURGE command was issued for the LTERM. All output is cancelled.

- **(SEV1) DFSCVCLO REQUEST IDLE LINE**

  The IMS LOGON or OPNDST processor (DFSCVCLO module) requests that the line be idled.

- **(SEV1) DO NOT SEND QUEUED MSG**

  The line or node associated with this LTERM was /PSTOPped.

- **(SEV2) DO NOT SEND QUEUED OUTPUT**

  The physical terminal associated with this LTERM is currently in receive mode. IMS will not send queued output to this terminal until input is received. The input can be in the form of a PA1, PA2, another input message, or a PF key.

- **(SEV2) DYNAMIC TERMINAL NOT ALLOCATED**

  This terminal was created dynamically by ETO and is not allocated to a node. This can occur under several circumstances; for example:

  – Output was sent to this LTERM and ETO created the LTERM and user structure but not the node. If a node cannot be or is not created and allocated to this LTERM, messages are categorized as dead letters.

  – A user logged off the system, either intentionally or through a network failure, and the status was such that the user structure and LTERM could not be deleted. This can occur, for example, if there are messages still queued to the LTERM or the user has an active conversation.

- **(SEV1) ERROR ON GET NEXT FOR OUTPUT**

  IMS was preparing an output message for transmission. The first segment of the message was successfully retrieved from the queue, but one of the subsequent segments could not be accessed. This is a temporary error condition. IMS terminated the processing of this message, reset this status message, and marked the LTERM as having a queue error. See the I/O ERROR OCCURRED ON QUEUE message for the subsequent status.

- **(SEV2) FATAL ERP**

  IMS has received or is scheduling an UNBIND for this LU6 ISC session.

- **(SEV1) /IDLE WITHOUT SHUTDOWN**

  The terminal had an /IDLE LINE x PTERM y NOSHUT command issued against it. All input and output is terminated. The terminal remains IDLE until it is restarted.

- **(SEV1) IMS SHUTDOWN MSG BEING SENT**

  IMS is shutting down. A shutdown message was sent to this terminal.

- **(SEV1) I/O ERROR OCCURRED ON QUEUE**

  Some of the messages queued to this terminal are unavailable for transmission because I/O errors occurred on one or more of the queue data sets.

- **(SEV2) INPUT ONLY DEVICE**

  This terminal is INPUT only. No output is possible for this device.

- **(SEV3) INQUIRY ONLY CNT**

  This LTERM is defined as INQUIRY only.

- **(SEV1) /LOCK ISSUED FOR TERMINAL**

  The terminal is LOCKed. The remote terminal user locked the terminal with the /LOCK NODE or PTERM command. IMS does not receive nor send messages to a terminal that is LOCKed; however, it continues queuing output messages to the terminal.

- **(SEV1) /LOOPTEST IN PROGRESS**

  The terminal had a /LOOPTEST LINE x PTERM y command issued against it. The terminal is in an output write loop until an /END command terminates the loop test mode.

- **(SEV1) LOOPTEST IS PENDING**

  The terminal had a /LOOPTEST LINE x PTERM y command issued against it. The terminal will be in an output write loop until an /END command terminates the loop test mode.

- **(SEV2) LOST TERM**

  The IMS lost terminal exit was entered for this terminal because of the loss of communications with the terminal.

- **(SEV2) LTERM HAS PAGED MSG IN PROCESS**

  This LTERM is looking at a multi-page output message. The user can get to the end of the message or next message by using the PA1 and PA2 keys.

- **(SEV1) LTERM LOCKED FROM /LOCK**

  The LTERM is LOCKed. The remote terminal user locked the terminal with the /LOCK LTERM command or the MTO issued the /LOCK LTERM x. IMS does not receive nor send messages to an LTERM that is LOCKed; however, it continues queuing output messages to the terminal.

- **(SEV1) LTERM STOPPED FOR QUEUING**

  The LTERM is STOPped. IMS will no longer queue output messages to this terminal. Messages already queued will not be sent.

- **(SEV1) LTERM STOPPED FOR SENDING**

  The LTERM is PSTOPped. IMS will continue queuing messages to this LTERM, but none will be sent.

- **(SEV2) MSC LCB NOT ALLOCATED**

  LTERM is for MSC (Multiple System Coupling), but the LCB (Link Control Block) has not been allocated to the LTERM yet. Use /START MSNAME to start the link.

- **(SEV3) MSC LINK CNT REMOTE=xxx**

  This LTERM is for MSC (Multiple System Coupling). xxx is its partner SID.

- **(SEV2) NOT READY FOR OUTPUT**

  The associated VTAM node is not ready to accept output. There is at least one message queued to this LTERM, but other asynchronous I/O is already active against the node. IMS will not send the queued output until the node completes its current communication.

- **(SEV1) OUTPUT QUEUING STOPPED**

  The node or line associated with this LTERM was the target of a /STO command. IMS will not queue messages to this LTERM until a /STA NODE or a /STA LINE command is issued.

- **(SEV1) OUTPUT STOPPED ON THIS LINE**

  This line has been stopped for output, but queuing continues.

- **(SEV1) P-LINK NO MORE LOGON**

  This LTERM is for the MSC (Multiple System Coupling) whose physical link is not accepting any more LOGONs.

- **(SEV1) P-LINK NOT OPEN**

  This LTERM is for the MSC (Multiple System Coupling) whose physical link is not yet opened.

- **(SEV1) QUEUE ERROR WITH SYSMSG**

  For LU6 sessions, an I/O error on the IMS queues is the cause of the SYSMSG FMH that was sent to the partner half-session.

- **(SEV1) QUEUING IS STOPPED**

  The terminal is stopped for all message queuing. No output messages will be queued to the terminal.

- **(SEV1) /QUIESCE ISSUED**

  The node associated with this LU6 session was /QUIesced by the MTO.

- **(SEV2) RECOVERY REQUEST ON THIS NODE**

  For IMS SLU type P sessions (LU 0), IMS is attempting to resynchronize the session after protocol errors occurred.

- **(SEV3) REJECT IF NOT INQUIRY TRAN**

  IMS rejects the transaction from this terminal because the transaction was not defined as inquiry only.

- **(SEV3) REMOTE CNT**

  This terminal is a remote-CNT for MSC link.

- **(SEV2) RESTART RECEIVED/SCHEDULED**

  IMS is in the process of attempting to re-establish an LU6 session or the other half-session is attempting to restart the session with IMS.

- **(SEV2) SCHED/STACK LOGON**

  IMS was asked to issue an open destination to this terminal.

- **(SEV2) SCHEDULE CANCEL**

  For LU6 sessions, a CANCEL FMH must be sent.

- **(SEV3) SHARED LTERM**

  This LTERM is defined as a shared terminal.

- **(SEV1) SNA NODE SENT QUIESCE**

  This terminal is requesting to terminate its session with IMS. This node will be disconnected.

- **(SEV3) SUBPOOL CNT**

  This LTERM is part of a subpool.

- **(SEV1) SUBPOOL STOPPED**

  CNT subpool is stopped.

- **(SEV1) SYSTEM SHUTDOWN PENDING**

  IMS is shutting down; no more input is allowed from the terminal.

- **(SEV1) TERMINAL DD EXTENT MISSING**

  An attempt to open a line group failed because the DD extent is missing.

- **(SEV2) TERMINAL IS AWAITING RESPONSE**

  This terminal sent input to IMS and is waiting for acknowledgement. The terminal is defined as FORCRESP or TRANRESP, or a Fast Path transaction was entered.

- **(SEV3) TERMINAL IS IN A CONVERSATION**

  The terminal entered a conversational transaction and is currently in the middle of that conversation.

- **(SEV1) TERMINAL IS INOPERABLE**

  The associated physical terminal is inoperable. IMS detected some problem with the terminal and marked it inoperable; however, IMS continues queuing output messages to the terminal.

- **(SEV2) TERMINAL IS NOT ALLOCATED**

  The terminal is not allocated. This is a VTAM subpool LTERM that is subject to dynamic allocation and is not currently in session. The node and the user ID are both set to NONE.

- **(SEV3) TERMINAL IS NOT CONNECTED**

  The terminal is not connected to IMS. The user can log on a VTAM terminal using the site's LOGON APPLID or the MTO can issue an /OPN NODE xxxx. If the terminal is a dial-up, the user can call in to IMS.

- **(SEV1) TERMINAL IS STOPPED FOR OUTPUT**

  The terminal had a /STOP LINE or NODE command issued against it. No output will be sent by IMS until a /START command is issued.

- **(SEV2) TERMINAL IS WAITING FOR RESP**

  This terminal sent input to IMS for a response-mode transaction. The terminal is not available, because IMS did not respond.

- **(SEV2) TERMINAL NOT SIGNED ON**

  This terminal requires that the operator sign on before using it. The operator should issue a /SIGN ON command, a user ID, and an optional site-dependent password.

- **(SEV1) /TEST ISSUED FOR TERMINAL**

  The terminal was placed in test with the /TEST command. It is in test until /END is issued.

- **(SEV2) THIS LINE IS INACTIVE**

  The line or node associated with this LTERM is inactive, because a session was never started or there are no messages queued.

- **(SEV3) VTAMPOOL CNT**

  This LTERM is defined as part of the VTAM pool to support the LU6 (ISC) session.

- **(SEV2) WAIT FOR LUS-ABORT**

  The LU6 session is in the process of being ABORTed. IMS is waiting for the LU ABORT status FMH.

- **(SEV1) WAITING FOR LOSTERM**

  IMS lost communications with this VTAM terminal and is waiting for VTAM to invoke the lost terminal exit.

- **(SEV2) WAITING FOR L1-LATCH (xxxx)**

  The terminal output ITASK is waiting for Level 1 Latch. xxxx is the name of the latch.

- **(SEV2) WAITING FOR L2-LATCH (xxxx)**

  The terminal output ITASK is waiting for Level 2 Latch. xxxx is the name of the latch.

- **(SEV2) WAITING FOR POOL SPACE (xxxx)**

  The terminal output ITASK is waiting for pool space. xxxx is the name of the pool.

Chapter 20. TRANQ - Transaction Queue Status Display

```
BMC SOFTWARE  -------------- TRANSACTION QUEUE STATUS ----------PERFORMANCE MGMT
 SERV ==> TRANQ   INPUT    14:40:23  INTVL=> 3  LOG=> N  TGT==> IMSA
 PARM ==> THDAMINQ

 TRANCODE  S  COUNT  CLS PR  PSBNAME QLIM PRCL PARL TRANSACTION STATUS
 --------  - ------  --- -- -------- ---- ---- ---- ------------------------------
 DSPALLI   1      0   1   7 DFSSAM07    3  65K    0 PSB IS TP PGM
 DSPINV    1      0   1   7 DFSSAM03    3  65K    0 PSB IS TP PGM
 FPDUMMY   1      0   1   1 DBFDUMMY  65K  65K    0 PSB DIR INIT FAILED
 FPSAMP1   1      0   1   1 DBFSAMP3  28K  65K    0 SMB FASTPATH EXCLUSIVE
 FPSAMP2   1      0   1   1 DBFSAMP4  65K  65K    0 PSB IS TP PGM
 PART      1      0   1   7 DFSSAM02    3  65K    0 PSB IS TP PGM
 STARTR    3      0   1   5 SAG600     10   10    0 PSB DIR INIT FAILED
 TBMP1     1      0   4   0 PBMP1     65K  65K    0 PSB IS BMP PGM
 TBMP1V    1      0   4   0 PBMP1V    65K  65K    0 PSB IS BMP PGM
 TBMP2     1      0   5   0 PBMP2     65K  65K    0 PSB IS BMP PGM
 TCON00    3      0   3   5 PCON00     10   10    0 SMB CONVERSATIONAL
 TCON01    3      0   3   5 PCON01     10   10    0 SMB CONVERSATIONAL
 TDRIVER   1      0   4   0 PDRIVER   65K  65K    0 PSB IS BMP PGM
 TE4CNINQ  1      0   1   1 PE4CNINQ  65K    5    0 PSB IS TP PGM
 TE4COCNG  1      0   1   1 PE4CODEL  65K    5    0 SMB CONVERSATIONAL
 TE4CODEL  1      0   1   1 PE4CODEL  65K    5    0 SMB CONVERSATIONAL
 TE4COINQ  1      0   1   1 PE4COINQ  65K    5    0 PSB IS TP PGM
 TE4CONEW  1      0   1   1 PE4CORDR  65K    5    0 SMB CONVERSATIONAL
```

Description: The transaction queue status display shows the status of transactions in the IMS input queue or scheduler message block (SMB) queues. It also shows the number of transactions in the input queue for any IMS transaction code.

Select Code: TRANQ

Parameter: The following parameters can be used with this service. Multiple parameters must be separated by a comma (,).

COUNT>n

Where n specifies the number of messages queued. This keyword is used to display only those transactions that have more messages queued than the number specified for COUNT; for example:

```
COUNT>5
```

Only transactions having more than five queued messages are displayed.

NONZERO|NZ

This keyword is used to display only transaction codes with one or more messages queued for them. For example:

```
TRAN=A*,NONZERO
```

Displays all transactions beginning with an A character that have messages queued for processing.

SEV1|SEV2

Shows only those transactions with the specified status; for example:

```
SEV1
```

Shows only those transactions with SEV1 status.

SSQ

Shows only those transactions scheduled in a region that is waiting on a subsequence queue.

START

Enter an 8-character transaction code or a qualified transaction code to begin paging through the transaction codes starting with that particular name, for example `START=TE4CONEW`

Note: For dynamic transaction codes, the exact transaction code must be specified.

SUSP

Shows only those transactions that have messages on the suspend queue.

Tuning Tip

Suspended messages are a problem with response mode transactions, because users requesting the transaction code cannot issue any more transactions until their message is removed from the suspend queue.

Messages are typically put on the suspend queue when a transaction attempts to access an unavailable resource such as a database. IMS psuedo-abends the transaction with a U3303 and places the input message on the suspend queue. If the suspend queue becomes too long, IMS puts the transaction into a USTOP status to prevent more transactions from being scheduled. The suspended condition can be cleared by making the resource identified in the DFS3303 message available. For example, if a database is not available because it is stopped, you can clear the suspend condition by starting the database.

TRAN

Enter an 8-character transaction code or a qualified transaction code. TRANQ displays only those transactions that have a matching TRANCODE, for example `TRAN=TE4*.`

TYPE=STAT|DYN

DYN

Shows only the transaction codes created dynamically for explicit APPC transactions.

STAT

Shows only the static transaction codes from the IMS Stage 1 definition (default).

Scrolling: The `START=` field in the TRANQ display contains the first transaction code in the next list of transactions to be displayed. Use this field to scroll through the list either forward or backward. For example, entering BBFTRN19 puts that transaction at the top of the next displayed list.

Pressing ENTER repetitively scrolls forward a page at a time. For example, if the `START=` field is THDAMINQ as shown in the sample display above, pressing ENTER puts that transaction at the top of the next list of displayed transactions.

To scroll to another place on the list enter the name of a transaction in the `START=` field. The * qualifier can be used to indicate a generic transaction code. For example, enter A* to scroll to the beginning of the list.

Field Descriptions: Each of the display fields is described below. The descriptions are arranged in alphabetical order.

CLS
Current class of the SMB (transaction). A remote transaction has a class of 0.

COUNT
Number of messages currently queued to this SMB (transaction).

PARL
The parallel limit is the number of messages that cause a transaction to be scheduled in another MPR region if the SMB (transaction) is defined as PARALLEL CAPABLE. It is defined in the IMS Stage 1 generation by the PARLIM operand of the TRANSACT macro contains `SCHDTYP=SERIAL`.

PR
Current scheduling priority of the SMB (transaction).

PRCL
The process limit is the number of messages that can be processed by a program in a single scheduling. It is defined in the IMS Stage 1 generation by the PROCLIM operand of the TRANSACT macro.

PSBNAME
Name of the program specification block (PSB) whose associated program processes this SMB (transaction).

QLIM

Queue limit count is the count of currently enqueued messages that cause the transaction's scheduling priority to change from normal to limit. The limit is defined in the IMS Stage 1 generation by the PRTY operand of the TRANSACT macro.

S

Transaction scheduling option (same as IMS Stage 1 generation, TRANSACT macro, SCHD parameter). If scheduling of this transaction failed because of an IMS internal reason, then one of the following applies:

1 Schedule transactions of equal or higher priority within the same class. This is the default.

2 Schedule transactions of higher priority within the same class.

3 Schedule any transaction within the same class.

4 Schedule next class of transaction.

TRANCODE

The name of the transaction (SMB) being displayed.

Transaction Status

IMS transactions can be in one of several states. The TRANQ service tests the status of a transaction code in a predefined sequence so that the most critical information is always displayed.

The following status messages are listed in alphabetical order. The status category is listed in parentheses to the left of each message. The status categories are:

- SEV1 SMB (transaction) is unusable. This status is highlighted on the display.
- SSQ Transaction is queued and pending scheduling.
- SEV2 SMB (transaction) has a problem, but is still usable.
- SEV3 SMB (transaction) is normal.

- **(SSQ) BMP WAITING FOR BLOCK LOADER**

  SMB (transaction) is scheduled for a BMP region, but the BMP is waiting in block loader for PSB (program) and/or DMB loading. The block loader can be active for only one region at a time.

  If this status appears consistently, revise your IMS Stage 1 definition (RESIDENT and DOPT options of the APPLCTN macro).

- **(SEV1) DEST(RSMB) Q ERROR (SYSID=XXX)**

  The transaction queued from the SMB is to be sent to another IMS (SYSID=XXX). However, the target SMB has a queue error, so the target IMS cannot process the transaction(s).

- **(SEV1) DO NOT SCHEDULE THIS PSB**

  The PSB (program) defined to process this transaction is stopped and cannot process the transaction(s). Terminal input and queuing are still possible.

  This can be caused by either a /STOP PGM command or a program abend. Use the /START PGM command to re-enable the PSB.

- **(SEV1) DO NOT SCHEDULE THIS SMB**

  The SMB (transaction) has been stopped with the /PSTOP TRAN command. Terminal input and queuing are still possible. Use the /START TRAN command to re-enable the SMB (transaction).

- **(SSQ) MPR WAITING FOR BLOCK LOADER**

  SMB (transaction) is scheduled for an MPP region, but the MPP is waiting in the block loader for PSB (program) and/or DMB loading. The block loader can be active for only one region at a time.

  If this status appears consistently, revise your IMS Stage 1 definition (RESIDENT and DOPT options of the APPLCTN macro).

- **(SEV2) NO MPP SERVING CLASS**

  No message region is assigned to process the class to which this transaction belongs. Either assign the transaction to a class that is being served by a region or assign the class to a new or existing region.

- **(SEV2) NO MPP SERVING CLASS/AGN**

  ISI security is active, but there is no region to serve the application group name to which the transaction code belongs. You should start a message region that is assigned an AGN that includes this transaction code.

- **(SEV1) PSB DIR INIT FAILED**

  The PSB (program) defined to process this transaction could not be initialized at IMS startup and therefore cannot process the transaction(s). Usually this is because the PSB (program) is not in the ACBLIB. Make an online change to switch to a new ACBLIB containing the PSB (program).

- **(SEV3) PSB IS BMP PGM (SCHEDULED)**

  The PSB (program) defined to process this transaction is a BMP program. If SCHEDULED appears, the PSB (program) is loaded and can be scheduled.

- **(SEV1) PSB IS LOCKED**

  The PSB (program) defined to process this transaction was locked by the /LOCK PGM command. Use /UNLOCK PGM to enable the PSB (program) to process transactions.

- **(SEV3) PSB IS TP PGM (SCHEDULED)**

  The PSB (program) defined to process this transaction is an MPP program. If SCHEDULED appears, it means the PSB (program) is loaded and can be scheduled.

- **(SEV3) PSB IS TYPE 3 BATCH (SCHEDULED)**

  The PSB (program) defined to process this transaction is a type 3 batch program. If SCHEDULED appears, it means the PSB (program) is loaded and can be scheduled.

- **(SEV3) REMOTE TRANSACTION (SYSID=XXX)**

  The transaction is sent to another IMS (`SYSID=xxx`) to be processed.

- **(SEV3) SMB CONVERSATIONAL**

  The transaction is conversational.

- **(SEV3) SMB ENQUEUED ON PST**

  The SMB (transaction) is queued on a dependent region (PST) to be processed.

- **(SEV3) SMB ENQUEUED ON TCT**

  The SMB (transaction) is queued on the transaction class table (TCT) waiting to be scheduled.

- **(SEV3) SMB FASTPATH EXCLUSIVE**

  The transaction is Fast Path exclusive.

- **(SEV3) SMB FASTPATH POTENTIAL**

  The transaction is Fast Path potential.

- **(SEV2) SMB IN/WAITING FOR BLK MOVER**

  The SMB (transaction) is scheduled and waiting in the block mover for PSB relocation. The block mover can be active in only one region at a time.

- **(SEV1) SMB LOCKED**

  The SMB (transaction) is locked by the /LOCK TRAN command and cannot be scheduled. Use /UNLOCK TRAN to enable the SMB (transaction) for scheduling.

- **(SEV1) SMB NOT SCHEDULED (MPP,PRI=0)**

  The SMB (transaction) is defined to be an MPP transaction. It is not schedulable, because the priority is 0.

- **(SEV2) SMB PAR LIM REACHED (ZZ9 RGNS)**

  The SMB (transaction) is currently scheduled in ZZ9 regions, but the number of transactions queued exceeds the parallel limit. Therefore it is eligible to be scheduled in another available region.

- **(SEV2) SMB PRIORITY RAISED FROM Z9**

  The number of transactions enqueued on the SMB exceeded the priority limit (QLIM). IMS raised the priority of the SMB from Z9 (normal) to its current priority limit.

- **(SEV2) SMB SCHEDULE IN MAX ZZ9 RGNS**

  The SMB (transaction) is defined to be scheduled concurrently in a maximum of ZZ9 regions and has now reached this limit.

- **(SEV2) SMB SCHEDULED IN ZZ9 REGIONS**

  The SMB (transaction) is currently scheduled in ZZ9 regions.

- **(SEV1) SMB STOPPED FOR QUEUING**

  The SMB (transaction) is stopped. Use /STA TRAN command to start it.

- **(SEV1) SMB STOPPED MSG SENT**

  The SMB (transaction) is stopped and message DFS554I was sent to the IMS MTO, because its associated PSB (program) abended. The PSB (program) is also stopped. Use /START TRAN and /START PGM to restart the transaction.

- **(SEV1) SMB SUSPENDED WAITING**

  The SMB (transaction) is suspended. This can be caused by a resource problem or IRLM or XRF takeover. A probable resource problem is that the database is not available. It is either stopped or locked, or could not be allocated.

  After resolving the cause of the problem, use /START DATABASE to redrive the transactions.

  Note: The MSG-Q-COUNT can be zero even though there is at least one transaction in the SUSPEND queue, because the SUSPEND queue is not part of the normal message queue.

- **(SEV1) SMB USTOPPED - DB NOT AVAIL**

  The SMB (transaction) is U-STOPped and cannot be scheduled, because a database required for the PSB is not available. After resolving the problem, use /START TRAN to re-enable the SMB (transaction) for scheduling.

  For some IMS versions, this status may not show. Instead, you may get SMB SUSPENDED WAITING (see this message definition in this list).

- **(SEV2) SMB WAITING CUTOFF PRIORITY**

  The cutoff priority of the current transaction is lower than the cutoff priority for the current class.

- **UNKNOWN STATUS**

  The status of the SMB (transaction) is unknown.

- **(SSQ) WAITING FOR DMB POOL SPACE**

  DMB pool space is insufficient for IMS to complete SMB (transaction) scheduling. The SMB (transaction) is in a wait queue for retry later. If this status appears consistently, revise your Stage 1 definition, the DFSPRRG0 system options module, and/or the JCL to increase the DMB pool size.

- **(SSQ) WAITING FOR INTENT**

  There is a database intent conflict between this transaction and another currently scheduled transaction. The SMB (transaction) is in a queue waiting for retry later.

- **(SSQ) WAITING FOR PSB POOL SPACE**

  PSB pool space is insufficient for IMS to complete SMB (transaction) scheduling. The SMB (transaction) is in a queue waiting for retry later. If this status appears consistently, revise your Stage 1 definition, the DFSPRRG0 system options module, and/or the JCL to increase the PSB pool size.

- **(SSQ) WAITING FOR PSB WORK POOL**

  PSB work pool space is insufficient for IMS to complete SMB (transaction) scheduling. The SMB (transaction) is in a queue waiting for retry later. If this status appears consistently, revise your Stage 1 definition, the DFSPRRG0 system options module, and/or the JCL to increase the PSB work pool size.

Chapter 21. USER - User Status Summary

```
BMC SOFTWARE  -------------    IMS USER DISPLAY     -----------PERFORMANCE MGMT
SERV ==> USER   INPUT    15:03:43  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> ,SORT=UI                                        ROW 1 OF  3 SCROLL=> CSR
EXPAND:  OSTAT, ISTAT, TRANQ, APPCA

USERID   USER     LTERM    NODE       ENQ  QCT TRAN    AGE  STATUS
-------- -------- -------- -------- ----- --- --------  --  ---------------------
PWW1     PWW1     PWW1     LF05         0   0  PART      0  DYN
PWW3     N/A      USER1    LF04         0   0  N/A       0  STAT
                  USER2                 0   0
******************************** END OF DATA ********************************
```

Description: This display shows summary information for IMS users, both static and dynamic (ETO).

USER displays:

- Status of each user structure and its associated resources
- Security user ID (if available), which can be different from the user structure name for dynamic terminals
- The static users (users signed on to static terminals)

Color: If you have a color monitor, users in exception status (see the XON parameter description) are shown in red.

Select Code: USER

Parameter: All of the USER parameters, except for SORT, act as filters that restrict the information shown according to the criteria specified by the parameter(s). They can be used as follows:

- Multiple parameters must be separated by commas.
- A blank indicates the end of a parameter(s).
- Multiple resources with similar names can be requested by using an * character as a generic qualifier and a + character as a positional qualifier. The positional qualifier is repeated for every character to be replaced. The generic qualifier replaces a group of characters. For example, a parameter of `USERID=AB+D*` shows all USERIDs that start with AB, have D in the fourth position, and have any character following D.
- If multiple filtering parameters are entered, the users displayed must meet **all** of the restrictions.
- If one parameter invalidates another, an error message is issued without further processing.

The following parameter descriptions are arranged alphabetically. Parameters containing a numeric character are first in their alphabetical group.

ALLOC

Displays only those users allocated to a node. NALLOC cannot be used when ALLOC is specified.

CONV

Displays users with an active conversation.

DEADQ

Displays users with queues marked as dead letter queues.

DYN

Displays only dynamic users. STATIC cannot be used when DYN is specified.

EXCL

Displays users in exclusive mode.

HELD

Displays users with a held conversation.

ISC=`NO|YES`

Displays static ISC users only when `ISC=YES` is specified.

L=`value`

Locates the specified value where value applies to the current SORTed column. That row is placed at the top of the list. Generic and positional qualifiers cannot be used for this parameter.

LTERM=`lterm`

Where lterm is a 1- to 8-character LTERM name. Generic and positional qualifiers can be used for the LTERM name. Displays users with a matching LTERM name. To display rows that do not have an LTERM name, specify LTERM=' ' or LTERM=N/A.

MFST

Displays users in MFS test mode.

NALLOC

Displays users not allocated to a node. ALLOC cannot be used when NALLOC is specified.

NODE=`id`

Where `id` is a 1- to 8-character node ID. Generic and positional qualifiers can be used for the node ID. Displays users with a matching node ID. To display rows that do not have a node ID, specify `NODE=' '` or `NODE=N/A`.

NZ

Displays users with a nonzero queue count.

PRST

Displays users in preset mode (IMS /SET command issued).

QCT> nnn

Where nnn can be 1 to 999. Displays users with a queue count exceeding nnn.

RESP

Displays users in response mode.

RESPINP

Displays users in response-input mode.

SORT|SO=`cc`

Where cc can be any of the following two characters. The display list is sorted by USERID by default.

AG	Sorts the list by the number of days that the oldest message was enqueued to the LTERM (descending).
EN	Sorts the list by ENQ count (descending).
LT	Sorts the list by LTERM (ascending).
NO	Sorts the list by NODE (ascending).
QC	Sorts the list by the queue count (descending).
TR	Sorts the list by trancode name (ascending).
UI	Sorts the list by USERID (ascending is the default).
US	Sorts the list by USER (ascending).

STATIC

Displays only static users. DYN cannot be used when STATIC is specified.

STOP

Displays stopped users.

TRAN=`trancode`

Where `trancode` is a 1- to 8-character transaction name. Generic and positional qualifiers can be used for the transaction name. Displays users whose current or last transaction have a matching transaction name. To display rows that do not have a transaction name, specify `TRAN=' '` or `TRAN=N/A`.

TST

Displays users in test mode.

USER=`user`

Where `user` is a 1- to 8-character user name. Generic and positional qualifiers can be used for the user name. Displays only those users that have a matching name. To display rows that do not have a user name, specify `USER=' '` or `USER=N/A`.

USERID=`id`

Where `id` is a 1- to 8-character user ID. Generic and positional qualifiers can be used for the user ID. Displays only those user IDs that have a matching ID. To display rows that do not have a user ID, specify `USERID=' '` or `USERID=N/A`.

XON

Displays users with **any** of the following:

CONV
DEADQ
EXCL
MFST
STOP
TST

Expand: USER can be EXPANDed by moving the cursor to the following fields and pressing ENTER:

OSTAT	Terminal output status display
ISTAT	Terminal input status display
TRANQ	Transaction queue status display
APPCA	APPC activity display

Sorting: The display list can be sorted by:

- Using the SORT parameter.
- Moving the cursor to the column heading to be sorted and pressing ENTER.

  This overrides any SORT parameter entered in the PARM field and primes the field with the action taken. The integrity of any other parameters entered in the PARM field is preserved.

The display list is sorted by USERID by default. Alphanumeric fields are sorted in ascending order. Numeric fields are sorted in descending order. Fields with no values are sorted to the bottom of the list.

Scrolling: The display is scrollable.

Field Descriptions: Each of the fields is described below. The descriptions are arranged in alphabetical order.

AGE

Age in days of the oldest message enqueued to the LTERM. An ** in this column indicates the age of the oldest message is over 99 days. STATUS field for this user contains DEADQ.

ENQ

The number of messages enqueued to the LTERM displayed in this row.

LTERM

Logical terminal name assigned to this user or node.

If a user or node has multiple LTERMs assigned to it, the LTERMs appear on separate rows with their own ENQ and QCT values. USERID, USER, and NODE are blank if they are the same as the row above.

NODE

The signon or allocated node name for this user. This field contains `N/A` if the user is not assigned to any node (dynamic only).

QCT

The sum of messages still on the queue for this LTERM.

STATUS

The status of this user. For static terminals, this is the status of the node associated with the user. Multiple status codes are displayed within the space limitations of the display line. The status can be:

CONV The user is in an active conversation.

DEADQ The user has messages on the queue that have exceeded the dead letter timeout value.

DYN The user was created by ETO signon.

EXCL	The IMS /EXCLUSIVE command was issued for this user. This user only receives messages from transactions submitted by this physical terminal. Other messages remain queued until the EXCL status is terminated with an IMS /END or /START command.
HELD	The user has a held conversation.
MFST	Transactions for this user search the MFS test library first for formats.
NALLOC	The user is not allocated to a VTAM node.
PRST	The user is in preset mode (IMS /SET command issued).
RESP	The user is in response mode.
RINP	The user is in response-input mode.
STAT	The user structure was prebuilt; for example, defined in Stage 1.
STOP	The user is stopped. With this status, the user cannot sign on to the IMS system (ETO only).
TST	The user is in test (echo) mode.
USER	Name of the user structure (SPQB) either created dynamically for a dynamic user or already existing (through system generation) for an ISC type connection.
USERID	Name of the security user ID.

TRAN

The name of the last or current transaction code processed at this node.

Chapter 22. Requesting Workload Wait Data Collection (MWAIT)

The Workload Analyzer Workload Wait service identifies and displays the events that account for a transaction's response time in IMS. The display of workload wait events requires previous data collection.

IMS workload wait data is collected by MWAIT. MWAIT samples workloads waiting for resources. The MWAIT data collection service periodically samples IMS and accumulates statistics for the requested workloads. This statistical data is displayed online by using the DWAIT service. Data collection must first be activated through the MWAIT service before the data can be displayed by the DWAIT service.

Note: For MWAIT to collect DBCTL thread data, `CICS=YES` or `CICS=ONLINE` must be specified in BBPARM member IMFECP00.

Starting MWAIT

MWAIT data collection can be activated by:

- Selecting the MWAIT service from the list of monitor data collection services (SM command)

  Use the S line command from the Data Collection Monitors service application (see *Monitors and Traces Reference Manual*).

  A data entry panel, shown on page 441, is displayed so that you can specify request options, described in Table 5 on page 442:

  – Pressing ENTER activates a request.

  – Pressing END redisplays the monitor service list.

  Multiple wait analysis requests with different selection criteria can be run concurrently. Each MWAIT request can be given an optional name for identification by specifying a 1- to 8-character identifier in the PARM field. One MWAIT request can be activated without an identifier; the request identifier defaults to blanks.

  For example, this MWAIT data collection request for the transaction PART is identified as MON1:

  ```
  PARM     ==> MON1
  INTERVAL ==> 200MSEC
  TRAN     ==> PART
  ```

  If no other options are specified and all the defaults are taken, this request collects data for the total IMS workload (all transactions processed), using the default Timer facility sampling interval. When the collected data is displayed using the DWAIT service, the default current period (CURPER) and history definition are used.

This request:

```
INTERVAL ==> 200MSEC
CURPER   ==> 00:10:00
HISTORY  ==> 02:00:00
```

collects data for the total IMS workload. Sampling will be performed every 200 milliseconds. When the collected data is displayed using the DWAIT service, the current period (CURPER) is 10 minutes and the history is 2 hours.

This request:

```
PARM   ==> SAMPLE
PSB    ==> SPT+++ BHR+++
REGION ==> CICSPRD1
```

collects data for all transactions executed in region CICSPRD1 whose PSB begins with the letters SPT or BHR.

The selection keywords are ANDed; keyword operands are ORed.

- Replicating an active request from the Active Timer list application (Primary Menu Option 2) as described in the chapter "Displaying a List of Active Timer Requests" in *Monitors and Traces Reference Manual*.

  You can replicate a request by using the R line command in the Active Timer list.

  – Use the D line command from the Data Collection Monitors service list application to access the Active Timer list for only the selected service.

  – Access the Active Timer list application directly from the Primary Option Menu (Primary Menu Option 2).

- Starting the MWAIT service from BBPARM with other service requests

  Define a series of SET requests as a member of your BBI-SS PAS BBPARM data set that can be started automatically when the system starts or at your request (see the "Set Timer Requests" chapter in *Monitors and Traces Reference Manual*).

- Starting MWAIT from an MAINVIEW AutoOPERATOR EXEC

  Write an EXEC that starts MWAIT (MAINVIEW AutoOPERATOR must be installed). Use the IMFEXEC IMF command followed by the service name, optional parameters, and an identifier for the target system; for example:

  ```
  IMFEXEC IMFC SET REQ=MWAIT TRAN=PAY+ TARGET=IMSVS4
  ```

  For more information, see the *MAINVIEW AutoOPERATOR Advanced Automation Guide for CLIST EXECS*.

- Starting MWAIT with a SET request

  Define a SET request for MWAIT from the SERV field of any display.

Using the Workload Wait Data Entry Panel

The Workload Analyzer Wait (MWAIT) monitor is a monitoring service that collects the workload wait events for all or specific IMS workloads. To display the data entry panel, shown in Figure 4 on page 441, for requesting the MWAIT monitor service:

1. Enter an SM command as described in the chapter called “Displaying a List of Data Collection Monitors” in *MAINVIEW for IMS Online – Monitors and Traces Reference Manual*.

2. Use an S line command to select MWAIT from the services shown in the display list of monitor services.

```
BMC SOFTWARE --------------- START  WA WAIT REQUEST ---------  PERFORMANCE MGMT
COMMAND ===>                                                  TGT ===> IMST

                       MWAIT - MONITOR WORKLOAD WAIT

PARM     ==>                                (Identifier)
INTERVAL ==> 200MSEC  START ==>             STOP ==>                 QIS ==> YES

RST      ==> HOT                            (Restart Option: HOT,COLD,PUR,QIS)
CURPER   ==> 00:01:00                       (Current Period (hh:mm:ss))
HISTORY  ==> 00:30:00                       (History Period (hh:mm:ss))

Specify Workload Selections:
  PGMTYPE  ==>                          (MPP,MDP,IFP,FPU,TPI,BMP,DBT,NOTDBT)
  TRANTYPE ==>                          (ALL, DLI, DB2, FP)
  TRAN     ==>
  CLASS    ==>
  PROG     ==>
  PSB      ==>
  REGION   ==>
  RGNID    ==>
  TERM     ==>                          (name, MSCCLOCK, SYNCLOCK)
  USERID   ==>
```

Figure 4. Start Workload Wait Request

These options are SET keywords for MWAIT and are described in Table 5 on page 442 in alphabetical order.

Table 5. SET Keywords to Activate a Workload Wait (MWAIT) Service

Keyword	Operand	Description
CURPER|CP	hh:mm:ss	Specifies the interval for the CURRENT PERIOD area of the DWAIT display produced by Workload Analyzer. At the end of this interval, the sample counters are reset to zero. **Note:** The CURRENT PERIOD interval must be an integer multiple of the INTERVAL value; if not, it is rounded up. Default is 30 seconds (00:00:30 - specified in BBPARM member BBIISP00).
HISTORY|H	hh:mm:ss	Specifies the interval for the HISTORY area of the DWAIT display produced by Workload Analyzer. At the end of this interval, the sample counters are reset to zero. **Note:** The HISTORY interval must be an integer multiple of the CURPER interval; if not, it is rounded up. Default is 12 hours (12:00:00 - specified in BBPARM member BBIISP00).
INTERVAL|I	hh:mm:ss	The time interval between successive invocations of the requested service. The default is one minute (00:01:00) or as specified by the user in the BBIISP00 member of the BBPARM data set. It can be used with the LOG keyword to request automatic logging of a display to the BBI-SS PAS Image log. **Note:** The MOD keyword cannot be used to change this option. The request must be purged and a new request must be made.
PARM	`id`	Where `id` is a unique 1- to 8-character identifier. If you want to run multiple requests, specify an ID in the PARM field to make this request unique. Blank can also be used as an identifier for one request. The identifier is used to specify which monitor data is to be displayed with the plot display service.
QIS		Defines the action to be taken for the service when IMS is not active.
	YES	Specifies that the service is to be quiesced. This is the default.
	NO	Specifies that the service is to start or continue running. **Note:** When `QIS=NO` is specified, monitors that require IMS continue to be scheduled at each interval; however, they return zero values. Any analyzer services set up to run asynchronously fail with a short message of CANNOT LOCATE IMS SPECIFIED in the first line. The BBI-SS PAS Image log contains screen images of these services.

Table 5. SET Keywords to Activate a Workload Wait (MWAIT) Service (continued)

Keyword	Operand	Description
RST		Defines the restart option to be used when a service is quiesced because of an inactive IMS subsystem or `RRR` is specified for BLK (see the "Set Timer Request" chapter in *Monitors and Traces Reference Manual*). Default is HOT.
	HOT	Restarts the service automatically without loss of previous data.
	COLD	Restarts the service automatically; all previously collected data is deleted.
	PUR	Purges the service automatically when the target IMS starts.
	QIS	Keeps the service in a quiesced state until it is purged by an authorized user.
START	hh:mm:ss	Requests monitor start time. If the time entered is more than 10 minutes prior to the current time, 24 hours are added to the specified time and the request is started the next day. To start a request at midnight, specify 24:00:00. The default is the next full minute. **Note:** This option cannot be modified. The request must be purged and a new request must be made.
STOP	`nn|hh:mm:ss`	Requests monitor stop limit where `nn` is length of time in minutes and `hh:mm:ss:` is a timestamp. Processing stops at the end of the last interval before the specified stop time. This time is displayed in the STOP field when the request is viewed with the R, P, M, or W line commands from the Active Timer Requests list (Primary Menu Option 2) application. If the time entered is the same as the START time, 24 hours are added to the STOP time.
Note: The following workload selection keywords act as filters to limit data collection to a specific part of the IMS workload		
CLASS	class	Qualifies an MWAIT request by the numeric scheduling class(es). Multiple classes can be specified as follows: `CLASS ==> 1 2 3` Default is to include all IMS scheduling classes. **Note:** This workload selection keyword cannot be used for a request for DBCTL threads.

Table 5. SET Keywords to Activate a Workload Wait (MWAIT) Service (continued)

Keyword	Operand	Description
PGMTYPE| PTYP	MPP|MDP IFP|FPU TPI|BMP DBT|NOTDBT	Qualifies a monitor request by program type. Multiple program types can be specified. The types are: MPP Message processing program MDP Message-driven program IFP IMS Fast Path program FPU Fast Path utility TPI CPI-C driven program BMP Batch message processing DBT DBCTL thread Default is all types. DBT selects only programs that use a DBT thread. NOTDBT selects programs that do not use a DBT thread.
PROG	program name	Qualifies an MWAIT request by the specified program. Valid entries are 1- to 8-character alphanumeric program names, which can be used with the plus qualifier (+). Multiple program names can be specified; for example: `PROG ==> abc cde+`
PSB	psb name	Qualifies an MWAIT request by the specified IMS program specification block. Valid entries are 1- to 8-character alphanumeric PSB names, which can be used with the plus qualifier (+). Multiple PSB names can be specified; for example: `PSB ==> ab1 c+2`
REGION	jobname|NOCOMM	jobname Qualifies an MWAIT request by the specified job name of an IMS region. Valid entries are 1- to 8-character alphanumeric region job names, which can be used with the plus qualifier (+). Multiple region job names can be specified; for example: `REGION ==> +ba ace` NOCOMM Allows monitoring of all regions, excluding communications and including queuing events.
RGNID	region number	Qualifies an MWAIT request by the specified region ID. Valid entries are 1- to 3-character numeric region IDs from 1 to `nnn` where `nnn` is a valid region number. Multiple region IDs can be specified; for example: `RGNID ==> 1 23 200`

Table 5. SET Keywords to Activate a Workload Wait (MWAIT) Service (continued)

Keyword	Operand	Description
TERM	lterm	Qualifies an MWAIT request by the name of the IMS LTERM. Valid entries are 1- to 8-character alphanumeric LTERM names, which can be used with the plus qualifier (+). Multiple LTERM names can be specified; for example: `TERM ==> L071 L0+`
	SYNCLOCK	Defines a monitor request to include *all* transactions from systems synchronized to the clock of the local IMS (in other words, all local transactions, all local MSC transactions, and all nonlocal MSC transactions that arrive from a system with its clock synchronized to the clock of the local IMS).
	MSCCLOCK	Defines a monitor request to include *only nonlocal* transactions from MSC systems synchronized to the clock of the local IMS.
TRAN	trancode	Qualifies an MWAIT request by the specified IMS or CICS transaction. Valid entries are 1- to 8-character alphanumeric transaction codes, which can be used with the plus qualifier (+). Multiple transaction codes can be specified; for example: `TRAN ==> TR+ PAY1` For a CICS DBCTL transaction, the CICS transaction code is used. For a Fast Path transaction, the routing code assigned by the DBFHAGU0 exit routine is used.
TRANTYPE| TTYP	ALL|DB2| DLI|FP	Qualifies an MWAIT request by transaction type: ALL All transaction types DB2 Transactions that access DB2 DLI Transactions that make DL/I database calls FP Transactions that make Fast Path database calls The default is all types, and multiple transaction types can be specified.
USERID	userid	Qualifies an MWAIT request by the name of the IMS sign-on user ID. Valid entries are to 1- to 8-character alphanumeric IMS sign-on user IDs, which can be used with the plus qualifier (+). Multiple user IDs can be specified; for example: `USERID ==> USER1 USER2 USER6`

The workload selection keywords can be used to limit the data collection to a specific part of the IMS workload. By specifying a certain resource to be monitored (such as an IMS region), the sampling is automatically limited to those events for that resource. For example, the only flow components that use an IMS region are scheduling, application program, and sync point.

Input and output communication and queuing events are ignored when a REGION parameter is specified.

REGION=

You should specify a REGION parameter to limit the amount of data that must be sampled. NOCOMM, a special keyword for the REGION parameter, can be used to exclude communications and include queuing events. No other REGION or RGNID parameters can be used with the NOCOMM keyword.

Stopping MWAIT

An MWAIT request can be stopped by:

- Stopping the request with a Z line command

  Use the Z line command from the Active Timer list application as described in the chapter "Displaying a List of Active Timer Requests" in *Monitors and Traces Reference Manual*.

- Setting a stop time for automatic completion of data collection

  Specify the STOP value (as a timestamp) on the start or modify MWAIT request panel. The collected data remains available for viewing until the request is purged.

- Purging a request from the Active Timer list with the P line command

  Use the P line command from the Active Timer list application as described in the chapter "Displaying a List of Active Timer Requests" in *Monitors and Traces Reference Manual*.

- Purging a service request with a SET request

  Issue a PRG request with SET from the SERV field of any display, a BBPARM member, or an MAINVIEW AutoOPERATOR EXEC (MAINVIEW AutoOPERATOR must be installed); for example:

  ```
  SERV ==> SET
  PARM ==> PRG=reqid|ALL
  ```

- Stopping a request with a SET request

  Use the STOP parameter with SET; for example:

  ```
  SERV ==> SET
  PARM ==> REQ=MWAIT,SAMPLE,START=00:10:00,STOP=00:30:00,I=200MSEC
  ```

  The request starts at 10 minutes after midnight and stops 30 minutes after midnight.

Storage Requirements

Each active MWAIT request requires approximately 6K of storage in CSA. This storage is GETMAINed when data collection starts and is freed when the MWAIT request is purged.

Defining a Sampling Interval

The more samples that are taken, the more accurate the workload analysis. An interval of less than one second can be defined by using MSEC with the INTERVAL keyword. The sampling interval (INTERVAL) and period (CURPER and HISTORY) should be defined (defaults are specified in BBPARM member BBIISP00) to take at least 2,000 samples in a period.

For example:

```
INTERVAL ==> 200MSEC
CURPER   ==> 00:10:00
HISTORY  ==> 00:30:00
TRAN     ==> MYTRAN
```

takes 5 samples per second or 3000 samples per current period (CURPER) and 9,000 samples per history period and the samples are limited to those events for transaction MYTRAN. The number of samples taken in a CURRENT or HISTORY period is displayed at the bottom of the DWAIT display.

Note: An interval that is too short could consume too much CPU, depending upon the number of IMS resources defined, the CPU speed, and the I/O rate.

Qualifying a Workload MWAIT Request

To limit the flow components monitored but not the resources, a generic operand of + can be specified for an MWAIT keyword to select all resources of that type. For example, `REGION=+` monitors all regions, but excludes input and output events. `TRAN=+` monitors all events that have an identifiable transaction code associated with them, which eliminates output queuing and output communications.

The + character can be used generically or positionally. As a generic resource name qualifier, it cannot be followed by any other character. As a positional qualifier, it must be repeated for every character to be replaced.

For example:

```
REGION ==> CICS+
```

is a data collection request for workload wait to sample only those regions whose names begin with CICS.

Entering:

```
TRAN ==> A++N+
```

monitors all events that have an identifiable transaction code with an A character in the first position, any two characters before N, and any character following N.

The + qualifier can be used for MWAIT service requests for:

Resource Selection	Resource
PROG keyword	Program names
PSB keyword	PSBs
REGION keyword	Region job names
TERM keyword	LTERM names
TRAN keyword	Transaction names
USERID keyword	User IDs

Chapter 23. Requesting Workload Wait Data Display (DWAIT)

As described in Chapter 22, “Requesting Workload Wait Data Collection (MWAIT)” on page 439, data collection must first be activated with an MWAIT request before DWAIT can be requested. Active MWAIT requests, each identified with its specified parameter, are displayed in the Active Timer Requests application (described in the chapter called “Displaying a List of Active Timer Requests” in *Monitors and Traces Reference Manual*). Use the S line command from this application to display the data collected by MWAIT with the DWAIT service. DWAIT can also be requested from a list of analyzer display services (Primary Menu Option 1) or from the service display panel with a SET request (see the “SET Timer Request” chapter in *Monitors and Traces Reference Manual*).

If an identifier is specified with the MWAIT request, it must be used with DWAIT. For example, for the following MWAIT request identified as MON1:

```
PARM     ==> MON1
INTERVAL ==> 200MSEC
TRAN     ==> PART
```

The same MON1 identifier must be specified if DWAIT is requested from the list of analyzer display services or the service display panel with a SET request.

```
SERV     ==> DWAIT
PARM     ==> MON1
```

The DWAIT service shows the workload wait events that were observed most frequently by the MWAIT service. These events are the main contributors affecting IMS response time for the sampled workloads. The events are classified into the components of transaction flow through IMS (such as application program) to make it simpler to identify where bottlenecks occur.

To provide a measure of workload throughput and performance to relate to the displayed workload wait events, the number of MPP transactions processed and the average response time measured are provided at the bottom of the display. This information is only available if the Event Collector is active.

Chapter 24. DWAIT - Workload Wait Display

```
BMC SOFTWARE  -------------- DISPLAY WORKLOAD WAIT   -----------PERFORMANCE MGMT
SERV ==> DWAIT            INPUT    12:02:41  INTVL=> 8  LOG=> N  TGT==> IMS71X
PARM ==> MON1 TRANS=ALL                                          SCROLL=> N/A
EVENTS - All Transactions   --- CURRENT PERIOD ---       ------ HISTORY -------
                         %  0________50_______100%    %  0________40________80%
INPUT COMMUNICATIONS    1.16|    .    .    .    .|   2.62|>   .    .    .    .|
  Sel Dsp - CIOP      (1.16)|    .    .    .    .| (2.62)|>   .    .    .    .|
INPUT QUEUE            83.68|---------------->  .|  63.23|--------------->   .|
  All MPR's Busy     (81.91)|--------------->   .|(60.86)|-------------->    .|
  MPP GU              (1.77)|    .    .    .    .| (2.37)|>   .    .    .    .|
SCHEDULING              1.16|    .    .    .    .|   2.62|>   .    .    .    .|
  FETCH I/O Active    (1.16)|    .    .    .    .| (2.62)|>   .    .    .    .|
APPLICATION PROGRAM     3.53|>   .    .    .    .|   7.96|->  .    .    .    .|
  DL/I-CTL Using CPU  (0.04)|    .    .    .    .| (0.06)|    .    .    .    .|
  Appl Using CPU      (3.49)|>   .    .    .    .| (7.86)|->  .    .    .    .|
SYNC POINT              3.49|>   .    .    .    .|   7.86|->  .    .    .    .|
  LWA Wait            (3.49)|>   .    .    .    .| (7.86)|->  .    .    .    .|
OUTPUT QUEUE            2.33|    .    .    .    .|   5.24|>   .    .    .    .|
  Node Busy           (2.33)|    .    .    .    .| (5.24)|>   .    .    .    .|
OUTPUT COMMUNICATIONS   4.65|>   .    .    .    .|  10.48|--> .    .    .    .|
  MFS Pool Failure    (4.65)|>   .    .    .    .|(10.48)|--> .    .    .    .|
                            +--------------------+       +--------------------+
RESPONSE TIME (SEC)     1.39|       79 SAMPLES   |   1.39|    1,039 SAMPLES   |
# OF TRANSACTIONS         67|     0 MIN/39 SEC   |     67|     8 MIN/39 SEC   |
```

Description: The DWAIT service displays data collected by the MWAIT service. This display shows the workload events that account for the IMS response time. The data displayed is collected by periodic sampling of the system by the MWAIT service.

Select Code: DWAIT

Parameter: The name used with the MWAIT service request.

FLOWCOMP=xx

Specifies IMS transaction processing event component(s), where xx represents any of the following characters. Any combination can be specified. They are presented below in the same sequence that the events occur during IMS transaction processing.

ALL	All IMS processing components
COMP	All components are to be displayed even if their sampled events are zero
IC	Input communications
IQ	Input queue
SC	Scheduling
AP	Application program

SP Synchronization point

OQ Output queue

OC Output communications

The default is to build a full screen display of the events that are the largest contributors to the transaction response time.

FORMAT=`%|#`

Specifies the format in which the statistics are to be presented.

% Individual events are to be expressed as a percentage of the total events sampled. This parameter is the default and can also be expressed as `FORMAT=PERCENT`.

Displays the average count of transactions in each event per sample. The number of events can be calculated by multiplying the count by the number of samples. This calculation can be used to determine the significance of high-percentage spikes and whether enough samples have been taken for accuracy. This parameter can be expressed as `FORMAT=COUNT`.

TRANS=`ACTIVE|ALL`

Specifies which events are to be displayed and used in calculation of percentages.

ACTIVE

Only active events are to be displayed or used in the calculations of percentages; queued events are excluded. This is the default.

ALL

All monitored events are to be displayed.

Field Descriptions: Each of the fields is shown and described below by display area.

```
Area 1

EVENTS - All Transactions
                              %
INPUT COMMUNICATIONS    1.16
  Sel Dsp - CIOP      (1.16)
INPUT QUEUE            83.68
  All MPR's Busy     (81.91)
  MPP GU              (1.77)
SCHEDULING              1.16
  FETCH I/O Active    (1.16)
APPLICATION PROGRAM     3.53
  DL/I-CTL Using CPU  (0.04)
  Appl Using CPU      (3.49)
SYNC POINT              3.49
  LWA Wait            (3.49)
OUTPUT QUEUE            2.33
  Node Busy           (2.33)
OUTPUT COMMUNICATIONS   4.65
  MFS Pool Failure    (4.65)

RESPONSE TIME (SEC)     1.39
# OF TRANSACTIONS         67
```

This area shows the IMS processing events that occur as transactions flow through the system. You can see the events that contribute to transaction response time and where transactions spend their time during IMS processing. This area also displays the transaction response time and the number of transactions that completed.

The IMS processing event components that are shown include:

INPUT COMMUNICATIONS
INPUT QUEUE
SCHEDULING
APPLICATION PROGRAM
SYNC POINT
OUTPUT QUEUE
OUTPUT COMMUNICATION

Minor IMS processing events are indented two spaces and are in lowercase letters beneath the major (component) processing event. The values measured for minor events during a sampling are enclosed in parentheses. These values make the total value measured for the major event.

If the value is too small to be displayed in two decimal places, `SMALL` is shown. If the numeric value for the CURRENT PERIOD (see “Area 2”) or HISTORY area of the display (see “Area 3”) is zero, `ZERO` is shown for the event value.

The other fields in this area of the display are listed below, in alphabetical order.

OF TRANSACTIONS

Number of MPP transactions that completed for the current PERIOD or HISTORY sampling.

Number of DBT transactions that satisfy the MWAIT request selection criteria for CICS regions attached to an IMS control region if `CICS=YES` or `CICS=ONLINE` is specified in BBPARM member IMFECP00. BMPs are excluded from this count.

EVENTS
: Identifies the events being displayed as specified by the TRANS parameter.

RESPONSE TIME
: Average response time of the MPP transactions that completed in the current period or history.

Average response time for CICS regions attached to an IMS control region if `CICS=YES` or `CICS=ONLINE` is specified in BBPARM member IMFECP00. BMPs are excluded from this count.

```
Area 2

                          --- CURRENT PERIOD ---
                          0________50_______100%
                     1.16|    .    .    .    .|
                   (1.16)|    .    .    .    .|
                    83.68|---------------->  .|
                  (81.91)|--------------->   .|
                   (1.77)|    .    .    .    .|
                     1.16|    .    .    .    .|
                   (1.16)|    .    .    .    .|
                     3.53|>   .    .    .    .|
                   (0.04)|    .    .    .    .|
                   (3.49)|>   .    .    .    .|
                     3.49|>   .    .    .    .|
                   (3.49)|>   .    .    .    .|
                     2.33|    .    .    .    .|
                   (2.33)|    .    .    .    .|
                     4.65|>   .    .    .    .|
                   (4.65)|>   .    .    .    .|
                          +--------------------+
                     1.39|       79 SAMPLES   |
                       67|     0 MIN/39 SEC   |
```

This area shows the distribution of the workload for the current period. The CURRENT PERIOD displays the statistics (see “Area 1”) for the last `n` time intervals as specified by the corresponding MWAIT request. When the CURRENT PERIOD is compared with the HISTORY area of the display (see “Area 3”), response time problems that are transient can be differentiated from ongoing problems.

The descriptions are arranged in alphabetical order.

MIN/SEC
: Number of minutes and seconds as defined by the corresponding MWAIT request for the CURRENT PERIOD sampling.

SAMPLES
: Number of samples taken to produce the statistics (see “Area 1”) and the CURRENT PERIOD graph.

Area 3

```
                                                  ------ HISTORY -------
                                                %  0________40________80%
                                                 2.62|>   .    .    .    .|
                                                (2.62)|>   .    .    .    .|
                                                 63.23|--------------->   .|
                                                (60.86)|-------------->    .|
                                                (2.37)|>   .    .    .    .|
                                                 2.62|>   .    .    .    .|
                                                (2.62)|>   .    .    .    .|
                                                 7.96|->  .    .    .    .|
                                                (0.06)|    .    .    .    .|
                                                (7.86)|->  .    .    .    .|
                                                 7.86|->  .    .    .    .|
                                                (7.86)|->  .    .    .    .|
                                                 5.24|>   .    .    .    .|
                                                (5.24)|>   .    .    .    .|
                                                 10.48|--> .    .    .    .|
                                                (10.48)|--> .    .    .    .|
                                                  +--------------------+
                                                 1.39|    1,039 SAMPLES   |
                                                   67|     8 MIN/39 SEC   |
```

This area shows the distribution of the workload over a long period of time (HISTORY) as specified by the corresponding MWAIT request. When the HISTORY period is compared with the CURRENT PERIOD, response time problems that are ongoing can be differentiated from those that are transient.

The descriptions are arranged in alphabetical order.

MIN/SEC
: Number of minutes and seconds as defined by the corresponding MWAIT request for the HISTORY sampling.

SAMPLES
: Number of samples taken to produce the statistics for the IMS processing events (see “Area 1”) and HISTORY graph.

Excluding Queued Events

Transactions that are delayed on the IMS input or output queues because of external conditions can have a skewing effect on the DWAIT display. This effect is removed by the DWAIT parameter `TRANS=ACTIVE`, which is the default. `TRANS=ACTIVE` excludes all queued events from the display; `TRANS=ALL` includes all events.

The excluded events are:

Input Queue

- BMP not active
- MPP unschedulable
- BMP unschedulable
- MPP class not active

Output Queue

- LTERM unavailable
- NODE busy
- NODE unavailable
- Line busy
- Line unavailable
- MSC P-link busy
- MSC P-link unavailable
- MSC L-link unavailable

DWAIT Event Definitions

The following sections describe what may be shown for a major IMS processing event component displayed by DWAIT. These descriptions are arranged alphabetically by:

- Application Program (AP)
- Input Communications (IC)
- Input Queue (IQ)
- Output Communications (OC)
- Output Queue (OQ)
- Scheduling (SC)
- Sync Point (SP)

Application Program (AP) Events

The transaction is now at the point where actual application processing is performed. It is at this stage that the majority of workload slowdowns usually occur. This transaction flow component starts at the point IMS branches to the application program in the dependent region and ends when the application program enters sync point.

The following sections list and define the events that may be shown for APPLICATION PROGRAM by the DWAIT display. The descriptions are in alphabetical order.

AP: Appl CPU Wait

The application program was executing in the dependent region and was not waiting for any event to occur. The program work could be executed but there were no CPUs available to process it. In the case of a UP processor, the CPU was executing other work (IMS or non-IMS) in the system. For MP processors, all the CPUs were busy with other work.

From an OS viewpoint, the dependent region program control task was in the OS dispatcher work-to-do queue. A high occurrence of this event indicates that the CPU is not fast enough or that excessive work of a higher priority was using the CPU cycles.

AP: Appl CSA Fault

The same as "AP: Appl Prv Fault" on page 458, except that the application program was accessing data or instructions in CSA.

AP: Appl CSA GFA

The same as "AP: Appl Prv GFA" on page 458, except that the program was accessing data or instructions in CSA.

AP: Appl I/O Active

During a sampling of the system, the application program had issued an I/O request directly to OS for a non-IMS database file. At the time of the sample, the I/O was active against the file. Processing of the message is suspended until the I/O completes.

AP: Appl I/O Queued

The same as "AP: Appl I/O Active", except that the application program I/O was queued on the logical channel or UCB because I/O contention prevented the successful initiation of the SIO instruction.

AP: Appl LPA Fault

The same as "AP: Appl Prv Fault" on page 458, except that the application program was accessing data or instructions in LPA.

AP: Appl LPA GFA

The same as "AP: Appl Prv GFA", except that the program was accessing data or instructions in LPA.

AP: Appl Prv Fault

During a sampling of the system, the application program was processing a message and a page fault occurred. Processing of the message is delayed until the fault is resolved.

For an application program, this means that the program in the dependent region address space under the program control task was accessing data or instructions in the private area of the dependent region address space when the fault occurred.

AP: Appl Prv GFA

During a sampling of the system, the application program was processing a message and a page fault occurred. Processing of the message is delayed until the fault is resolved. The page-in I/O process could not be executed because no real frames were available. The page fault is placed in the general frame allocation (GFA) queue while the situation is dealt with.

For the application program, this means that the program in the dependent region address space under the program control task was accessing data or instructions in the private area of the dependent region address space when the fault occurred.

General frame allocation (GFA) page faults refer to the situation when a page fault occurs and the OS/390 real storage manager (RSM) did not have any available frames to allocate to the page fault. To find a frame to use, the system resources manager (SRM) is called to steal from existing users. This may result in a page-out operation that extends the page fault resolution time even more.

AP: Appl Using CPU

The application program was executing in the dependent region and was not waiting for any event to occur. The program could be executed and, in fact, a CPU was actively processing it. In the case of a UP processor, the CPU was executing this application program. For MP processors, one of the CPUs was executing the application program.

A high occurrence of this event indicates that the application program is looping or consuming lots of CPU for some other reason.

AP: Application in CICS

During a sampling of the system, the application was under control of the CICS address space. A large percentage of time spent under this event could indicate a bottleneck in the CICS address space, but it could be normal if the transaction does more processing in CICS than in DL/I.

AP: CBTS Latch

During a sampling of the system, IMS was processing a DL/I call and required the dynamic control block latch but the latch was in use by another IMS task.

AP: CTL SYNC I/O Active

The same as "SC: CTL SYNC I/O Active" on page 491 except that the application program processing has begun.

AP: CTL SYNC I/O Queued

The same as "SC: CTL SYNC I/O Queued" on page 491, except that the application program processing has begun.

AP: DB2N-Dep CPU Wait

The application program in the dependent region has issued a normal SQL call and is waiting to be dispatched by the operating system. A high occurrence of this event indicates that either the CPU is too slow to process the workload or that the dispatching priority of the dependent region is not high enough and higher priority tasks in the system are being selected for processing.

Note: Only SQL calls made through the IMS attach (for example, BMPs or MPPs) are monitored. SQL calls made through the CICS attach are not shown.

AP: DB2N-Dep CSA Fault

The same as "AP: DB2N-Dep Prv Fault" except that the DB2 interface code was accessing data or instructions in CSA.

AP: DB2N-Dep CSA GFA

The same as "AP: DB2N-Dep Prv GFA" on page 460 except that the DB2 interface code was accessing data or instructions in CSA.

AP: DB2N-Dep LPA Fault

The same as "AP: DB2N-Dep Prv Fault" except that the DB2 interface code was accessing data or instructions in LPA.

AP: DB2N-Dep LPA GFA

The same as "AP: DB2N-Dep Prv GFA" on page 460 except that the DB2 interface code was accessing data or instructions in LPA.

AP: DB2N-Dep Prv Fault

During a sampling of the system, the application program had issued an SQL call and the DB2 interface code had a page fault while accessing data or instructions in the private region during call processing.

Note: Only SQL calls made through the IMS attach (for example, BMPs or MPPs) are monitored. SQL calls made through the CICS attach are not shown.

AP: DB2N-Dep Prv GFA

During a sampling of the system, the application program had issued an SQL call. The DB2 interface code had suffered a page fault while accessing data or instructions in the private region during call processing. The required page could not be paged in because of a shortage of real storage frames to do the I/O. The page fault is placed on the general frame allocation (GFA) queue until a frame is made available. When a page fault occurs, the system resource manager (SRM) is called to steal a page from existing users. This could result in a page-out operation.

Note: Only SQL calls made through the IMS attach (for example, BMPs or MPPs) are monitored. SQL calls made through the CICS attach are not shown.

AP: DB2N-Dep Using CPU

The application program in the dependent region issued a normal SQL call and was actively processing the call on a CPU. A high occurrence of this event indicates that DB2 is consuming a large amount of CPU to process the call. This could be because of:

- A complex SQL call
- Inefficient usage of DB2 buffer pools
- Inefficient index access
- Bad DB2 table design
- Entire table scan
- Badly coded SQL statement

Note: Only SQL calls made through the IMS attach (for example, BMPs or MPPs) are monitored. SQL calls made through the CICS attach are not shown.

AP: DB2N-Dep Wait

The application program in the dependent region issued a normal SQL call and is in a wait for processing by DB2. A high occurrence of this event could indicate resource contention in DB2, such as:

- Insufficient pool space in the buffer pools or EDM pool
- Lock contention
- Table OPEN/CLOSE processing

Note: Only SQL calls made through the IMS attach (for example, BMPs or MPPs) are monitored. SQL calls made through the CICS attach are not shown.

AP: DB2S-Dep CPU Wait

The same as "AP: DB2N-Dep CPU Wait" on page 459 except that the DB2 interface code was processing a service call.

A service call is issued by the IMS DB2 interface code for certain events in the dependent region. A CREATE THREAD call is issued to identify the transaction to DB2 and a COMMIT PHASE 1 and PHASE 2 call is done at IMS synchronization point time for data integrity.

Note: Only SQL calls made through the IMS attach (for example, BMPs or MPPs) are monitored. SQL calls made through the CICS attach are not shown.

AP: DB2S-Dep CSA Fault

The same as "AP: DB2N-Dep CSA Fault" on page 459 except that the DB2 interface code was processing a service call.

AP: DB2S-Dep CSA GFA

The same as "AP: DB2N-Dep CSA GFA" on page 459 except that the DB2 interface code was processing a service call.

AP: DB2S-Dep LPA Fault

The same as "AP: DB2N-Dep LPA Fault" on page 459 except that the DB2 interface code was processing a service call.

AP: DB2S-Dep LPA GFA

The same as "AP: DB2N-Dep LPA GFA" on page 459 except that the DB2 interface code was processing a service call.

AP: DB2S-Dep Prv Fault

The same as "AP: DB2N-Dep Prv Fault" on page 459 except that the DB2 interface code was processing a service call.

AP: DB2S-Dep Prv GFA

The same as "AP: DB2N-Dep Prv GFA" on page 460 except that the DB2 interface code was processing a service call.

AP: DB2S-Dep Using CPU

The same as "AP: DB2N-Dep Using CPU" on page 460 except that the DB2 interface code was processing a service call.

AP: DB2S-Dep Wait

The same as "AP: DB2N-Dep Wait" on page 460 except that the DB2 interface code was processing a service call.

AP: DC Mon Latch

During a sampling of the system, the application program issued a DL/I call which needed the DC Monitor latch. The latch was already in use by another IMS task. Processing is suspended until the latch becomes available.

The DC Monitor latch is used to serialize the use of the DC Monitor in IMS. DL/I attempts to move data to the DC monitor buffers. Each call to move a new record to the buffers requires this latch. A high occurrence of this event indicates that the DC Monitor is very busy or that the DC Monitor is hung up in its I/O attempt to DASD or the tape file.

AP: DEDB Area Latch

During a sampling of the system, one or more transactions were waiting for a specific DEDB area.

AP: DEDB CI Contention

During a sampling of the system, one or more transactions were in contention for the same DEDB control interval.

AP: DEDB Latch

During a sampling of the system, one or more transactions were waiting for a DEDB latch.

AP: DL/I-CTL CPU Wait

The same as "AP: DL/I-Dep CPU Wait" on page 463, except that DL/I has switched to the control task in the control region.

AP: DL/I-CTL CSA Fault

The same as "AP: DL/I-Dep Prv Fault" on page 463, except that DL/I was accessing data or instructions in CSA while executing under the LSO task in the control region.

AP: DL/I-CTL CSA GFA

The same as "AP: DL/I-Dep Prv GFA" on page 464, except that DL/I was accessing data or instructions in CSA while executing under the control task in the control region.

AP: DL/I-CTL LPA Fault

The same as "AP: DL/I-Dep Prv Fault" on page 463, except that DL/I was accessing data or instructions in LPA while executing under the LSO task in the control region.

AP: DL/I-CTL LPA GFA

The same as "AP: DL/I-Dep Prv GFA" on page 464, except that DL/I was accessing data or instructions in LPA while executing under the control task in the control region.

AP: DL/I-CTL Prv Fault

The same as "AP: DL/I-Dep Prv Fault" on page 463, except that DL/I was accessing data or instructions in the private area of the control region while executing under the control task in the control region.

AP: DL/I-CTL Prv GFA

The same as "AP: DL/I-Dep Prv GFA" on page 464, except that DL/I was accessing data or instructions in the private area of the control region while executing under the control task in the control region.

AP: DL/I-CTL Using CPU

The same as "AP: DL/I-Dep Using CPU" on page 464, except that DL/I has switched to the control task in the control region.

AP: DL/I-Dep CPU Wait

The application program in the dependent region has issued a DL/I call and DL/I was executing in the dependent region and was not waiting for any event to occur. DL/I could be executed but there were no CPUs available to process it. In the case of a UP processor, the CPU was executing other work (IMS or non-IMS) in the system. For MP processors, all the CPUs were busy with other work.

From an OS viewpoint, the dependent region program control task was in the OS dispatcher work-to-do queue. A high occurrence of this event indicates that the CPU is not fast enough or that excessive work of a higher priority was using the CPU cycles.

AP: DL/I-Dep CSA Fault

The same as "AP: DL/I-Dep Prv Fault", except that DL/I was accessing data or instructions in CSA.

AP: DL/I-Dep CSA GFA

The same as "AP: DL/I-Dep Prv GFA" on page 464, except that DL/I was accessing data or instructions in CSA.

AP: DL/I-Dep LPA Fault

The same as "AP: DL/I-Dep Prv Fault", except that DL/I was accessing data or instructions in LPA.

AP: DL/I-Dep LPA GFA

The same as "AP: DL/I-Dep Prv GFA" on page 464, except that DL/I was accessing data or instructions in LPA.

AP: DL/I-Dep Prv Fault

During a sampling of the system, the application program had issued a DL/I call and DL/I suffered a page fault in the private area of the dependent region. Message is delayed until the fault is resolved.

For a DL/I call, this means that DL/I in the dependent region address space under the program control task was accessing data or instructions in the private area of the dependent region address space when the fault occurred.

AP: DL/I-Dep Prv GFA

During a sampling of the system, the application program had issued a DL/I call and DL/I suffered a page fault. Processing of the message is delayed until the fault is resolved. The page-in I/O process could not be executed because no real frames were available. The page fault is placed on the general frame allocation (GFA) queue until the situation is resolved.

For the DL/I call, this means that DL/I in the dependent region address space under the program control task was accessing data or instructions in the private area of the dependent region address space when the fault occurred.

General frame allocation (GFA) page faults refer to the situation when a page fault occurs and the OS/390 real storage manager (RSM) did not have any available frames to allocate to the page fault. To find a frame to use, the system resources manager (SRM) is called to steal from existing users. This may result in a page-out operation that extends the page fault resolution time even more.

AP: DL/I-Dep Using CPU

The application program in the dependent region has issued a DL/I call and DL/I was executing in the dependent region and was not waiting for any event to occur. DL/I could be executed and, in fact, a CPU was actively processing it. In the case of a UP processor, the CPU was executing this DL/I call. For MP processors, one of the CPUs was executing the DL/I call.

A high occurrence of this event indicates that the database design is such that DL/I is consuming a large amount of CPU to access the requested data. Examples of DL/I configurations that may result in considerable CPU needs are:

- Logical relationships
- Secondary indices
- Long twin chains
- Insufficient Root Anchor Points (RAPs) in an HDAM database
- Calls that require data set OPENs

AP: DL/I-LSO CPU Wait

The same as "AP: DL/I-Dep CPU Wait" on page 463, except that DL/I has switched to the LSO task in the control region. `LSO=Y` was specified in the control region JCL.

AP: DL/I-LSO CSA Fault

The same as "AP: DL/I-Dep Prv Fault" on page 463, except that DL/I was accessing data or instructions in CSA while executing under the LSO task in the control region.

AP: DL/I-LSO CSA GFA

The same as "AP: DL/I-Dep Prv GFA", except that DL/I was accessing data or instructions in CSA while executing under the LSO task in the control region.

AP: DL/I-LSO LPA Fault

The same as "AP: DL/I-Dep Prv Fault" on page 463, except that DL/I was accessing data or instructions in LPA while executing under the LSO task in the control region.

AP: DL/I-LSO LPA GFA

The same as "AP: DL/I-Dep Prv GFA" on page 464, except that DL/I was accessing data or instructions in LPA while executing under the LSO task in the control region.

AP: DL/I-LSO Prv Fault

The same as "AP: DL/I-Dep Prv Fault" on page 463, except that DL/I was accessing data or instructions in the private area of the control region while executing in cross-task in the control region.

AP: DL/I-LSO Prv GFA

The same as "AP: DL/I-Dep Prv GFA" on page 464, except that DL/I was accessing data or instructions in the private area of the control region while executing under the LSO task in the control region.

AP: DL/I-LSO Using CPU

The same as "AP: DL/I-Dep Using CPU" on page 464, except that DL/I has switched to the LSO task in the control region. `LSO=Y` was specified in the control region JCL.

AP: DL/I-SAS CPU Wait

The same as "AP: DL/I-Dep CPU Wait" on page 463, except that DL/I has switched to the DL/I serial task in the DL/I subordinate address space.

AP: DL/I-SAS CSA Fault

The same as "AP: DL/I-CTL Prv Fault" on page 462, except that DL/I was accessing data or instructions in CSA while executing under the DL/I serial task in the DL/I subordinate address space.

AP: DL/I-SAS CSA GFA

The same as "AP: DL/I-Dep Prv GFA" on page 464, except that DL/I was accessing data or instructions in CSA while executing under the DL/I serial task in the DL/I subordinate address space.

AP: DL/I-SAS LPA Fault

The same as "AP: DL/I-CTL Prv Fault" on page 462, except that DL/I was accessing data or instructions in LPA while executing under the DL/I serial task in the DL/I subordinate address space.

AP: DL/I-SAS LPA GFA

The same as "AP: DL/I-Dep Prv GFA" on page 464, except that DL/I was accessing data or instructions in LPA while executing under the DL/I serial task in the DL/I subordinate address space.

AP: DL/I-SAS Prv Fault

The same as "AP: DL/I-CTL Prv Fault" on page 462, except that DL/I was accessing data or instructions in the private area of the DL/I subordinate address space while executing under the DL/I serial task in the DL/I subordinate address space.

AP: DL/I-SAS Prv GFA

The same as "AP: DL/I-Dep Prv GFA" on page 464, except that DL/I was accessing data or instructions in the private area of the DL/I subordinate address space while executing under the DL/I serial task in the DL/I subordinate address space.

AP: DL/I-SAS Using CPU

The same as "AP: DL/I-Dep Using CPU" on page 464, except that DL/I has switched to the DL/I serial task in the DL/I subordinate address space.

AP: DL/I-XMEM CPU Wait

The same as "AP: DL/I-Dep CPU Wait" on page 463, except that DL/I was using hardware cross-memory op codes to execute DL/I code in the private area of the control region address space or DL/I subordinate address space. `LSO=X` or `LSO=S` was specified in the control region JCL.

AP: DL/I-XMEM CSA Fault

The same as "AP: DL/I-Dep Prv Fault" on page 463, except that DL/I was accessing data or instructions in CSA while executing in cross-memory mode.

AP: DL/I-XMEM CSA GFA

The same as "AP: DL/I-Dep Prv GFA" on page 464, except that DL/I was accessing data or instructions in CSA while executing in cross-memory mode.

AP: DL/I-XMEM LPA Fault

The same as "AP: DL/I-Dep Prv Fault" on page 463, except that DL/I was accessing data or instructions in LPA while executing in cross-memory mode.

AP: DL/I-XMEM LPA GFA

The same as "AP: DL/I-Dep Prv GFA" on page 464, except that DL/I was accessing data or instructions in LPA while executing in cross-memory mode.

AP: DL/I-XMEM Prv Fault

The same as "AP: DL/I-Dep Prv Fault" on page 463, except that DL/I was accessing data or instructions in the private area of the control region or the private area of the DL/I subordinate address space while executing in cross-memory mode.

AP: DL/I-XMEM Prv GFA

The same as "AP: DL/I-Dep Prv GFA" on page 464, except that DL/I was accessing data or instructions in the private area of the control region or the private area of the DL/I subordinate address space while executing in cross-memory mode.

AP: DL/I-XMEM Using CPU

The same as "AP: DL/I-Dep Using CPU" on page 464, except that DL/I was using hardware cross-memory op codes to execute DL/I code in the private area of the control region address space or DL/I subordinate address space. `LSO=X` or `LSO=S` was specified in the control region JCL.

AP: FP Resource Latch

During a sampling of the system, it was noted that one or more transactions were waiting for a Fast Path resource that needs to be serialized.

AP: Generic Latch

During a sampling of the system, DL/I needed a generic latch but the latch was already in use by another IMS task.

A generic latch is one that locks a caller-defined entity. Any part of IMS that requires serialization but is not defined under one of the other specific latches is locked by a generic latch. Generic latches are used to lock updates for the items in the following table:

Table 6. Latch Locks

Generic Latch	Latch Target
DMBE	Data management block (DMB) updates
VSBP	VSAM buffer pool master updates
DBBP	OSAM buffer pool master updates

AP: IRLM Wait

During a sampling of the system, a program executing in a dependent region issued a DL/I call that required database block level sharing. The database segment needed was already in use by another program in another IMS subsystem or pass-the-buck processing with another IRLM required a wait.

During the processing of DL/I calls against databases, IMS ensures that database integrity is maintained by enqueuing database segments to prevent multiple updates. To affect this enqueue across systems, the IMS resource lock manager (IRLM) is called to enqueue the block or control interval (CI).

A high occurrence of this event indicates that there is considerable contention in IRLM processing. There may be too much block sharing of the database occurring.

AP: LGMSG I/O Active

The same as "IC: LGMSG I/O Active" on page 475, except that the application program has issued a DL/I call against a TP PCB that resulted in I/O to the LGMSG data set.

AP: LGMSG I/O Queued

The same as "IC: LGMSG I/O Queued" on page 476, except that the application program has issued a DL/I call against a TP PCB that resulted in I/O to the LGMSG data set.

AP: Log Buffer Wait

The same as "SC: Log Buffer Wait" on page 499, except that it occurred during application DL/I processing.

AP: Logical Log Latch

The same as "IC: Logical Log Latch" on page 476, except that it is DL/I that needs the latch.

AP: LWA Wait

During a sampling of the system, DL/I processing was in a LOG WRITE AHEAD (LWA) wait status. It was waiting for a database change record to be physically written to the log before the actual database could be updated. This is done to ensure data integrity in case of failure.

If necessary, IMS will write the log buffer containing this record, even if the buffer is not yet full. This is the normal signal for the I/O operation (see "SC: Log Buffer Wait" on page 499 for more information on logging.).

LOG WRITE AHEAD (LWA) is also referred to as LOG TAPE WRITE AHEAD (LTWA). LOG WRITE AHEAD calls generally occur at sync point, which is when most physical database updates occur. They may also occur during application processing if IMS needs to use a database buffer that contains changed database records to access a different database block (buffer steal). The number of buffer steals may be reduced by increasing the number of buffers in these database subpools.

DB LWA is a required function. The DCLWA keyword in the IMS SYSGEN is used to activate or deactivate DC LWA.

AP: Misc DLI-CTL Wait

The same as "AP: Misc DLI-Dep Wait", except that DL/I is waiting under the control task in the control region.

AP: Misc DLI-Dep Wait

This event is detected when the sampler finds DL/I was executing in the dependent region but was waiting in the IMS dispatcher for an event to complete. The sampler could not attribute the wait to any other category in the application program component. An IWAIT was issued by DL/I while executing in the dependent region.

If this event is ever a significant contributor to response time, call BMC Software Customer Support.

AP: Misc DLI-LSO Wait

The same as "AP: Misc DLI-Dep Wait", except that DL/I is waiting under the LSO task in the control region.

AP: Misc DLI-SAS Wait

The same as "AP: Misc DLI-Dep Wait", except that DL/I is waiting under the DL/I serial task in the DL/I subordinate address space.

AP: Misc DLI-XMEM Wait

The same as "AP: Misc DLI-Dep Wait", except that DL/I is waiting while in cross-memory mode using the hardware cross-memory op codes.

AP: MSDB Latch

During a sampling of the system, one or more transactions were waiting for an MSDB latch.

AP: OS Wait DL/I-CTL

The same as "AP: OS Wait DL/I-Dep", except that DL/I had switched to the CTL task and then went into the OS wait.

This is very serious because the control task supports the entire TP network; the network is hung while OS processes this DL/I request.

The following DL/I processing is always performed under the control task in the control region:

- DB OPEN, CLOSE, and EOV
- HSAM access
- CA Splits
- CI Splits
- VSAM BGWRT
- TP PCB calls
- VSAM database access if LSR pools

If this event is observed with high values, notify BMC Software Customer Support because DL/I OS requests generally are reported under other events within this flow component.

AP: OS Wait DL/I-Dep

During a sampling of the system, the application program had issued a DL/I call. DL/I was processing the call in the dependent region (through parallel DL/I) and DL/I had issued an OS request (macro, SVC, and the like), which resulted in an OS wait (WAIT).

If this event is observed with high values, notify BMC Software Customer Support because IMS OS requests generally are reported under other events within this flow component.

AP: OS Wait DL/I-LSO

The same as "AP: OS Wait DL/I-Dep", except that DL/I had switched to the LSO task and then went into the OS wait. `LSO=Y` was specified in the control region JCL.

If this event is observed with high values, notify BMC Software Customer Support because DL/I OS requests generally are reported under other events within this flow component.

AP: OS Wait DL/I-SAS

The same as "AP: OS Wait DL/I-Dep", except that DL/I had switched to the DL/I serial task in the DL/I subordinate address space and then went into the OS wait.

If this event is observed with high values, notify BMC Software Customer Support because DL/I OS requests generally are reported under other events within this flow component.

AP: OS Wait DL/I-XMEM

The same as "AP: OS Wait DL/I-Dep", except that DL/I was executing in the dependent region address space, but executing modules reside in the private area of the control region or DL/I subordinate address space. This is done by using cross-memory hardware op codes.

If this event is observed with high values, notify BMC Software Customer Support because DL/I OS requests generally are reported under other events within this flow component.

AP: OS Wait In Appl

During a sampling of the system, the application program was processing a message and had issued an OS request (macro, SVC, for example), which resulted in an OS wait (WAIT).

If this event is observed with high values, the application programs are being significantly degraded by OS requests outside the control of IMS.

AP: OSAM DB I/O Active

During a sampling of the system, the application program had issued a DL/I call that resulted in an OSAM I/O. At the time of the sample, the I/O was active against the database. Processing of the message is suspended until the I/O completes.

AP: OSAM DB I/O Queued

The same as "AP: OSAM DB I/O Active", except that the OSAM database I/O was queued on the logical channel or UCB because I/O contention prevented the successful initiation of the SIO instruction.

AP: Other Latch

During a sampling of the system, DL/I needed a specific IMS latch but the latch was already in use by another IMS task.

The data collector could not determine which latch was needed. Call BMC Software Customer Support if this event occurs frequently.

AP: Overflow Buffer Latch

A transaction is waiting for the overflow buffer latch. A high percentage of this event requires investigation of the OBA and NBA parameters in the regions. By increasing the number of normal buffers (NBA), the overflow buffers may not be used and the wait for the latch will not occur. Only one region can use the overflow buffers at one time.

AP: PI ENQ/DEQ Latch

During a sampling of the system, a program executing in a dependent region had issued a DL/I call that required the enqueuing of a database segment. The latch used to serialize the IMS routines that enqueue segments was already in use; this region had to wait.

During the processing of DL/I calls against databases, IMS ensures that database integrity is maintained by enqueuing database segments to prevent multiple updaters. This is called program isolation (PI) and is one of the mechanisms used by IMS to achieve its high level of data integrity.

This event is not the same as a PI wait. A PI wait occurs when an application program requests access to data that is already in use by another program. A PI latch wait occurs when an application program requests access to data and DL/I must check the enqueue status of the data, but the enqueue routine is already in use by another program.

A high occurrence of this event indicates that IMS is processing a very large number of PI enqueues and dequeues, or many page faults are occurring while it is accessing the PI pool.

AP: PI Wait

During a sampling of the system, a program executing in a dependent region had issued a DL/I call that required the enqueuing of a database segment. The database segment needed was already in use by another program and so this region had to wait.

During the processing of DL/I calls against databases, IMS ensures that database integrity is maintained by enqueuing database segments to prevent multiple updaters. This is called program isolation (PI) and is one of the mechanisms used by IMS to achieve its high level of data integrity.

A high occurrence of this event indicates that there is considerable contention for some database segments. The use of `PROCOPT=E` should be considered, as well as a redesign of the database to relieve the contention.

AP: QBLKS I/O Active

The same as "IC: QBLKS I/O Active" on page 480 except that the application program has issued a DL/I call against a TP PCB that resulted in I/O to the QBLKS data set.

AP: QBLKS I/O Queued

The same as "IC: QBLKS I/O Queued" on page 480, except that the application program has issued a DL/I call against a TP PCB that resulted in I/O to the QBLKS data set.

AP: SAS SYNC I/O Active

The same as "SC: SAS SYNC I/O Active" on page 503, except that the application program processing has begun.

AP: SAS SYNC I/O Queued

The same as "SC: SAS SYNC I/O Queued" on page 503, except that the application program processing has begun.

AP: SHMSG I/O Active

The same as "IC: SHMSG I/O Active" on page 481, except that the application program has issued a DL/I call against a TP PCB that resulted in I/O to the SHMSG data set.

AP: SHMSG I/O Queued

The same as "IC: SHMSG I/O Queued" on page 482, except that the application program has issued a DL/I call against a TP PCB that resulted in I/O to the SHMSG data set.

AP: Storage Mgt Latch

The same as "IC: Storage Mgt Latch" on page 482, except that it is DL/I that needs the latch.

AP: VSAM DB I/O Active

During a sampling of the system, the application program had issued a DL/I call that resulted in a VSAM I/O. At the time of the sample, the I/O was active against the database.
The processing of the message is suspended until the I/O completes.

AP: VSAM DB I/O Queued

The same as "AP: VSAM DB I/O Active", except that the VSAM database I/O was queued on the logical channel or UCB because I/O contention prevented the successful initiation of the SIO instruction.

AP: Waiting for Buffer

During a sampling of the system, one or more transactions were waiting for a Fast Path buffer.

AP: Waiting for CTL Task

The application program in the dependent region has issued a DL/I call, such as a message call, that requires processing under the control task in the control region.

The work is ready to be executed, but the control task is currently processing a different task so that this region's work must wait for dispatching by IMS.

AP: Waiting for SAS Task

The application program in the dependent region has issued a DL/I call, such as a message call, that requires processing under the DL/I serial task in the DL/I subordinate address space.

The work is ready to be executed, but the DL/I subordinate address space is currently processing a different task so that this region's work must wait for dispatching by IMS.

Input Communications (IC) Events

When a transaction enters the host from the network, it is first processed by input communications. This processing is a combination of an OS/390 access method and IMS formatting. Basically, input communications is responsible for receiving a message from the terminal network and placing it in the IMS input queue.

The following subsections list and define the events that may be shown for INPUT COMMUNICATIONS by the DWAIT display. They are arranged in alphabetical order.

IC: CBTS Latch

During a sampling of the system, IMS was processing a message and required the dynamic control block latch, but the latch was in use by another IMS task.

During a sampling of the system, while an input message was processing, additional space was needed in the communications input/output pool (CIOP), but sufficient free space was not available to meet the requirement. The CIOP is used by IMS for buffering network traffic and as a work area for editing MFS messages. An area is taken at control region startup for use by the MFS TEST facility (`MFS=` on the control region JCL) and VTAM RECEIVE ANY buffers are taken out of this pool at control region startup. The amount of CIOP used for RECEIVE ANY buffers is equal to the size of one buffer times the number requested (both on COMM macro in SYSDEF).

When this event occurs, the entire BTAM line or VTAM node is suspended until enough CIOP space becomes available. Consequently, this can be a very serious source of response network stoppage.

If this event is observed, it usually means that the `TPDP=` parameter on the control region JCL must be increased. Care must be taken not to specify too large a value because this area will be statically GETMAINed in the control region private address space.

IC: CPU Wait

During a sampling of the system, IMS was processing a message and was ready to use the CPU, but all CPUs were busy on higher priority work. Processing of the message is delayed until a CPU is available.

For input and output communications, this indicates that a particular communications task (ITASK) in the control region address space under the control task, was not receiving CPU cycles when needed.

IC: CSA Fault

During a sampling of the system, IMS was processing a message and suffered a page fault. Processing of the message is delayed until the fault is resolved.

For input and output communications, this indicates that a particular communications task (ITASK) in the control region address space under the control task, was accessing data or instructions in CSA when the fault occurred.

IC: CSA GFA CSA

During a sampling of the system, IMS was processing a message and a page fault occurred. Processing of the message is delayed until the fault is resolved. The page-in I/O process could not be executed, because no real frames were available. The page fault is placed on the general frame allocation (GFA) queue until the situation is resolved.

For input and output communications, this indicates that a particular communications task (ITASK) in the control region address space under the control task, was accessing data or instructions in CSA space when the fault occurred.

General frame allocation (GFA) page faults refer to the situation when a page fault occurs and the OS/390 real storage manager (RSM) did not have any available frames to allocate to the page fault. To find a frame to use, the system resources manager (SRM) is called to steal from existing users. This may result in a page-out operation that extends the page fault resolution time even more.

IC: DC Mon Latch

During a sampling of the system, IMS was processing a message and needed the DC Monitor latch but the latch was already in use by another IMS task. Processing of the message is suspended until the latch becomes available.

The DC monitor latch serializes the use of the DC Monitor in IMS. Whenever the DC Monitor is active, each call for it to move a new record to the buffers requires this latch. A high occurrence of this event indicates that the DC Monitor is very busy or that the DC Monitor is hung up in its attempt to do I/O to the DASD or tape file.

IC: Generic Latch

During a sampling of the system, IMS was processing a message and needed a generic latch but the latch was already in use by another IMS task. Processing of the message is suspended until the latch becomes available.

A generic latch is one that locks a caller-defined entity. Any part of IMS that requires serialization, but is not defined under one of the other specific latches, is locked by a generic latch. Currently, generic latches are used to lock updates for the items in the following table.

Table 7. Latch Locks

Generic Latch	Latch Target
DMBE	Data management block (DMB) updates
VSBP	VSAM buffer pool master updates
DBBP	OSAM buffer pool master updates

IC: LGMSG I/O Active

During a sampling of the system, IMS was processing a message and had I/O active against the LGMSG data set. Processing of the message is suspended until the I/O completes.

The LGMSG data set is used to save all message traffic for those messages IMS determines to be large. Excessive values for this event indicate that the queue buffer pool size should be

increased (`QBUF=` on the control region JCL). If the I/O to SHMSG is not approximately equal to the I/O to LGMSG, respecify the LRECL and BLKSIZE of both to balance the I/O to both data sets.

IC: LGMSG I/O Queued

During a sampling of the system, IMS was processing a message and had I/O queued for the LGMSG data set. Processing of the message is suspended until the I/O completes.

The LGMSG data set is used to save all message traffic for those messages IMS determines to be large. Excessive values for this event indicate that contention exists for the channel, control unit, head of string, or spindle where LGMSG is allocated. This could be caused by over-use by this host or by contention (RESERVE, for example) with another host.

IC: Log Buffer Wait

During a sampling, it was found that a buffer was not available for the current record to be logged and the communications task that created the record was waiting until a buffer was written to the data set.

Every major event that occurs in IMS results in a record being written to the IMS log. From this log, IMS supports recovery and accounting. This log is usually on tape to handle the volume produced.

Because of the critical nature of this data, the logging routines cause any task requesting their services (such as writing a record describing an event) to wait until the logging can be completed. Records are posted to an in-storage buffer, which is usually written to the log only when full. While one buffer is being written, posting can continue to another buffer, if available.

If many log buffer waits are occurring, the buffer size and/or number of buffers should be increased. Contention in the logging function can have a critical performance impact.

IC: Logical Log Latch

During a sampling of the system, IMS was processing a message and needed the logical logger latch but the latch was already in use by another IMS task. Processing of the message is suspended until the latch becomes available.

The logical logger latch serializes the use of the logical logger in IMS. The logical logger is that part of IMS responsible for maintaining the log buffers before they are written to IEFRDER and IEFRDER2. Originally this latch was used for only this purpose; however, in recent releases, this latch is used anytime part of IMS wants to serialize the entire online system. Consequently, a high occurrence of logical latch waits is generally a sign that something is really wrong outside of IMS. For example, if the log tape drive is not ready, the first sign of this in IMS is that the log buffers are all full and each task, as it attempts to place its log record in a log buffer, has to wait for this latch.

IC: LPA Fault

During a sampling of the system, IMS was processing a message and suffered a page fault. Processing of the message is delayed until the fault is resolved.

For input and output communications, this indicates that a particular communications task (ITASK) in the control region address space under the control task, was accessing data or instructions in LPA when the fault occurred.

IC: LPA GFA

During a sampling of the system, IMS was processing a message and suffered a page fault. Processing of the message is delayed until the fault is resolved. The page-in I/O process could not be executed because no real frames were available. The page fault is placed on the general frame allocation (GFA) queue until the situation is resolved.

For input and output communications, the indicates that a particular communications task (ITASK) in the control region address space under the control task was accessing data or instructions in LPA space when the fault occurred.

General frame allocation (GFA) page faults refer to the situation when a page fault occurs and the OS/390 real storage manager (RSM) did not have any available frames to allocate to the page fault. To find a frame to use, the system resources manager (SRM) is called to steal from existing users. This may result in a page-out operation that extends the page fault resolution time even more.

IC: LWA Wait

During a sampling of the system, IMS input message processing was in a DC LOG WRITE AHEAD (LWA) wait status. It was waiting for a log record to be physically written to the log before processing could continue. This ensures data integrity in case of failure.

If necessary, IMS writes the log buffer containing this record even if the buffer is not yet full. This is the normal signal for the I/O operation (see "SC: Log Buffer Wait" on page 499 for more information about logging.).

DB LWA is a required function. The DCLWA keyword in the IMS SYSGEN is used to activate or deactivate DC LWA.

IC: MFS Blk I/O Active

During a sampling of the system, IMS was processing a message and had I/O active against the MFS data set. Processing of the message is suspended until the I/O completes.

The MFS data set contains the MFS control blocks (DIF, MID, MOD, and DOF) needed to edit a message. Excessive values for this event indicate that the MFS pool should be enlarged.

IC: MFS Blk I/O Queued

During a sampling of the system, IMS was processing a message and had I/O queued for the MFS data set. Processing of the message is suspended until the I/O completes.

The MFS data set contains the MFS control blocks (DIF, MID, MOD, and DOF) needed to edit a message. Excessive values for this event indicate that contention exists for the channel, control unit, head of string, or spindle where the MFS data set is allocated. This could be caused by over-use by this host or by contention (RESERVE, for example) with another host.

IC: MFS Dir I/O Active

During a sampling of the system, IMS was processing a message and had I/O active against the MFS data set directory. Processing of the message is suspended until the I/O completes.

The MFS directory is searched any time an MFS block is needed that is not in the MFS pool and there is no in-core directory entry for it. Excessive values for this event indicate that the incore directory should be expanded or that the MFS pool should be enlarged.

IC: MFS Dir I/O Queued

During a sampling of the system, IMS was processing a message and had I/O queued for the MFS data set directory. Processing of the message is suspended until the I/O completes.

The MFS directory is searched any time an MFS block is needed that is not in the MFS pool and there is no in-core directory entry for it. Excessive values for this event indicate that contention exists for the channel, control unit, head of string, or spindle where the MFS data set is allocated. This could be caused by over-use by this host or by contention (RESERVE, for example) with another host.

IC: MFS FRE Unavailable

During a sampling of the system, MFS was in the process of editing a message, but there were no fetch request elements (FREs) available. FREs are used by MFS to manage control blocks in the MFS pool. Each DIF, MID, MOD, and DOF in the pool, and each one that is read in require one FRE each.

When this event occurs, the entire BTAM line or VTAM node is suspended until a FRE is freed. Consequently, this can be a very serious source of response network stoppage.

If this event is observed, it usually means that the FRE parameter on the control region JCL must be increased. Care must be taken not to specify too large a value because each FRE takes 40 bytes away from the MFS pool.

IC: MFS Pool Failure

During a sampling of the system, while a message was processing, additional space was needed in the message format services pool (MFSP), but there was not enough continuous free space to meet the requirement. The MFSP is used by IMS to hold MFS control blocks (DIF/MID on input, MOD/DOF on output). In addition, the in-core directory ($$IMSDIR) and MFS fetch request elements (FREs) are taken out of the pool at control region startup.

When this event occurs, the entire BTAM line or VTAM node is suspended until enough MFS pool space becomes available. Consequently, this can be a very serious source of response network stoppage.

If this event is observed, it usually means that the FBP parameter on the control region JCL must be increased. Care must be taken not to specify too large a value because this area will be statically GETMAINed in the control region private address space. The amount of the MFS pool space used for FREs is equal to the number of FREs (`FRE=` on control region JCL) times 40 bytes, the length of 1 FRE. The size of $$IMSDIR can be determined by running the MFS service utility with a LIST INDEX or by calculating its size, knowing that each directory entry is 14 bytes long. This information is also available from the MFSST service.

IC: OS Wait

During a sampling of the system, IMS was processing a message and had issued an OS request (macro or SVC, for example), which resulted in an OS wait (WAIT). The data collector could not assign the wait to any other category in input or output communications.

If this event is ever observed with high values, please contact BMC Software Customer Support.

IC: Other IMS Wait

During a sampling of the system, IMS was processing a message and had issued an internal IMS wait (IWAIT). The data collector was unable to assign the wait to any other category in input or output communications.

If this event is ever observed with high values, please contact BMC Software Customer Support.

IC: Other Latch

During a sampling of the system, IMS was processing a message and needed a specific IMS latch, but the latch was already in use by another IMS task. Processing of the message is suspended until the latch becomes available.

The data collector could not determine which latch was needed. Call BMC Software Customer Support if this event occurs.

IC: PI ENQ/DEQ Latch

During a sampling of the system, IMS was processing an input message that required executing an enqueue of a database segment. The latch used to serialize the IMS routines that enqueue segments was already in use; this message had to wait.

During the processing of calls against databases, IMS ensures that database integrity is maintained by enqueuing database segments to prevent multiple updating. This is called program isolation (PI) and is one of the mechanisms used by IMS to achieve its high level of data integrity.

Do not confuse this event with a PI wait. A PI wait occurs when an application program requests access to data that is already in use by another program. A PI latch wait occurs when an application program requests access to data and DL/I must check the enqueue status of the data, but the enqueue routine is already in use by another program.

A high occurrence of this event indicates that IMS is processing a very large number of PI enqueues and dequeues, or many page faults are occurring while it is accessing the PI pool.

IC: Prv Fault

During a sampling of the system, IMS was processing a message and a page fault occurred. Processing of the message is delayed until the fault is resolved.

For input and output communications, this indicates that a particular communications task (ITASK) in the control region address space under the control task, was accessing data or instructions in the private area of the control region address space when the fault occurred.

IC: Prv GFA

During a sampling of the system, IMS was processing a message and a page fault occurred. Processing of the message is delayed until the fault is resolved. The page-in I/O process could not be executed because no real frames were available. The page fault is placed on the general frame allocation (GFA) queue until the situation is resolved.

For input and output communications, this indicates that a particular communications task (ITASK) in the control region address space under the control task was accessing data or instructions in the private control region address space when the fault occurred.

General frame allocation (GFA) page faults refer to the situation when a page fault occurs and the OS/390 real storage manager (RSM) did not have any available frames to allocate to the page fault. To find a frame to use, the system resources manager (SRM) is called to steal from existing users. This may result in a page-out operation that extends the page fault resolution time even more.

IC: QBLKS I/O Active

During a sampling of the system, IMS was processing a message and had I/O active against the QBLKS data set. Processing of the message is suspended until the I/O completes.

The QBLKS data set is used to anchor various messages found in SHMSG and LGMSG. Excessive values for this event indicate that the queue buffer pool should be increased (`QBUF=` on the control region JCL).

IC: QBLKS I/O Queued

During a sampling of the system, IMS was processing a message and had I/O queued for the QBLKS data set. Processing of the message is suspended until the I/O completes.

The QBLKS data set is used to anchor various messages found in SHMSG and LGMSG. Excessive values for this event indicate that contention exists for the channel, control unit, head of string, or spindle where QBLKS is allocated. This could be caused by over-use by this host or by contention (RESERVE, and the like) with another host.

IC: SAP Unavailable

During a sampling of the system, an input message was received from the network, but IMS had not dispatched input communications to process the message because no save area prefix (SAP) was available. A SAP is the master control block needed by IMS to dispatch any unit of IMS work. The entire BTAM line or VTAM node is suspended until a SAP is freed by another unit of work. Consequently, this can be a very serious source of response network stoppage.

If this event is observed, it usually means that the SAV parameter on the control region JCL must be increased. Care must be taken not to specify too large a value because each SAP requires approximately 1000 bytes in the control region private address space.

During a sampling of the system, an input message was received from the network, but IMS had not dispatched input communications to process the message because CIOP or HIOP utilization had exceeded 95%, thus preventing further dispatching of new units of IMS communications work. This curtailing of dispatching is called selective dispatching and can be caused by CIOP, HIOP, or SAP shortages. The CIOP is used by IMS for buffering network traffic and as a work area for editing MFS messages. In addition, an area is taken out at control region startup for use by the MFS TEST facility (`MFS=` in control region JCL) and VTAM RECEIVE ANY buffers are taken out of this pool at control region startup. The amount of CIOP used for RECEIVE ANY buffers is equal to the size of one buffer times the number requested (both on COMM macro in SYSDEF).

When this event occurs, the entire BTAM line or VTAM node is suspended until CIOP utilization drops below 85%. Consequently, this can be a very serious source of response network stoppage.

If this event is observed, it usually means that the TPDP parameter on the control region JCL must be increased. Care must be taken not to specify too large a value because this area will be statically GETMAINed in the control region private address space.

IC: Sel Dsp - SAP

During a sampling of the system, an input message was received from the network, but IMS had not dispatched input communications to process the message because the number of save area prefixes (SAPs) in use exceeded 95%, thus preventing further dispatching of new units of IMS communications work. This curtailing of dispatching is called selective dispatching and can be caused by CIOP or SAP shortages. A SAP is the master control block needed by IMS to dispatch any unit of IMS communications work.

When this event occurs, the entire BTAM line or VTAM node is suspended until SAP utilization drops below 85%. Consequently, this can be a very serious source of response network stoppage.

If this event is observed, it usually means that the SAV parameter on the control region JCL must be increased. Care must be taken not to specify too large a value because each SAP requires 1000 bytes in the control region private address space.

IC: SHMSG I/O Active

During a sampling of the system, IMS was processing a message and had I/O active against the SHMSG data set. Processing of the message is suspended until the I/O completes.

The SHMSG data set is used to save all message traffic for those messages IMS determines to be small. Excessive values for this event indicate that the queue buffer pool should be increased (`QBUF=` on control region JCL). If the I/O to SHMSG is not approximately equal to the I/O to LGMSG, respecify the LRECL and BLKSIZE of both to balance the I/O to these data sets.

IC: SHMSG I/O Queued

During a sampling of the system, IMS was processing a message and had I/O queued for the SHMSG data set. Processing of the message is suspended until the I/O completes.

The SHMSG data set is used to save all message traffic for those messages IMS determines to be small. Excessive values for this event indicate that contention exists for the channel, control unit, head of string, or spindle where SHMSG is allocated. This could be caused by overuse by this host or by contention (RESERVE, for example) with another host.

IC: SPA I/O Active

During a sampling of the system, IMS was processing a message and had I/O active against the scratch pad area (SPA) data set. Processing of the message is suspended until the I/O completes.

The SPA data set is used to hold all SPAs defined to reside on DASD. Excessive values for this event indicate that consideration should be given to converting some of the DASD-based conversations to main storage (CORE).

IC: SPA I/O Queued

During a sampling of the system, IMS was processing a message and had I/O queued for the SPA data set. Processing of the message is suspended until the I/O completes.

The scratch pad area (SPA) data set is used to hold all SPAs defined to reside on DASD. Excessive values for this event indicate that contention exists for the channel, control unit, head of string, or spindle where SPA is allocated. This could be caused by over-use by this host or by contention (RESERVE, for example) with another host.

IC: Storage Mgt Latch

During a sampling of the system, IMS was processing a message and needed the storage management latch but the latch was already in use by another IMS task. Processing of the message is suspended until the latch becomes available.

The storage management latch is used by the main storage management routines in IMS to create and destroy buffer pools and to get and free buffers within those pools. Because of the design of this part of IMS, storage management must be serialized; thus, this latch.

A high occurrence of this event is a sign that IMS is in extreme trouble because storage management executes quite quickly for each request and usually does not suspend. Any requests for storage that require a wait (IWAIT) frees the latch before waiting; therefore, pool space failures does not result in a high occurrence of this latch event.

IC: Using CPU

During a sampling of the system, IMS was processing a message and a CPU was actively executing instructions on behalf of the task. If a task is not waiting for any of the previously stated reasons, it must be in this state.

For input and output communications, this indicates that a particular communications task (ITASK) in the control region address space under the control task, was receiving CPU cycles.

Input Queue (IQ) Events

The final result of the input communications process is an input message queued on the IMS input queue. It will remain there until a message region or batch message region becomes available to process it. There are several reasons why the IMS message scheduler might be unable to schedule a dependent region with the necessary application program.

Whenever the workload wait sampler accumulates statistics for the target IMS system, each message (subject to user parameters) on the input queue will be accounted for under one of the categories listed in this subsection. These reasons explain the cause of the work slowdown in this area of IMS processing.

The following subsections list and define the events that may be shown for INPUT QUEUE by the DWAIT display. The descriptions are in alphabetical order.

IQ: All MPR's Busy

During a sampling of the system, there were messages waiting in the input queue for an MPP that was not active in any region and all the regions capable of processing the associated class were busy with other MPPs.

A high occurrence of this event could be an indication that the MPRs should be reclassed or additional regions should be started.

IQ: BMP GU

During a sampling of the system, there were messages waiting in the input queue destined for a BMP and the BMP was currently scheduled in one or more regions. The PROCLIM was such that these messages would be processed in one of the same regions that is already active without a reschedule.

IQ: BMP Not Active

During a sampling of the system, there were messages waiting in the input queue destined for a BMP program. The BMP was not scheduled and the messages will remain queued until the BMP is initiated.

IQ: BMP Unschedulable

During a sampling of the system, there were messages waiting in the input queue destined for a BMP, but the BMP could not be scheduled because of resource problems.

The following resource problems are typical:

- Transaction code (SMB) stopped
- Transaction code (SMB) pstopped
- Transaction code (SMB) locked
- PSB locked
- Program stopped
- PSB-sensitive database stopped
- PSB-sensitive database locked
- PSB not found in ACBLIB
- Program locked

IQ: IFP GU

A transaction is waiting on the balancing group queue for an available IFP. A high percentage of this event indicates that more IFP regions may be required to process Fast Path transactions or the IFP regions cannot process transactions quickly because of some resource contention.

IQ: MPP Class Not Active

During a sampling of the system, there were messages waiting in the input queue destined for an MPP, but the class of the transaction was not processable by any of the active message regions. The messages remain in the queue until the classes of existing regions are changed or until additional regions are started.

IQ: MPP GU

During a sampling of the system, there were messages waiting in the input queue destined for an MPP and the MPP was currently scheduled in one or more regions. The PROCLIM was such that these messages would be processed in one of the same regions that is already active without a reschedule.

IQ: MPP Schd Blocked

During a sampling of the system, there were messages waiting in the input queue destined for an MPP, but the MPP was not scheduled. At least one region with the appropriate class was inactive, but it could not schedule this transaction because the scheduling options (`SCHD=` on TRANSACT macro) prevented it. The inactive region(s) were suspended because of INTENT or pool space failures, but IMS was not allowed to look for other work to schedule in the region. If it were, this transaction would be scheduled.

A high incidence of this event indicates over-restrictive use of a SCHD parameter in the IMS SYSGEN.

IQ: MPP Unschedulable

During a sampling of the system, there were messages waiting in the input queue destined for an MPP, but the MPP could not be scheduled because of resource problems.

The following resource problems are typical:

- Transaction code (SMB) stopped
- Transaction code (SMB) pstopped
- Transaction code (SMB) locked
- PSB locked
- Program stopped
- PSB-sensitive database stopped
- PSB-sensitive database locked
- PSB not found in ACBLIB
- Program locked
- Transaction class stopped
- Transaction class set to zero

IQ: PROCLIM Reschedule

During a sampling of the system, there were messages waiting in the input queue destined for an MPP that was active in one or more regions, but the PROCLIM value was such that a reschedule had to occur before the queued messages could be processed.

A high occurrence of this event could be an indication that the PROCLIM values should be increased.

Output Communications (OC) Events

During SYNC point processing all output messages generated by the application program are placed in the output queue. When the destination BTAM line or VTAM node becomes available, output communications is invoked by IMS to send the queued messages. Output communications is a combination of an OS access method and IMS formatting. Basically, output communications is responsible for taking a message out of the queue and sending it to the network.

The events associated with output communications are identical to those for input communications (see "Input Communications (IC) Events" on page 474 for the detailed event descriptions).

Output Queue (OQ) Events

The output messages generated by the application program are made available for transmission as part of SYNC point processing. An exception to this is the messages placed in the queue using ISRT and PURG calls against an EXPRESS TP PCB. These messages are available for transmission immediately following the completion of the PURG DL/I call.

Output messages remain on the IMS output queue until IMS output communications is ready to issue the necessary OS access method request. If the network resources are unavailable, these messages also remain on the queue.

For this major processing event component, the workload wait display provides the information needed to determine if there are any significant delays in output traffic. The reasons why the messages are remaining in the queue are given.

For those messages destined for a remote system, MSC delays caused by link problems are accounted for separately.

The following subsections list and define the events that may be shown for OUTPUT QUEUE by the DWAIT display. The descriptions are in alphabetical order.

OQ: Line Busy

During a sampling of the system, there was a message in the output queue destined for an LTERM, but the associated BTAM line was busy.

This event may be reported in a system with a VTAM network, if the OS console WTOR is used to communicate with IMS. IMS and MVIMS both consider the WTOR as LINE 1, PTERM 1, and not as a node.

OQ: Line Unavailable

During a sampling of the system, there was a message in the output queue destined for an LTERM, but the associated BTAM line was unavailable.

This event may be reported in a system with a VTAM network, if the OS console WTOR is used to communicate with IMS. IMS and MVIMS both consider the WTOR as LINE 1, PTERM 1, and not as a node.

The following resource problems are typical:

- BTAM Line stopped
- BTAM Line pstopped
- BTAM Line locked
- BTAM terminal inoperable
- BTAM terminal stopped
- BTAM terminal pstopped
- BTAM terminal locked

OQ: LTERM Unavailable

During a sampling of the system, there was a message in the output queue destined for an LTERM, but the LTERM was unavailable.

The following resource problems are typical:

- LTERM stopped
- LTERM pstopped
- LTERM locked

OQ: MSC L-Link Unavailable

During a sampling of the system, there was a message in the output queue destined for a remote terminal, but the associated MSC logical link was unavailable.

The following resource problems are typical:

- Link stopped
- Link pstopped
- Link locked
- PTERM stopped
- PTERM pstopped
- PTERM locked

OQ: MSC P-Link Busy

During a sampling of the system, there was a message in the output queue destined for a remote terminal, but the associated MSC physical link was busy.

OQ: MSC P-Link Unavailable

During a sampling of the system, there was a message in the output queue destined for a remote terminal, but the associated MSC physical link was unavailable.

The following resource problems are typical:

- Link stopped
- Link pstopped
- Link locked
- Link inoperable
- PTERM stopped
- PTERM pstopped
- PTERM locked

OQ: Node Busy

During a sampling of the system, there was a message in the output queue destined for an LTERM, but the associated VTAM node was busy.

OQ: Node Unavailable

During a sampling of the system, there was a message in the output queue destined for an LTERM, but the associated VTAM node was unavailable.

The following resource problems are typical:

- VTAM node stopped
- VTAM node pstopped
- VTAM node locked
- VTAM terminal stopped
- VTAM terminal pstopped

Scheduling (SC) Events

When a dependent region becomes available to process an input message, the IMS scheduler is invoked.

The IMS scheduler is responsible for acquiring the resources needed by the application and then invoking the application.

There is a delay between the time the scheduler takes a message out of the queue and the time the application requests it for processing. The workload wait sampler accumulates slowdowns in this area under the scheduler component of flow.

To Workload Analyzer, the actual searching for and loading of the application program in the dependent region is included as scheduler processing. This is a different approach from that taken by other IMS performance tools such as the DC Monitor. Workload Analyzer takes this approach because the activity that occurs in the dependent region seems to be scheduling-type activity and the application program is not responsible for delays in this area. With this approach, the workload wait analyzer differentiates between scheduling work performed in the control region and scheduling work performed in the dependent region, which makes it easy to determine if there is a scheduling problem in the control or dependent region.

The following subsections list and define the events that may be shown for SCHEDULING by the DWAIT display.

SC: BLR Busy - BMP

The IMS initialization routine for a BMP region was attempting to allocate the needed PSB and DMBs. Before the BMP program can be called, the associated PSB and DMBs must be in the main storage pools. The IMS block loader is used to ensure that these blocks are in storage. The block loader can be in use for only one region at a time; to ensure this, IMS maintains a lock that is held by the region currently loading blocks from ACBLIB.

The workload wait sampler detected a BMP that needed the services of the block loader, but it was in use by another dependent region. This BMP region had to wait for the block loader, and, therefore, the transaction was suspended and the region was suspended.

The only way to reduce this contention for the block loader is to reduce the number of schedules performed by IMS or to reduce the time the block loader is used.

Scheduling activity may be reduced by:

- Using Wait-For-Input regions
- Increasing the PROCLIM value

The time the block loader is in use may be reduced by:

- Making some PSBs and DMBs RESIDENT
- Page fixing the PSBP and DMBP pools
- Increasing the size of the PSBP and DMBP pools

The use of the block loader and the contention for it is, to a large degree, intrinsic in the IMS design.

SC: BLR Busy - DBT

Similar to "SC: BLR Busy - BMP" on page 490, but the scheduler is executing in a DBT region.

SC: BLR Busy - MPP

The IMS MPP region scheduler was in the process of scheduling an MPP. Before the MPP can be called, the associated PSB and DMBs must be in the main storage pools. The IMS block loader is used to ensure that these blocks are in storage. The block loader can only be in use for one region at a time and to ensure this, IMS maintains a lock that is held by the region currently loading blocks from ACBLIB.

The workload wait sampler detected an MPP region that needed the services of the block loader, but it was in use by another dependent region. This MPR had to wait for the block loader and, therefore, the transaction was suspended and the MPR was suspended.

The only way to reduce this contention for the block loader is to reduce the number of schedules performed by IMS or by reducing the time the block loader is used. Scheduling activity may be reduced by:

- Using Wait-For-Input regions.
- Increasing the PROCLIM value. The time the block loader is in use may be reduced by:
- Making some PSBs and DMBs RESIDENT.
- Page fixing the PSBP and DMBP pools.
- Increasing the size of the PSBP and DMBP pools.

The use of the block loader and the contention for it is, to a large degree, intrinsic in the IMS design.

SC: CBTS Latch

During the sampling of the system, IMS was scheduling a region and required the dynamic control block latch but the latch was in use by another IMS task.

SC: CTL SYNC I/O Active

During a sampling of the system, the IMS scheduler, executing in the control region, had issued a request to OS/390 for an unidentified I/O operation. IMS issues miscellaneous I/Os that result in implied waits within OS/390. This can seriously impact IMS performance, because implied waits suspend the entire control task of IMS while OS/390 executes the I/O, such as directory searches (BLDL) of the ACBLIB, to locate a PSB:I1.ACBLIB specified as DOPT.

SC: CTL SYNC I/O Queued

The same as "SC: CTL SYNC I/O Active" above, except that the I/O cannot be started because of I/O subsystem contention. The I/O is queued on the logical channel or UCB.

SC: DB Intent - BMP

During the initialization of a BMP region, IMS could not complete the setup, because the subject thread's PSB contained a PCB with `PROCOPT=E`, but the object database was already in use by another dependent region. Conversely, the BMP thread may not need exclusive use of the database, but a program is already scheduled with `PROCOPT=E` against the database. As a result, the region remains suspended until the database is no longer in use by other regions or until the owning `PROCOPT=E` program completes. The associated transaction is also suspended.

`PROCOPT=E` should be used judiciously and a high occurrence of this event indicates that it has been used inappropriately. A high occurrence of PI waits in the application programs indicates that `PROCOPT=E` should be considered.

SC: DB Intent - DBT

Similar to "SC: DB Intent - BMP", but the scheduler is executing in a DBT region.

SC: DB Intent - MPP

During the scheduling of an MPR, IMS could not complete the setup because the subject MPP's PSB contained a PCB with `PROCOPT=E`, but the object database was already in use by another dependent region. Conversely, the MPP may not need exclusive use of the database, but a program is already scheduled with `PROCOPT=E` against the database.

As a result, the region remains suspended until the database is no longer in use by other regions or until the owning `PROCOPT=E` program completes. The associated transaction is also suspended.

`PROCOPT=E` should be used judiciously; a high occurrence of this event indicates that it has been used inappropriately. A high occurrence of PI waits in the application programs indicates that `PROCOPT=E` should be considered.

The SCHD parameter on the TRANSACT macro of the IMS SYSGEN tells IMS what to do if an intent failure occurs. Use of this parameter can prevent the region from remaining suspended if other work is in the input queue and can be processed in this region. The transaction that failed because of INTENT is placed back in the queue and another message is selected for scheduling.

SC: DBWP Pool - BMP

Once an application program starts executing, it issues DL/I calls. DL/I requires a work area for accessing the databases. The DB work pool is used for this purpose. The ACBGEN process placed the DB work pool requirement for a given DMB in the DMB itself.

As part of the scheduling process, the block loader reserves an area in the DB work pool of size equal to the sum of all the DMBs the PSB is sensitive to. If there is insufficient room in the pool, the scheduler waits for space.

As a general rule, waits of this type should never occur if the DB work pool has been sized accurately. IBM's ADF product and Data Dictionary product can require substantial space in this pool.

SC: DBWP Pool - DBT

Similar to "SC: DBWP Pool - BMP", but the scheduler is executing in a DBT region.

SC: DBWP Pool - MPP

See "SC: DBWP Pool - BMP".

SC: DC Mon Latch

During a sampling of the system, IMS was processing a message and needed the DC Monitor latch but the latch was already in use by another IMS task. Processing of the message is suspended until the latch becomes available.

The DC monitor latch serializes the use of the DC Monitor in IMS. Whenever the DC Monitor is active, each call for it to move a new record to the buffers requires this latch. A high occurrence of this event indicates that the DC Monitor is very busy or that the DC Monitor is hung up in its I/O attempt to the DASD or tape file.

SC: DMB I/O Active

During a sampling of the system, the IMS scheduler, executing in the control region, had issued a request to OS/390 to read in a DMB for a database needed by the program being scheduled. The ACBGEN utility builds a DMB from the DBD in DBDLIB. The DMB describes the structure of a database.

Some ways to reduce DMB I/O requirements are:

- Make the DMB RESIDENT using the DATABASE macro
- Reduce the number of different DMBs by creating common ones
- Increase the size of the DMBP pool to allow more DMBs to be in the pool concurrently

SC: DMB I/O Queued

The same as "SC: DMB I/O Active", except that the I/O to load the DMB from ACBLIB cannot be started because of I/O subsystem contention. The I/O is queued on the logical channel or UCB.

SC: DMBP Pool - BMP

Before a transaction can be processed, all the databases specified in the associated PSB must have their DMBs in the DMB pool. During the scheduling process, the block loader ensures that all DMBs are in main storage.

During a sampling, a transaction was found that was in the process of being scheduled, but at least one DMB was not already in main storage and there was insufficient room in the pool to bring it in. The scheduling process for this transaction is suspended until there is enough room in the pool.

There are several ways to reduce DMB pool failures:

- Make some of the DMBs RESIDENT (specify RESIDENT on the DATABASE macro and `RES=Y` on the IMS control region JCL). These DMBs are brought into virtual storage at control region startup in an area separate from the DMB pool.
- Increase the size of the pool so that most DMBs in concurrent use can fit in the pool.

DMBs are reentrant control blocks, and, therefore, all regions accessing the same database use the same DMB. No more than one copy of a DMB is ever in storage at one time.

A high price is paid if the block loader deletes unused DMBs from the pool to make room for a new one. First, the DMB being freed requires that the database be CLOSEd because the database's DCB is contained within the DMB. Second, the new DMB being brought into the pool requires that the associated database be OPENed.

SC: DMBP Pool - DBT

Similar to “SC: DMBP Pool - BMP”, but the scheduler is executing in a DBT region.

SC: DMBP Pool - MPP

See “SC: DMBP Pool - BMP”.

SC: FETCH I/O Active

During a sampling of the system, the IMS scheduler, executing in the dependent region, had issued a request to OS/390 to load the application program. OS/390 program fetch had issued I/O to STEPLIB or LNKLST, and the I/O is active.

The application program must be fetched for each schedule unless it is preloaded or brought in through a virtual fetch. Program fetch often accounts for a significant part of a transaction time-in-system. Some ways to reduce fetch I/O requirements are:

- Preload highly used programs
- Use wait-for-input programs
- Use virtual fetch
- Run highly used MPPs in BMP mode.

SC: FETCH I/O Queued

The same as "SC: FETCH I/O Active" on page 494, except that the program fetch I/O cannot be started because of I/O subsystem contention. The I/O is queued on the logical channel or UCB.

SC: Generic Latch

During a sampling of the system, IMS was processing a message and needed a generic latch but the latch was already in use by another IMS task. Processing of the message is suspended until the latch becomes available.

A generic latch is one that locks a caller-defined entity. Any part of IMS that requires serialization but is not defined under one of the other specific latches is locked by a generic latch. Generic latches are used to lock updates for the items in the following table:

Table 8. Latch Locks

Generic Latch	Latch Target
DMBE	Data management block (DMB) updates
VSBP	VSAM buffer pool master updates
DBBP	OSAM buffer pool master updates

SC: IMS-CTL CPU Wait

The same as "SC: IMS-Dep CPU Wait" on page 496, except that the scheduler is waiting for a CPU in the control region.

SC: IMS-CTL CSA Fault

The same as "SC: IMS-Dep Prv Fault" on page 497, except that the scheduler was accessing data or instructions in CSA while executing under the control task in the control region.

SC: IMS-CTL CSA GFA

The same as "SC: IMS-Dep Prv GFA" on page 497, except that the scheduler was accessing data or instructions in CSA while executing under the control task in the control region.

SC: IMS-CTL LPA Fault

The same as "SC: IMS-Dep Prv Fault" on page 497, except that the scheduler was accessing data or instructions in LPA while executing under the control task in the control region.

SC: IMS-CTL LPA GFA

The same as "SC: IMS-Dep Prv GFA" on page 497, except that the scheduler was accessing data or instructions in LPA while executing under the control task in the control region.

SC: IMS-CTL Prv Fault

The same as "SC: IMS-Dep Prv Fault" on page 497, except that the scheduler was accessing data or instructions in the private area of the control region while executing under the control task in the control region.

SC: IMS-CTL Prv GFA

The same as "SC: IMS-Dep Prv GFA" on page 497, except that the scheduler was accessing data or instructions in the private area of the control region while executing under the control task in the control region.

SC: IMS-CTL Using CPU

The same as "SC: IMS-Dep Using CPU" on page 497, except that the scheduler is active on a CPU in the control region.

SC: IMS-Dep CPU Wait

The scheduler was executing in the dependent region and was not waiting for any event to occur. The scheduler work could be executed, but there were no CPUs available to process it. In the case of a UP processor, the CPU was executing other work (IMS or non-IMS) in the system. For MP processors, all the CPUs were busy with other work.

From an OS viewpoint, the dependent region program control task was on the OS dispatcher work-to-do queue. A high occurrence of this event indicates that the CPU is not fast enough or that too much higher-priority work was using the CPU cycles.

SC: IMS-Dep CSA Fault CSA

The same as "SC: IMS-Dep Prv Fault" on page 497, except that the scheduler was accessing data or instructions in CSA.

SC: IMS-Dep CSA GFA CSA

The same as "SC: IMS-Dep Prv GFA" on page 497, except that the scheduler was accessing data or instructions in CSA.

SC: IMS-Dep LPA Fault

The same as "SC: IMS-Dep Prv Fault" on page 497, except that the scheduler was accessing data or instructions in LPA.

SC: IMS-Dep LPA GFA

The same as "SC: IMS-Dep Prv GFA" on page 497, except that the scheduler was accessing data or instructions in LPA.

SC: IMS-Dep Prv Fault

During a sampling of the system, the IMS scheduler was processing a message and suffered a page fault. Processing of the message is delayed until the fault is resolved.

For the scheduler, this indicates that a particular IMS scheduler task (ITASK) in the dependent region address space under the program control task was accessing data or instructions in the private area of the dependent region address space when the fault occurred.

SC: IMS-Dep Prv GFA

During a sampling of the system, the IMS scheduler was processing a message and suffered a page fault. Processing of the message is delayed until the fault is resolved. The page-in I/O process could not be executed because no real frames were available. The page fault is placed on the general frame allocation (GFA) queue while the situation is dealt with.

For the scheduler, this indicates that a particular IMS scheduler task (ITASK) in the dependent region address space under the program control task was accessing data or instructions in the private area of the dependent region address space when the fault occurred.

General frame allocation (GFA) page faults refer to the situation when a page fault occurs and the OS/390 real storage manager (RSM) did not have any available frames to allocate to the page fault. To find a frame to use, the system resources manager (SRM) is called to steal from existing users. This may result in a page-out operation that extends the page fault resolution time even more.

SC: IMS-Dep Using CPU

The scheduler was executing in the dependent region and was not waiting for any event to occur. The scheduler work could be executed and, in fact, a CPU was actively processing it. In the case of a UP processor, the CPU was executing this scheduler task. For MP processors, one of the CPUs was executing the scheduling task.

A high occurrence of this event indicates that the scheduling parameters in the IMS SYSGEN are so involved that the scheduler spends a lot of CPU cycles to prepare a region for execution.

SC: IMS-SAS CPU Wait

The same as "SC: IMS-Dep CPU Wait" on page 496, except that the scheduler is waiting for a CPU in the DL/I subordinate address space under the DL/I serial task.

SC: IMS-SAS CSA Fault

The same as "SC: IMS-Dep Prv Fault", except that the scheduler was accessing data or instructions in CSA while executing under the DL/I serial task in the DL/I subordinate address space.

SC: IMS-SAS CSA GFA

The same as "SC: IMS-Dep Prv GFA", except that the scheduler was accessing data or instructions in CSA while executing under the DL/I serial task in the DL/I subordinate address space.

SC: IMS-SAS LPA Fault

The same as "SC: IMS-Dep Prv Fault" on page 497, except that the scheduler was accessing data or instructions in LPA while executing under the DL/I serial task in the DL/I subordinate address space.

SC: IMS-SAS LPA GFA

The same as "SC: IMS-Dep Prv GFA" on page 497, except that the scheduler was accessing data or instructions in LPA while executing in the DL/I subordinate address space.

SC: IMS-SAS Prv Fault

The same as "SC: IMS-Dep Prv Fault" on page 497, except that the scheduler was accessing data or instructions in the private area of the DL/I subordinate address space while executing under the DL/I serial task in the DL/I subordinate address space.

SC: IMS-SAS Using CPU

The same as "SC: IMS-Dep Using CPU" on page 497, except that the scheduler is active on a CPU in the DL/I subordinate address space under the DL/I serial task.

SC: IMS-SAS Prv GFA

The same as "SC: IMS-Dep Prv GFA" on page 497, except that the scheduler was accessing data or instructions in the private area of the DL/I subordinate address space while executing under the DL/I serial task in the DL/I subordinate address space.

SC: Int List I/O Active

During a sampling of the system, the IMS scheduler, executing in the control region, had issued a request to OS/390 to read in the intent list for the program to be scheduled. The ACBGEN utility builds an intent list for each PSB. The intent list is used by IMS to determine if the application program's intent against its databases is in conflict with any other currently active PSBs.

Some ways to reduce intent list I/O requirements are:

- Make the intent lists RESIDENT using the APPLCTN macro
- Reduce the number of different PSBs by creating common ones
- Increase the size of the PSBP pool to allow more intent lists to be in the pool concurrently

SC: Int List I/O Queued

The same as "SC: Int List I/O Active", except that the intent list I/O cannot be started because of I/O subsystem contention. The I/O is queued on the logical channel or UCB.

SC: IRLM Wait

During a sampling of the system, the IMS scheduler, executing in the control region, had issued a request to the IRLM because of database block level sharing. This request resulted in a wait.

SC: LGMSG I/O Active

The same as "IC: LGMSG I/O Active" on page 475, except that the LGMSG I/O is because of a request from the IMS scheduler.

SC: LGMSG I/O Queued

The same as "IC: LGMSG I/O Queued" on page 476, except that the LGMSG I/O is because of a request from the IMS scheduler.

SC: Log Buffer Wait

During a sampling, it was found that a buffer was not available for the current record to be logged and the scheduling task that created the record was waiting until a buffer was written to the data set.

Every major event that occurs in IMS results in a record being written to the IMS log. From this log, IMS supports recovery and accounting. This log is usually on tape to handle the volume produced.

Because of the critical nature of this data, the logging routines cause any task requesting their services (write a record describing an event) to wait until the logging can be completed. Records are posted to an in-storage buffer, which is usually written to the log only when full. While one buffer is being written, posting can continue to another buffer, if available.

If many log buffer waits are occurring, the buffer size and/or number of buffers should be increased. Contention in the logging function can have a critical performance impact.

SC: Logical Log Latch

During a sampling of the system, IMS was processing a message and needed the logical logger latch but the latch was already in use by another IMS task. Processing of the message is suspended until the latch becomes available.

The logical logger latch serializes the use of the logical logger in IMS. The logical logger is that part of IMS responsible for maintaining the log buffers before they are written to IEFRDER and IEFRDER2. Originally, this latch was used for only this purpose; however, in recent releases, this latch is used any time part of IMS wants to serialize the entire online system. Consequently, a high occurrence of logical latch waits is usually a sign that something is wrong outside of IMS. For example, if the log tape drive drops ready, the first sign of this in IMS is that the log buffers are all full and each task, as it attempts to place its log record in a log buffer, must wait for this latch.

SC: LWA Wait

During a sampling of the system, schedule processing was in a LOG WRITE AHEAD (LWA) wait status. It was waiting for a log record to be physically written to the log before processing could continue. This is done to ensure data integrity in case of failure.

If necessary, IMS will write the log buffer containing this record, even if the buffer is not yet full, which is the normal signal for the I/O operation (see "SC: Log Buffer Wait" for more information about logging).

LOG WRITE AHEAD calls generally occur at sync point, which is when most physical database updates occur. They may also occur during application processing if IMS needs to use a database buffer that contains changed database records to access a different database block (buffer steal). The number of buffer steals may be reduced by increasing the number of buffers in these database subpools.

The DCLWA keyword in the IMS SYSGEN is used to activate or deactivate DC LWA.

SC: Misc IMS-CTL Wait

Similar to "SC: Misc IMS-Dep Wait", but the scheduler is executing in the control region.

SC: Misc IMS-Dep Wait

Part of the scheduling process is executed in the control region and part is executed in the dependent region.

This event is detected when the sampler finds the IMS scheduler is scheduling a region and the scheduler was executing in the dependent region, but was waiting in the IMS dispatcher for an event to complete. The sampler could not attribute the wait to any other category in the scheduler component. An IWAIT was issued by the scheduler while executing in the dependent region.

SC: Misc IMS-SAS Wait

Similar to "SC: Misc IMS-Dep Wait", but the scheduler is executing in the DL/I subordinate address space (DLISAS) under the DL/I serial task.

SC: PSBP Pool - BMP

Before a transaction can be processed, the program's PSB must be in the PSB pool. As part of the scheduling process, the PSB is brought into the pool if it is not already there.

During a sampling, a transaction was found that was in the process of being scheduled, but the PSB was not already in main storage and there was insufficient room in the pool to bring it in. The scheduling process for this transaction is suspended until there is enough room in the pool.

There are several ways to reduce PSB pool failures:

- Make some of the PSBs RESIDENT (specify RESIDENT on the APPLCTN macro and `RES=Y` on the IMS control region JCL). These PSBs are brought into virtual storage at control region startup in an area separate from the PSB pool.
- Increase the size of the pool so that most PSBs in concurrent use can fit in the pool.
- Reduce the number of schedules performed.
- Make judicious use of the PARALLEL scheduling option.

It should noted that PSBs are non-reentrant control blocks and, therefore, if several regions are using the same PSB name, they all require their own copy of the PSB, each one using space in the PSB pool. In addition, if a PSB is defined as RESIDENT and PARALLEL, the resident copy will never be used. Instead, a copy of it will be made in the PSB pool for each region using it. This must be considered when calculating PSB pool size.

SC: PSBP Pool - DBT

Similar to "SC: PSBP Pool - BMP" on page 500, but the scheduler is executing in a DBT region.

SC: PSBP Pool - MPP

See "SC: PSBP Pool - BMP" on page 500.

SC: PSBW Pool - BMP

Once an application program starts executing, it issues DL/I calls. DL/I requires a work area for handling these calls. The PSB work pool is used for this purpose. The ACBGEN process placed the PSB work pool requirement for a given PSB in the PSB itself.

As part of the scheduling process, the block loader reserves an area in the PSB work pool of the size found in the PSB. If there is insufficient room in the pool, the scheduler waits for space.

As a general rule, waits of this type should never occur if the PSB work pool has been sized accurately. IBM's ADF product and Data Dictionary product can require substantial space in this pool.

SC: PSBW Pool - DBT

Similar to "SC: PSBW Pool - BMP", but the scheduler is executing in a DBT region.

SC: PSBW Pool - MPP

See "SC: PSBW Pool - BMP".

SC: OS Wait-CTL

Similar to "SC: OS Wait-Dep", but the scheduler is executing in the control region.

SC: OS Wait-Dep

Part of the scheduling process is executed in the control region and part is executed in the dependent region.

This event is detected when the sampler finds the IMS scheduler is scheduling a region and the scheduler was executing in the dependent region, but was waiting for the completion of an OS event. The sampler was unable to attribute the wait to any other category in the scheduler component. A wait was issued by the scheduler while executing in the dependent region. The wait may have been issued by a component of OS called by the IMS scheduler.

SC: OS Wait-SAS

Similar to "SC: OS Wait-Dep", but the scheduler is executing in the DL/I subordinate address space under the DL/I serial task.

SC: Other Latch

During a sampling of the system, IMS was processing a message and needed a specific IMS latch but the latch was already in use by another IMS task. Processing of the message is suspended until the latch becomes available.

The data collector could not determine which latch was needed. Call BMC Software Customer Support if this event occurs frequently.

SC: PI ENQ/DEQ Latch

During a sampling of the system, a program being scheduled in a dependent region required the enqueuing of a database segment. The latch used to serialize the IMS routines that enqueue segments was already in use; this region had to wait.

During the processing of calls against databases, IMS ensures that database integrity is maintained by enqueuing database segments to prevent multiple updating. This is called program isolation (PI) and is one of the mechanisms used by IMS to achieve its high level of data integrity.

This event is not the same as a PI wait. A PI wait occurs when an application program requests access to data that is already in use by another program. A PI latch wait occurs when an application program requests access to data and DL/I must check the enqueue status of the data but the enqueue routine is already in use by another program.

A high occurrence of this event indicates that IMS is processing a very large number of PI enqueues and dequeues, or many page faults are occurring while it is accessing the PI pool.

SC: PSB I/O Active

During a sampling of the system, the IMS scheduler, executing in the control region, had issued a request to OS/390 to read in the PSB for the program to be scheduled. The ACBGEN utility builds a PSB from the PSB in PSBLIB. The PSB describes the application program's access parameters for all the databases that the program is sensitive to. The PCBs are contained in the PSB.

Some ways to reduce PSB I/O requirements are:

- Make the PSB RESIDENT using the APPLCTN macro
- Reduce the number of different PSBs by creating common ones
- Increase the size of the PSBP pool to allow more PSBs to be in the pool concurrently

SC: PSB I/O Queued

The same as “SC: PSB I/O Active”, except that the I/O to load the PSB from ACBLIB cannot be started because of I/O subsystem contention. The I/O is queued on the logical channel or UCB.

SC: QBLKS I/O Active

The same as “IC: QBLKS I/O Active” on page 480, except that the QBLKS I/O is because of a request from the IMS scheduler.

SC: QBLKS I/O Queued

The same as "IC: QBLKS I/O Queued" on page 480, except that the QBLKS I/O is because of a request from the IMS scheduler.

SC: SAS SYNC I/O Active

During a sampling of the system, the IMS scheduler, executing under the DL/I serial task in the DL/I subordinate address space, issued a request to OS/390 for an unidentified I/O operation. IMS issues miscellaneous I/Os that result in implied waits within OS/390. This can seriously impact IMS performance because implied waits hang the DL/I serial task of IMS while OS/390 executes the I/O, such as directory searches (BLDL) of the ACBLIB, to locate a PSB specified as DOPT.

SC: SAS SYNC I/O Queued

The same as "SC: SAS SYNC I/O Active", except that the I/O cannot be started because of I/O subsystem contention. The I/O is queued on the logical channel or UCB.

SC: SHMSG I/O Active

The same as "IC: SHMSG I/O Active" on page 481, except that the SHMSG I/O is because of a request from the IMS scheduler.

SC: SHMSG I/O Queued

The same as "IC: SHMSG I/O Queued" on page 482, except that the SHMSG I/O is because of a request from the IMS scheduler.

SC: Storage Mgt Latch

During a sampling of the system, IMS was processing a message and needed the storage management latch but the latch was already in use by another IMS task. Processing of the message is suspended until the latch becomes available.

The storage management latch is used by the main storage management routines in IMS to create and destroy buffer pools and to get and free buffers within those pools. Because of the design of this part of IMS, storage management must be serialized; thus, this latch.

A high occurrence of this event is a sign that IMS is in extreme trouble because storage management executes quite quickly for each request and usually does not hang. Any requests for storage that require a wait (IWAIT) free the latch before waiting; therefore, pool space failures do not result in a high occurrence of this latch event.

Synchronization Point (SP) Events

Synchronization point (sync point) processing is the processing done by IMS to maintain integrity in the system for a given transaction. It is instigated by the application program through a GU to the I/O PCB, by the application program through a CHKP or SYNC call, or when an application program ends. Sync point processing completes when all the database changes have been physically written to the databases and all message traffic has been appropriately discarded or made available for transmission (the input message is discarded and the output messages are ready to send).

IMS can execute sync processing twice for one transaction. This can occur when the application program completes the processing of the first message, then issues a GU to the I/O PCB to retrieve the second message, which results in a QC status code. At this point, the application normally would terminate. Two sync points will have occurred: one when the GU with the QC was processed; one when the application ended. The workload wait sampler will take this properly into account when sampling the system.

The following subsections list and define the events that may be shown for SYNC POINT by the DWAIT display. The descriptions are in alphabetical order.

SP: CBTS Latch

During a sampling of the system, IMS was processing a sync point and required the dynamic control block latch but the latch was in use by another IMS task.

SP: CTL SYNC I/O Active

The same as "SC: CTL SYNC I/O Active" on page 491, except that it occurred during sync point processing.

SP: CTL SYNC I/O Queued

The same as "SC: CTL SYNC I/O Queued" on page 491, except that it occurred during sync point processing.

SP: DB2S-DEP CPU Wait

The same as "AP: DB2N-Dep CPU Wait" on page 459 except that the DB2 interface code was processing a service call during IMS sync point processing.

A service call is issued by the IMS DB2 interface code for certain events in the dependent region. A CREATE THREAD call is issued to identify the transaction to DB2 and a COMMIT PHASE 1 and PHASE 2 call is done at IMS sync point time for data integrity.

Note: Only SQL calls made through the IMS attach (for example, BMPs or MPPs) are monitored. SQL calls made through the CICS attach are not shown.

SP: DB2S-DEP CSA Fault

The same as "AP: DB2N-Dep CSA Fault" on page 459 except that the DB2 interface code was processing a service call during IMS sync point processing.

SP: DB2S-DEP CSA GFA

The same as "AP: DB2N-Dep CSA GFA" on page 459 except that the DB2 interface code was processing a service call during IMS sync point processing.

SP: DB2S-DEP LPA Fault

The same as "AP: DB2N-Dep LPA Fault" on page 459 except that the DB2 interface code was processing a service call during IMS sync point processing.

SP: DB2S-DEP LPA GFA

The same as "AP: DB2N-Dep LPA GFA" on page 459 except that the DB2 interface code was processing a service call during IMS sync point processing.

SP: DB2S-DEP Prv Fault

The same as "AP: DB2N-Dep Prv Fault" on page 459 except that the DB2 interface code was processing a service call during IMS sync point processing.

SP: DB2S-DEP Prv GFA

The same as "AP: DB2N-Dep Prv GFA" on page 460 except that the DB2 interface code was processing a service call during IMS sync point processing.

SP: DB2S-DEP Using CPU

The same as "AP: DB2N-Dep Using CPU" on page 460 except that the DB2 interface code was processing a service call during IMS sync point processing.

SP: DB2S-DEP Wait

The same as "AP: DB2N-Dep Wait" on page 460 except that the DB2 interface code was processing a service call during IMS sync point processing.

SP: DC Mon Latch

The same as: "SC: DC Mon Latch" on page 493, except that it is the sync point manager that needs the latch.

SP: DEDB Area Latch

During a sampling of the system, that one or more transactions were waiting for a specific DEDB area.

SP: DEDB Latch

During a sampling of the system, one or more transactions were waiting for a DEDB latch.

SP: FP Syncpoint Latch

During a sampling of the system, it was noted that one or more transactions were waiting for a Fast Path synchronization point latch.

SP: Generic Latch

The same as "SC: Generic Latch" on page 495, except that it is the sync point manager that needs the latch.

SP: IMS-CTL CPU Wait

The same as "SP: IMS-Dep CPU Wait" on page 507, except that the IMS sync point manager is waiting for a CPU in the control region.

SP: IMS-CTL CSA Fault

The same as "SP: IMS-Dep Prv Fault" on page 508, except that the sync point manager was accessing data or instructions in CSA while executing under the control task in the control region.

SP: IMS-CTL CSA GFA

The same as "SP: IMS-Dep Prv GFA" on page 508, except that the sync point manager was accessing data or instructions in CSA while executing under the control task in the control region.

SP: IMS-CTL LPA Fault

The same as "SP: IMS-Dep Prv Fault" on page 508, except that the sync point manager was accessing data or instructions in LPA while executing under the control task in the control region.

SP: IMS-CTL LPA GFA

The same as "SP: IMS-Dep Prv GFA" on page 508, except that the sync point manager was accessing data or instructions in LPA while executing under the control task in the control region.

SP: IMS-CTL Prv Fault

The same as "SP: IMS-Dep Prv Fault" on page 508, except that the sync point manager was accessing data or instructions in the private area of the control region while executing under the control task in the control region.

SP: IMS-CTL Prv GFA

The same as "SP: IMS-Dep Prv GFA" on page 508, except that the sync point manager was accessing data or instructions in the private area of the control region while executing under the control task in the control region.

SP: IMS-CTL Using CPU

The same as "SP: IMS-Dep Using CPU" on page 508, except that the IMS sync point manager is active on a CPU in the control region.

A high occurrence of this event indicates:

- Queue data set problems - The output messages generated by the application program are permanently committed to the queues during sync point in the control region. If there are insufficient queue buffers or excessive I/Os are being executed against the three queue data sets, high CPU utilization in the sync point manager while in the control region will be noted.
- Excessive sync points - The path length through IMS sync point is often nontrivial. If many sync points per minute are being performed, then sync point can become a critical point in the performance of a transaction. The number of sync points taken can be reduced by using `MODE=MULT` for some transactions, or by reducing the number of CHKP or SYNC calls issued by BMPs.

SP: IMS-Dep CPU Wait

The IMS sync point manager was executing in the dependent region and was not waiting for any event to occur. The sync point manager work could be executed but there were no CPUs available to process it. In the case of a UP processor, the CPU was executing other work (IMS or non-IMS) in the system. For MP processors, all the CPUs were busy with other work.

From an OS viewpoint, the dependent region program control task was in the OS dispatcher work-to-do queue. A high occurrence of this event indicates that the CPU is not fast enough or that excessive work of a higher priority was using the CPU cycles.

SP: IMS-Dep CSA Fault

The same as "SP: IMS-Dep Prv Fault" on page 508, except that the sync point manager was accessing data or instructions in CSA.

SP: IMS-Dep CSA GFA

The same as "SP: IMS-Dep Prv GFA" on page 508, except that the sync point manager was accessing data or instructions in CSA.

SP: IMS-Dep LPA Fault

The same as "SP: IMS-Dep Prv Fault" on page 508, except that the sync point manager was accessing data or instructions in LPA.

SP: IMS-Dep LPA GFA

The same as "SP: IMS-Dep Prv GFA", except that the sync point manager was accessing data or instructions in LPA.

SP: IMS-Dep Prv Fault

During a sampling of the system, the sync point manager was processing a message and suffered a page fault. Processing of the message is delayed until the fault is resolved.

The sync point manager executing in the dependent region address space under the program control task was accessing data or instructions in the private area of the dependent region address space when the fault occurred.

SP: IMS-Dep Prv GFA

During a sampling of the system, the sync point manager was processing a message and a page fault occurred. Processing of the message is delayed until the fault is resolved. The page-in I/O process could not be executed because no real frames were available. The page fault is placed in the general frame allocation (GFA) queue until the situation is resolved.

The sync point manager executing in the dependent region was accessing data or instructions in the private area of the dependent region address space when the fault occurred.

General frame allocation (GFA) page faults refer to the situation when a page fault occurs and the OS/390 real storage manager (RSM) did not have any available frames to allocate to the page fault. To find a frame to use, the system resources manager (SRM) is called to steal from existing users. This may result in a page-out operation that extends the page fault resolution time even more.

SP: IMS-Dep Using CPU

The IMS sync point manager was executing in the dependent region and was not waiting for any event to occur. The sync point manager work could be executed and, in fact, a CPU was actively processing it. In the case of a UP processor, the CPU was executing this sync point task. For MP processors, one of the CPUs was executing the sync point task.

A high occurrence of this event indicates that many database buffers are being updated by the application program. The only sync point processing performed in the dependent region is the flushing of modified database buffers. If an excessive number of buffers are not being updated, VSAM, OSAM, or IOS may be involved in I/O error recovery, which would account for the high CPU utilization here.

SP: IMS-SAS CPU Wait

The same as "SP: IMS-Dep CPU Wait" on page 507, except that the IMS sync point manager is waiting for a CPU under the DL/I serial task in the DL/I subordinate address space.

SP: IMS-SAS CSA Fault

The same as "SP: IMS-Dep Prv Fault", except that the sync point manager was accessing data or instructions in CSA while executing under the DL/I serial task in the DL/I subordinate address space.

SP: IMS-SAS CSA GFA

The same as "SP: IMS-Dep Prv GFA" on page 508, except that the sync point manager was accessing data or instructions in CSA while executing under the DL/I serial task in the DL/I subordinate address space.

SP: IMS-SAS LPA Fault

The same as "SP: IMS-Dep Prv Fault" on page 508, except that the sync point manager was accessing data or instructions in LPA while executing under the DL/I serial task in the DL/I subordinate address space.

SP: IMS-SAS LPA GFA

The same as "SP: IMS-Dep Prv GFA" on page 508, except that the sync point manager was accessing data or instructions in LPA while executing under the DL/I serial task in the DL/I subordinate address space.

SP: IMS-SAS Prv Fault

The same as "SP: IMS-Dep Prv Fault" on page 508, except that the sync point manager was accessing data or instructions in the private area of the DL/I subordinate address space while executing under the DL/I serial task in the DL/I subordinate address space.

SP: IMS-SAS Prv GFA

The same as "SP: IMS-Dep Prv GFA" on page 508, except that the sync point manager was accessing data or instructions in the private area of the DL/I subordinate address space while executing under the DL/I serial task in the DL/I subordinate address space.

SP: IMS-SAS Using CPU

The same as "SP: IMS-Dep Using CPU" on page 508, except that the IMS sync point manager is active on a CPU under the DL/I serial task in the DL/I subordinate address space.

SP: IRLM Wait

The same as "AP: IRLM Wait" on page 467, except that it occurred during sync point processing.

SP: LGMSG I/O Active

The same as "IC: LGMSG I/O Active" on page 475, except that the sync point manager has initiated the request that caused the I/O.

SP: LGMSG I/O Queued

The same as "IC: LGMSG I/O Queued" on page 476, except that the sync point manager has initiated the request that caused the I/O.

SP: Log Buffer Wait

The same as "SC: Log Buffer Wait" on page 499, except that it occurred during sync point processing.

SP: Logical Log Latch

The same as "IC: Logical Log Latch" on page 476, except that it is the sync point manager that needs the latch.

SP: LWA Wait

The same as "AP: LWA Wait" on page 468, except that it occurred during sync point processing, not because of buffer steals.

Whenever the sync point manager is invoked on behalf of an application program (GU to I/O PCB, CHKP, SYNC, or program termination), the first activity performed is the writing of all database blocks or CIs modified by the application. This activity is performed in the dependent region to increase the parallelism of the sync point process across multiple regions. If LWA is active, the writing of the blocks is deferred until the associated log records (type 50) are physically on the log; therefore, the log is written ahead of the database blocks. LWA improves the recoverability of an IMS database, but reduces the performance of the transactions processed.

A high occurrence of this event indicates that the workload volume is insufficient to cause the log blocks to be written before a transaction reaches sync point. The negative impact of LWA can be reduced by reducing the block size of the log, because the smaller log blocks fill more quickly. A commensurate increase in log buffers should also be made to prevent delay of other transactions that need log buffer space. Often reducing the log block size to the absolute minimum allowed by IMS still results in high LWA waits in sync point. Little can be done by the IMS user to improve the situation.

SP: Misc IMS-CTL Wait

The same as "SP: Misc IMS-Dep Wait", except that the sync point manager is executing in the control region.

SP: Misc IMS-Dep Wait

Part of the sync point process is executed in the control region and part is executed in the dependent region.

This event is detected when the sampler finds a transaction within sync point processing, the processing was occurring in the dependent region but was waiting in the IMS dispatcher for an event to complete. The sampler could not attribute the wait to any other category in the sync point component. An unknown IWAIT was issued by the IMS sync point manager while executing in the dependent region.

If this event is ever a significant contributor to response time, call BMC Software Customer Support.

SP: Misc IMS-SAS Wait

The same as "SP: Misc IMS-Dep Wait", except that the sync point manager is executing under the DL/I serial task in the DL/I subordinate address space.

SP: MSDB Latch

During a sampling of the system, one or more transactions were waiting for an MSDB latch.

SP: OS Wait-CTL

The same as "SP: OS Wait-Dep", except that the sync point manager is executing in the control region.

SP: OS Wait-Dep

Part of the sync point process is executed in the control region and part is executed in the dependent region.

This event is detected when the sampler finds a transaction within sync point processing. The processing was occurring in the dependent region but was waiting for the completion of an OS event. The sampler could not attribute the wait to any other category in the sync point component. The WAIT may have been issued by a component of OS called by the IMS sync point manager.

The WAIT usually is caused by a BMP or MPP region that issues its own STIMER WAIT macros. This was a common technique used before WFI (Wait for Input) transactions became available. Another possibility is a transaction that issues a WTOR and waits for the reply. You may use the PGMTYPE or TRAN parameter to eliminate these programs or transactions from sampling.

SP: OS Wait-SAS

The same as "SP: OS Wait-Dep", except that the sync point manager is executing under the DL/I serial task in the DL/I subordinate address space.

SP: OSAM DB I/O Active

During a sampling of the system, the sync point manager had issued a purge call to write out modified OSAM blocks. At the time of the sample, the I/O was active against the database. Processing of the message is suspended until the I/O completes.

SP: OSAM DB I/O Queued

The same as "SP: VSAM DB I/O Active" on page 512, except that the OSAM database I/O was queued on the logical channel or UCB because I/O contention prevented the successful initiation of the SIO instruction.

SP: Other Latch

The same as "SC: Other Latch" on page 502, except that it is the sync point manager that needs the latch.

SP: PI ENQ/DEQ Latch

The same as "AP: PI ENQ/DEQ Latch" on page 471, except that the PI routine is called as part of sync point processing. Generally, the calls to the PI routines here are to release database enqueues acquired during the preceding application program processing.

SP: QBLKS I/O Active

The same as "IC: QBLKS I/O Active" on page 480, except that the sync point manager has initiated the request that caused the I/O.

SP: QBLKS I/O Queued

The same as "IC: QBLKS I/O Queued" on page 480, except that the sync point manager has initiated the request that caused the I/O.

SP: SAS SYNC I/O Active

The same as "SC: SAS SYNC I/O Active" on page 503, except that it occurred during sync point processing.

SP: SAS SYNC I/O Queued

The same as "SC: SAS SYNC I/O Queued" on page 503, except that it occurred during sync point processing.

SP: SHMSG I/O Active

The same as "IC: SHMSG I/O Active" on page 481, except that the sync point manager has initiated the request that caused the I/O.

SP: SHMSG I/O Queued

The same as "IC: SHMSG I/O Queued" on page 482, except that the sync point manager has initiated the request that caused the I/O.

SP: Storage Mgt Latch

The same as "IC: Storage Mgt Latch" on page 482, except that it is the sync point manager that needs the latch.

SP: VSAM DB I/O Active

During a sampling of the system, the sync point manager had issued a purge call to write out modified VSAM CIs. At the time of the sample, the I/O was active against the database. Processing of the message is suspended until the I/O completes.

SP: VSAM DB I/O Queued

The same as "SP: VSAM DB I/O Active", except that the VSAM database I/O was queued on the logical channel or UCB because I/O contention prevented the successful initiation of the SIO instruction.

Part 4. Appendixes

Appendix A. IMS Dump Analysis 517
AO Exit 517
MAINVIEW AutoOPERATOR for IMS Routines in IMS 517
Event Collector 517

Appendix B. How Product Libraries Should Be Used 519

Appendix A. IMS Dump Analysis

This appendix describes how to analyze an IMS dump with MAINVIEW for IMS or MAINVIEW AutoOPERATOR for IMS installed.

AO Exit

Except for MAINVIEW AutoOPERATOR for IMS MTO message capture for the Journal log, all AO code merely passes control to the specified routines during operation. During initialization, special protection exists while the Event Collector is being set up.

MAINVIEW AutoOPERATOR for IMS Routines in IMS

During initialization, the MAINVIEW AutoOPERATOR for IMS AO code creates two subtasks under the IMS control task. Each of these is protected by ESTAE routines and uses different control blocks than IMS. These subtasks generally can be ignored during IMS dump analysis since they do not affect the IMS flow. These subtasks are terminated correctly at IMS termination.

Event Collector

The following should be noted about IMS dumps:

- MAINVIEW for IMS register save areas are in MAINVIEW for IMS data areas, not in the IMS prechained save areas. The IMS chains remain unchanged.
- Sometimes the R14 return register in an IMS save area does not point back into the calling IMS module. The IMS R14 value can be found 4 bytes in front of the address pointed to by R14.
- A MAINVIEW for IMS module at entry saves the registers of an IMS module in the next IMS prechained save area pointed to by R13.
- MAINVIEW for IMS module registers are always saved in MAINVIEW for IMS save areas. These save areas are assigned dynamically as required. Normally, one of several preallocated save areas per region is used.

  Each active IMS region has a MAINVIEW for IMS data area acquired for it at region initialization. This data area is in ECSA and is named IMERD*nnn*, where *nnn* is the PST number. The preallocated save areas are in this block.

  If more save areas are required, a dynamic storage pool is used. This pool is also in ECSA and is named IMFSP000.

  Any area in actual use as a MAINVIEW for IMS save area, whether in IMERDnnn or IMFSP000, is identified with SAR or ISA.
- In most cases, only a save area backward pointer exists, pointing from the MAINVIEW for IMS area to the previous IMS save area. While a MAINVIEW for IMS module is in control, the current R12 is its base register and the current R13 points to its SAR.

- In some cases, a MAINVIEW for IMS module transfers control to an IMS module, but needs to regain control after it completes processing. In this case also, the IMS save area chains remain unchanged.

  The only sign of the presence of a MAINVIEW for IMS module is an R14 value in an IMS save area which does not point back to the calling IMS module. If you need to verify the IMS path, the IMS R14 value is saved in the MAINVIEW for IMS SAR, 4 bytes in front of the address pointed to by the R14 in the IMS save area.

  Note: When MAINVIEW for IMS interfaces between two IMS modules, MAINVIEW for IMS is transparent to the IMS modules. All registers are preserved.

- IMECSRVx and IMFCSRVx appear in dumps as active ITASKS. This is normal as long as the current save area is for DFSIWAIT.

Appendix B. How Product Libraries Should Be Used

Several distributed libraries are included with your MAINVIEW products, including a parameter library (BBPARM), a sample library (BBSAMP), and a profile library (BBPROF). Use the contents of these distributed libraries as models to create site-customized product libraries, either manually or automatically, with AutoCustomization.

Warning

The distributed libraries should never be modified. If you change the distributed libraries, subsequent SMP maintenance will overwrite your changes.

Throughout the MAINVIEW documentation set, references to these libraries use the distributed name. However, when you need to make changes, be sure to use the corresponding library that has been customized for your site. Table 9 lists the distributed name, the corresponding customized library created by AutoCustomization, and leaves space for you to note any other corresponding library that may have been created for your site.

Table 9. Product Libraries

Distributed Library Name	Library Created by AutoCustomization	Other Site-Customized Copy
BBPARM	UBBPARM	
BBSAMP	UBBSAMP	
BBPROF	SBBPROF	

For more detailed information about all the product libraries, see “Using MAINVIEW Product Libraries” in the *MAINVIEW Common Customization Guide* or “Using Product Libraries” in the *MAINVIEW Administration Guide*.

Part 5. Index

Glossary 523

Index 535

Glossary

This glossary defines BMC Software terminology. Other dictionaries and glossaries can be used in conjunction with this glossary.

Since this glossary pertains to BMC Software-related products, some of the terms defined might not appear in this book.

To help you find the information you need, this glossary uses the following cross-references:

Contrast with	Indicates a term that has a contrary or contradictory meaning.
See	Indicates an entry that is a synonym or contains expanded information.
See also	Indicates an entry that contains related information.

A

action. Defined operation, such as modifying a MAINVIEW window, that is performed in response to a command. *See* object.

active window. Any MAINVIEW window in which data can be refreshed. *See* alternate window, current window, window.

administrative view. Display from which a product's management tasks are performed, such as the DSLIST view for managing historical data sets. *See* view.

ALT WIN field. Input field that allows you to specify the window identifier for an alternate window where the results of a hyperlink are displayed. *See* alternate window.

Alternate Access. *See* MAINVIEW Alternate Access.

alternate form. View requested through the FORM command that changes the format of a previously displayed view to show related information. *See also* form, query.

alternate window. (1) Window that is specifically selected to display the results of a hyperlink. (2) Window whose identifier is defined to the ALT WIN field. *Contrast with* current window. *See* active window, window, ALT WIN field.

analyzer. (1) Online display that presents a snapshot of status and activity data and indicates problem areas. (2) Component of CMF MONITOR. *See* CMF MONITOR Analyzer.

application. (1) Program that performs a specific set of tasks within a MAINVIEW product. (2) In MAINVIEW VistaPoint, combination of workloads to enable display of their transaction performance data in a single view.

application trace. *See* trace.

ASCH workload. Workload comprising Advanced Program-to-Program Communication (APPC) address spaces.

AutoCustomization. Online facility for customizing the installation of products. AutoCustomization provides an ISPF panel interface that both presents customization steps in sequence and provides current status information about the progress of the installation.

automatic screen update. Usage mode wherein the currently displayed screen is refreshed automatically with new data at an interval you specify. Invoked by the ASU command.

B

batch workload. Workload consisting of address spaces running batch jobs.

BBI. Basic architecture that distributes work between workstations and multiple OS/390 targets for BMC Software MAINVIEW products.

BBI-SS PAS. *See* BBI subsystem product address space.

BBI subsystem product address space (BBI-SS PAS). OS/390 subsystem address space that manages communication between local and remote systems and that contains one or more of the following products:

- Command MQ for S/390
- MAINVIEW AutoOPERATOR
- MAINVIEW for CICS
- MAINVIEW for DB2
- MAINVIEW for DBCTL
- MAINVIEW for IMS Online
- MAINVIEW for MQSeries
- MAINVIEW SRM
- MAINVIEW VistaPoint (for CICS, DB2, DBCTL, and IMS workloads)

BBPARM. *See* parameter library.

BBPROC. *See* procedure library.

BBPROF. *See* profile library.

BBSAMP. *See* sample library.

BBV. *See* MAINVIEW Alternate Access.

BBXS. BMC Software Subsystem Services. Common set of service routines loaded into common storage and used by several BMC Software MAINVIEW products.

border. Visual indication of the boundaries of a window.

bottleneck analysis. Process of determining which resources have insufficient capacity to provide acceptable service levels and that therefore can cause performance problems.

C

CA-Disk. Data management system by Computer Associates that replaced the DMS product.

CAS. Coordinating address space. One of the address spaces used by the MAINVIEW windows environment architecture. The CAS supplies common services and enables communication between linked systems. Each OS/390 or z/OS image requires a separate CAS. Cross-system communication is established through the CAS using VTAM and XCF communication links.

CFMON. *See* coupling facility monitoring.

chart. Display format for graphical data. *See also* graph.

CICSplex. User-defined set of one or more CICS systems that are controlled and managed as a single functional entity.

CMF MONITOR. Comprehensive Management Facility MONITOR. Product that measures and reports on all critical system resources, such as CPU, channel, and device usage; memory, paging, and swapping activity; and workload performance.

CMF MONITOR Analyzer. Batch component of CMF MONITOR that reads the SMF user and 70 series records created by the CMF MONITOR Extractor and/or the RMF Extractor and formats them into printed system performance reports.

CMF MONITOR Extractor. Component of CMF that collects performance statistics for CMF MONITOR Analyzer, CMF MONITOR Online, MAINVIEW for OS/390, and RMF postprocessor. *See* CMF MONITOR Analyzer, CMF MONITOR Online, MAINVIEW for OS/390.

CMF MONITOR Online. Component of CMF that uses the MAINVIEW window interface to present data on all address spaces, their use of various system resources, and the delays that each address space incurs while waiting for access to these resources. *See* CMF MONITOR, MAINVIEW for OS/390.

CMF Type 79 API. Application programming interface, provided by CMF, that provides access to MAINVIEW SMF-type 79 records.

CMFMON. Component of CMF MONITOR that simplifies online retrieval of information about system hardware and application performance and creates MAINVIEW SMF-type 79 records.

The CMFMON *online facility* can be used to view data in one or more formatted screens.

The CMFMON *write facility* can be used to write collected data as MAINVIEW SMF-type 79 records to an SMF or sequential data set.

CMRDETL. MAINVIEW for CICS data set that stores detail transaction records (type 6E) and abend records (type 6D). Detail records are logged for each successful transaction. Abend records are written when an abend occurs. Both records have the same format when stored on CMRDETL.

CMRSTATS. MAINVIEW for CICS data set that stores both CICS operational statistic records, at five-minute intervals, and other records, at intervals defined by parameters specified during customization (using CMRSOPT).

column. Vertical component of a view or display, typically containing fields of the same type of information, that varies by the objects associated in each row.

collection interval. Length of time data is collected. *See also* delta mode, total mode.

command delimiter. Special character, usually a **;** (semicolon), used to stack commands typed concurrently on the COMMAND line for sequential execution.

COMMAND line. Line in the control area of the display screen where primary commands can be typed. *Contrast with* line command column.

Command MQ Automation D/S. Command MQ agents, which provide local proactive monitoring for both MQSeries and MSMQ (Microsoft message queue manager). The Command MQ agents operate at the local node level where they continue to perform functions regardless of the availability of the MQM (message queue manager) network. Functionality includes automatic monitoring and restarts of channels, queue managers, queues and command servers. In cases where automated recovery is not possible, the agents transport critical alert information to a central console.

Command MQ Automation S/390. Command MQ component, which monitors the MQM (message queue manager) networks and intercedes to perform corrective actions when problems arise. Solutions include:

- Dead-Letter Queue management
- System Queue Archival
- Service Interval Performance solutions
- Channel Availability

These solutions help ensure immediate relief to some of the most pressing MQM operations and performance problems.

Command MQ for D/S. Command MQ for D/S utilizes a true client/server architecture and employs resident agents to provide configuration, administration, performance monitoring and operations management for the MQM (message queue manager) network.

Command MQ for S/390. *See* MAINVIEW for MQSeries.

COMMON STORAGE MONITOR. Component of MAINVIEW for OS/390 that monitors usage and reconfigures OS/390 or z/OS common storage blocks.

composite workload. Workload made up of a WLM workload or other workloads, which are called *constituent workloads.*

constituent workload. Member of a composite workload. Constituent workloads in a composite usually belong to a single workload class, but sometimes are mixed.

contention. Occurs when there are more requests for service than there are servers available.

context. In a Plex Manager view, field that contains the name of a target or group of targets specified with the CONTEXT command. *See* scope, service point, SSI context, target context.

CONTEXT command. Specifies either a MAINVIEW product and a specific target for that product (*see* target context) or a MAINVIEW product and a name representing one or more targets (see *SSI context*) for that product.

control statement. (1) Statement that interrupts a sequence of instructions and transfers control to another part of the program. (2) Statement that names samplers and other parameters that configure the MAINVIEW components to perform specified functions. (3) In CMF MONITOR, statement in a parameter library member used to identify a sampler in the extractor or a report in the analyzer, or to describe either component's processing requirements to the operating system.

coupling facility monitoring (CFMON). Coupling facility views that monitor the activity of your system's coupling facilities.

current data. Data that reflects the system in its current state. The two types of current data are realtime data and interval data. *Contrast with* historical data. *See also* interval data and realtime data.

current window. In the MAINVIEW window environment, window where the main dialog with the application takes place. The current window is used as the default window destination for commands issued on the COMMAND line when no window number is specified. *Contrast with* alternate window. *See* active window, window.

D

DASD. Direct Access Storage Device. (1) A device with rotating recording surfaces that provides immediate access to stored data. (2) Any device that responds to a DASD program.

data collector. Program that belongs to a MAINVIEW product and that collects data from various sources and stores the data in records used by views. For example, MAINVIEW for OS/390 data collectors obtain data from OS/390 or z/OS services, OS/390 or z/OS control blocks, CMF MONITOR Extractor control blocks, and other sources. *Contrast with* extractor.

delta mode. (1) In MAINVIEW for DB2 analyzer displays, difference between the value sampled at the start of the current statistics interval and the value sampled by the current analyzer request. See also *statistics interval.* (2) In CMFMON, usage mode wherein certain columns of data reflect the difference in values between one sample cycle and the next. Invoked by the DELta ON command. *See also* collection interval, sample cycle, total mode.

DFSMS. Data Facility Storage Management System. Data management, backup, and HSM software from IBM for OS/390 or z/OS mainframes.

DMR. *See* MAINVIEW for DB2.

DMS. Data Management System. *See* CA-Disk.

DMS2HSM. *See* MAINVIEW SRM DMS2HSM.

DSO. Data Set Optimizer. CMF MONITOR Extractor component that uses CMF MONITOR Extractor data to produce reports specifying the optimal ordering of data sets on moveable head devices.

E

EasyHSM. *See* MAINVIEW SRM EasyHSM.

EasyPOOL. *See* MAINVIEW SRM EasyPOOL.

EasySMS. *See* MAINVIEW SRM EasySMS.

element. (1) Data component of a data collector record, shown in a view as a field. (2) Internal value of a field in a view, used in product functions.

element help. Online help for a field in a view. The preferred term is *field help.*

Enterprise Storage Automation. *See* MAINVIEW SRM Enterprise Storage Automation.

event. A message issued by Enterprise Storage Automation. User-defined storage occurrences generate events in the form of messages. These events provide an early warning system for storage problems and are routed to user-specified destinations for central viewing and management.

Event Collector. Component for MAINVIEW for IMS Online, MAINVIEW for IMS Offline, and MAINVIEW for DBCTL that collects data about events in the IMS environment. This data is required for Workload Monitor and optional for Workload Analyzer (except for the workload trace service). This data also is recorded as transaction records (X'FA') and program records (X'F9') on the IMS system log for later use by the MAINVIEW for IMS Offline components: Performance Reporter and Transaction Accountant.

expand. Predefined link from one display to a related display. *See also* hyperlink.

extractor. Program that collects data from various sources and keeps the data control blocks to be written as records. Extractors obtain data from services, control blocks, and other sources. *Contrast with* data collector.

extractor interval. *See* collection interval.

F

fast path. Predefined link between one screen and another. To use the fast path, place the cursor on a single value in a field and press Enter. The resulting screen displays more detailed information about the selected value. *See also* hyperlink.

field. Group of character positions within a screen or report used to type or display specific information.

field help. Online help describing the purpose or contents of a field on a screen. To display field help, place the cursor anywhere in a field and press PF1 (HELP). In some products, field help is accessible from the screen help that is displayed when you press PF1.

filter. Selection criteria used to limit the number of rows displayed in a view. Data that does not meet the selection criteria is not displayed. A filter is composed of an element, an operator, and an operand (a number or character string). Filters can be implemented in view customization, through the PARm/QPARm commands, or through the Where/QWhere commands. Filters are established against elements of data.

fire. The term used to indicate that an event has triggered an action. In MAINVIEW AutoOPERATOR, when a rule selection criteria matches an incoming event and *fires*, the user-specified automation actions are performed. This process is also called *handling* the event.

fixed field. Field that remains stationary at the left margin of a screen that is scrolled either right or left.

FOCAL POINT. MAINVIEW product that displays a summary of key performance indicators across systems, sites, and applications from a single terminal.

form. One of two constituent parts of a view; the other is query. A form defines how the data is presented; a query identifies the data required for the view. See also *query, view.*

full-screen mode. Display of a MAINVIEW product application or service on the entire screen. There is no window information line. *Contrast with* windows mode.

G

global command. Any MAINVIEW window interface command that can affect all windows in the window area of a MAINVIEW display.

graph. Graphical display of data that you select from a MAINVIEW window environment view. *See also* chart.

H

hilevel. For MAINVIEW products, high-level data set qualifier required by a site's naming conventions.

historical data. (1) Data that reflects the system as it existed at the end of a past recording interval or the duration of several intervals. (2) Any data stored in the historical database and retrieved using the TIME command. *Contrast with* current data, interval data and realtime data.

historical database. Collection of performance data written at the end of each installation-defined recording interval and containing up to 100 VSAM clusters. Data is extracted from the historical database with the TIME command. *See* historical data.

historical data set. In MAINVIEW products that display historical data, VSAM cluster file in which data is recorded at regular intervals.

HSM. (Hierarchical Storage Management) Automatic movement of files from hard disk to slower, less-expensive storage media. The typical hierarchy is from magnetic disk to optical disk to tape.

hyperlink. (1) Preset field in a view or an EXPAND line on a display that permits you to

- Access cursor-sensitive help
- Issue commands
- Link to another view or display

The transfer can be either within a single product or to a related display/view in a different BMC Software product. Generally, hyperlinked fields are highlighted. (2) Cursor-activated short path from a topic or term in online help to related information. *See also* fast path.

I

Image log. Collection of screen-display records. Image logs can be created for both the BBI-SS PAS and the BBI terminal session (TS).

The BBI-SS PAS Image log consists of two data sets that are used alternately: as one fills up, the other is used. Logging to the BBI-SS PAS Image log stops when both data sets are filled and the first data set is not processed by the archive program.

The TS Image log is a single data set that wraps around when full.

IMSPlex System Manager (IPSM). MVIMS Online and MVDBC service that provides Single System Image views of resources and bottlenecks for applications across one or more IMS regions and systems.

interval data. Cumulative data collected during a collection interval. Intervals usually last from 15 to 30 minutes depending on how the recording interval is specified during product customization. *Contrast with* historical data.

Note: If change is made to the workloads, a new interval will be started.

See also current data and realtime data.

InTune. Product for improving application program performance. It monitors the program and provides information used to reduce bottlenecks and delays.

IRUF. IMS Resource Utilization File (IRUF). IRUFs can be either detail (one event, one record) or summarized (more than one event, one record). A detail IRUF is created by processing the IMS system log through a program called IMFLEDIT. A summarized IRUF is created by processing one or more detail IRUFs, one or more summarized IRUFs, or a combination of both, through a sort program and the TASCOSTR program.

J

job activity view. Report about address space consumption of resources. *See* view.

journal. Special-purpose data set that stores the chronological records of operator and system actions.

Journal log. Collection of messages. Journal logs are created for both the BBI-SS PAS and the BBI terminal session (TS).

The BBI-SS PAS Journal log consists of two data sets that are used alternately: as one fills up, the other is used. Logging to the BBI-SS PAS Journal log stops when both data sets are filled and the first data set is not being processed by the archive program.

The TS Journal log is a single data set that wraps around when full.

L

line command. Command that you type in the line command column in a view or display. Line commands initiate actions that apply to the data displayed in that particular row.

line command column. Command input column on the left side of a view or display. *Contrast with* COMMAND line.

Log Edit. In the MAINVIEW for IMS Offline program named IMFLEDIT, function that extracts transaction (X‘FA’) and program (X‘F9’) records from the IMS system log. IMFLEDIT also extracts certain records that were recorded on the system log by IMS. IMFLEDIT then formats the records into a file called the IMS Resource Utilization File (IRUF).

M

MAINVIEW. BMC Software integrated systems management architecture.

MAINVIEW Alarm Manager. In conjunction with other MAINVIEW products, notifies you when an exception condition occurs. MAINVIEW Alarm Manager is capable of monitoring multiple systems simultaneously, which means that MAINVIEW Alarm Manager installed on one system keeps track of your entire sysplex. You can then display a single view that show exceptions for all MAINVIEW performance monitors within your OS/390 or z/OS enterprise.

MAINVIEW Alternate Access. Enables MAINVIEW products to be used without TSO by providing access through EXCP and VTAM interfaces.

MAINVIEW Application Program Interface. REXX- or CLIST-based, callable interface that allows MAINVIEW AutoOPERATOR EXECs to access MAINVIEW monitor product view data.

MAINVIEW AutoOPERATOR. Product that uses tools, techniques, and facilities to automate routine operator tasks and provide online performance monitoring, and that achieves high availability through error minimization, improved productivity, and problem prediction and prevention.

MAINVIEW control area. In the MAINVIEW window environment, first three lines at the top of the view containing the window information line and the COMMAND, SCROLL, CURR WIN, and ALT WIN lines. The control area cannot be customized and is part of the information display. *Contrast with* MAINVIEW display area, MAINVIEW window area.

MAINVIEW display area. *See* MAINVIEW window area.

MAINVIEW Explorer. Product that provides access to MAINVIEW products from a Web browser running under Windows. MAINVIEW Explorer replaces MAINVIEW Desktop.

MAINVIEW for CICS. Product (formerly MV MANAGER for CICS) that provides realtime application performance analysis and monitoring for CICS system management.

MAINVIEW for DB2. Product (formerly MV MANAGER for DB2) that provides realtime and historical application performance analysis and monitoring for DB2 subsystem management.

MAINVIEW for DBCTL. Product (formerly MV MANAGER for DBCTL) that provides realtime application performance analysis and monitoring for DBCTL management.

MAINVIEW for IMS (MVIMS) Offline. Product with a Performance Reporter component that organizes data and prints reports used to analyze IMS performance and a Transaction Accountant component that produces cost accounting and user charge-back records and reports.

MAINVIEW for IMS (MVIMS) Online. Product that provides realtime application performance analysis and monitoring for IMS management.

MAINVIEW for IP. Product that monitors OS/390 mission-critical application performance as it relates to IP stack usage. Collected data includes: connections, response time statistics, application availability, application throughput, and IP configuration.

MAINVIEW for Linux–Servers. Product that allows you to monitor the performance of your Linux systems from the MAINVIEW windows interface.

MAINVIEW for MQSeries. Delivers comprehensive capabilities for configuration, administration, performance monitoring and operations management for an entire MQM (message queue manager) network.

MAINVIEW for OS/390. System management application (known as MAINVIEW **for MVS** prior to version 2.5). Built upon the MAINVIEW window environment architecture, it uses the window interface to provide access to system performance data and other functions necessary in the overall management of an enterprise.

MAINVIEW for UNIX System Services. System management application that allows you to monitor the performance of the Unix System Services from a MAINVIEW window interface.

MAINVIEW for VTAM. Product that displays application performance data by application, transaction ID, and LU name. This collected data includes: connections, response time statistics, application availability, and application throughput.

MAINVIEW for WebSphere. Product that provides Web monitoring and management for applications integrated with IBM WebSphere Application Server for OS/390 or z/OS.

MAINVIEW Selection Menu. ISPF selection panel that provides access to all MAINVIEW windows-mode and full-screen mode products.

MAINVIEW SRM. *See* MAINVIEW Storage Resource Manager (SRM).

MAINVIEW SRM DMS2HSM. Product that facilitates the conversion of CA-Disk, formerly known as DMS, to HSM.

MAINVIEW SRM EasyHSM. Product that provides online monitoring and reporting to help storage managers use DFHSM efficiently.

MAINVIEW SRM EasyPOOL. Product that provides control over data set allocation and enforcement of allocation and naming standards. EasyPOOL functions operate at the operating system level to intercept normal job processing, thus providing services without any JCL changes.

MAINVIEW SRM EasySMS. Product that provides tools that aid in the conversion to DFSMS and provides enhancement to the DFSMS environment after implementation. EasySMS consists of the EasyACS functions, the SMSACSTE function, and the Monitoring and Positioning Facility.

MAINVIEW SRM Enterprise Storage Automation. Product that delivers powerful event generation and storage automation technology across the storage enterprise. Used in conjunction with MAINVIEW AutoOPERATOR, automated solutions to perform pool, volume, application, or data set-level manipulation can be created and used in response to any condition or invoked to perform ad hoc requests

MAINVIEW SRM SG-Auto. Product that provides early warning notification of storage anomalies and automated responses to those anomalies based on conditions in the storage subsystem.

MAINVIEW SRM SG-Control. Product that provides real-time monitoring, budgeting, and control of DASD space utilization.

MAINVIEW SRM StopX37/II. Product that provides enhancements to OS/390 or z/OS space management, reducing the incidence of space-related processing problems. The StopX37/II functions operate at the system level to intercept abend conditions or standards violations, thus providing services without any JCL changes.

MAINVIEW SRM StorageGUARD. Product that monitors and reports on DASD consumption and provides historical views to help control current and future DASD usage.

MAINVIEW Storage Resource Manager (SRM). Suite of products that assists in all phases of OS/390 or z/OS storage management. MAINVIEW SRM consists of products that perform automation, reporting, trend analysis, and error correction for storage management.

MAINVIEW SYSPROG Services. *See* SYSPROG Services.

MAINVIEW VistaPoint. Product that provides enterprise-wide views of performance. Application and workload views are available for CICS, DB2, DBCTL, IMS, and OS/390. Data is summarized at the level of detail needed; for example, views can be for a single target, an OS/390 or z/OS image, or an entire enterprise.

MAINVIEW window area. Portion of the information display that is not the control area and in which views are displayed and windows opened. It includes all but the first three lines of the information display. *Contrast with* MAINVIEW control area.

monitor. Online service that measures resources or workloads at user-defined intervals and issues warnings when user-defined thresholds are exceeded.

Multi-Level Automation (MLA). The user-defined, multiple step process in Enterprise Storage Automation that implements solutions in a tiered approach, where solutions are invoked one after another until the condition is resolved.

MVALARM. *See* MAINVIEW Alarm Manager.

MVAPI. *See* MAINVIEW Application Program Interface.

MVCICS. *See* MAINVIEW for CICS.

MVDB2. *See* MAINVIEW for DB2.

MVDBC. *See* MAINVIEW for DBCTL.

MVIMS. *See* MAINVIEW for IMS.

MVLNX. *See* MAINVIEW for Linux–Servers.

MVMQ. *See* MAINVIEW for MQSeries.

MVMVS. *See* MAINVIEW for OS/390.

MVScope. MAINVIEW for OS/390 application that traces both CPU usage down to the CSECT level and I/O usage down to the channel program level.

MVSRM. *See* MAINVIEW Storage Resource Manager (SRM).

MVSRMHSM. *See* MAINVIEW SRM EasyHSM.

MVSRMSGC. *See* MAINVIEW SRM SG-Control.

MVSRMSGD. *See* MAINVIEW SRM StorageGUARD.

MVSRMSGP. *See* MAINVIEW SRM StorageGUARD.

MVVP. *See* MAINVIEW VistaPoint.

MVVTAM. *See* MAINVIEW for VTAM.

MVWEB. *See* MAINVIEW for WebSphere.

N

nested help. Multiple layers of help pop-up windows. Each successive layer is accessed by clicking a hyperlink from the previous layer.

O

object. Anything you can manipulate as a single unit. MAINVIEW objects can be any of the following: product, secondary window, view, row, column, or field.

You can issue an action against an object by issuing a line command in the line command column to the left of the object. *See* action.

OMVS workload. Workload consisting of OS/390 OpenEdition address spaces.

online help. Help information that is accessible online.

OS/390 and z/OS Installer. BMC Software common installation system for mainframe products.

OS/390 product address space (PAS). Address space containing OS/390 or z/OS data collectors, including the CMF MONITOR Extractor. Used by the MAINVIEW for OS/390, MAINVIEW for Unix System Services, and CMF MONITOR products. *See* PAS.

P

parameter library. Data set consisting of members that contain parameters for specific MAINVIEW products or a support component. There can be several versions:

- The distributed parameter library, called BBPARM
- A site-specific parameter library or libraries

  These can be

  – A library created by AutoCustomization, called UBBPARM

  – A library created manually, with a unique name

PAS. Product address space. Used by the MAINVIEW products. Contains data collectors and other product functions. *See* OS/390 product address space (PAS), BBI subsystem product address space (BBI-SS PAS).

performance group workload. Collection of address spaced defined to OS/390 or z/OS. If you are running OS/390 or z/OS with WLM in compatibility mode, MAINVIEW for OS/390 creates a performance group workload instead of a service class. *See* service class workload, workload definition.

PERFORMANCE MANAGER. MAINVIEW for CICS online service for monitoring and managing current performance of CICS regions.

Performance Reporter (MVIMS Offline). MVIMS Offline component that organizes data and prints reports that can be used to analyze IMS performance.

Performance Reporter. Product component that generates offline batch reports. The following products can generate these reports:

- MAINVIEW for DB2
- MAINVIEW for CICS

Plex Manager. Product through which cross-system communication, MAINVIEW security, and an SSI context are established and controlled. Plex Manager is shipped with MAINVIEW window environment products as part of the coordinating address space (CAS) and is accessible as a menu option from the MAINVIEW Selection Menu.

PRGP workload. In MVS/SP 5.0 or earlier, or in compatibility mode in MVS/SP 5.1 or later, composite of service classes. MAINVIEW for OS/390 creates a performance group workload for each performance group defined in the current IEAIPS*xx* member.

procedure library. Data set consisting of members that contain executable procedures used by MAINVIEW AutoOPERATOR. These procedures are execute command lists (EXECs) that automate site functions. There can be several versions:

- The distributed parameter library, called BBPROC
- A site-specific parameter library or libraries

  These can be

  – A library created by AutoCustomization, called UBBPROC

  – A library created manually, with a unique name

The site-created EXECs can be either user-written or customized MAINVIEW AutoOPERATOR-supplied EXECs from BBPROC.

product address space. *See* PAS.

profile library. Data set consisting of members that contain profile information and cycle refresh definitions for a terminal session connected to a BBI-SS PAS. Other members are dynamically created by MAINVIEW applications. There can be several versions:

- The distributed profile library, called BBPROF
- A site-specific profile library or libraries

  These can be

  – A library created by AutoCustomization, called SBBPROF

  – A library created manually, with a unique name

The site library is a common profile shared by all site users. The terminal session CLIST creates a user profile automatically if one does not exist; it is called userid.BBPROF, where userid is your logon ID. User profile libraries allow each user to specify unique PF keys, CYCLE commands, target system defaults, a Primary Option Menu, and a unique set of application profiles.

Q

query. One of two constituent parts of a view; the other is form. A query defines the data for a view; a form defines the display format. *See also* form, view.

R

realtime data. Performance data as it exists at the moment of inquiry. Realtime data is recorded during the smallest unit of time for data collection. *Contrast with* historical data. *See also* current data and interval data.

Resource Analyzer. Online realtime displays used to analyze IMS resources and determine which are affected by specific workload problems.

Resource Monitor. Online data collection services used to monitor IMS resources and issue warnings when defined utilization thresholds are exceeded.

row. (1) Horizontal component of a view or display comprising all the fields pertaining to a single device, address space, user, etc. (2) Horizontal component of a DB2 table consisting of a sequence of values, one for each column of the table.

RxD2. Product that provides access to DB2 from REXX. It provides tools to query the DB2 catalog, issue dynamic SQL, test DB2 applications, analyze EXPLAIN data, generate DDL or DB2 utility JCL, edit DB2 table spaces, perform security administration, and much more.

S

sample cycle. Time between data samples.

For the CMF MONITOR Extractor, this is the time specified in the extractor control statements (usually 1 to 5 seconds).

For realtime data, the cycle is not fixed. Data is sampled each time you press Enter.

sample library. Data set consisting of members each of which contains one of the following:

- Sample JCL that can be edited to perform specific functions
- A macro that is referenced in the assembly of user-written services
- A sample user exit routine

There can be several versions:

- The distributed sample library, called BBSAMP
- A site-specific sample library or libraries

  These can be

  – A library created by AutoCustomization, called UBBSAMP

  – A library created manually, with a unique name

sampler. Program that monitors a specific aspect of system performance. Includes utilization thresholds used by the Exception Monitor. The CMF MONITOR Extractor contains samplers.

SBBPROF. *See* profile library.

scope. Subset of an SSI context. The scope could be all the data for the context or a subset of data within the context. It is user- or site-defined. *See* SSI context, target.

screen definition. Configuration of one or more views that have been stored with the SAVEScr command and assigned a unique name. A screen includes the layout of the windows and the view, context, system, and product active in each window.

selection view. In MAINVIEW products, view displaying a list of available views.

service class workload. Collection of address spaces defined to OS/390 or z/OS. If you are running Workload Manager (WLM) in goal mode, MAINVIEW for OS/390 creates a service class workload for each service class that you define through WLM definition dialogs.

If you are running MVS 4.3 or earlier, or MVS/SP 5.1 or later with WLM in compatibility mode, MVS creates a performance group workload instead of a service class. *See* performance group workload.

service objective. Workload performance goal, specified in terms of response time for TSO workloads or turnaround time for batch workloads. Performance group workloads can be measured by either objective. Composite workload service objectives consist of user-defined weighting factors assigned to each constituent workload. For compatibility mode, neither OS/390 nor z/OS provides any way to measure service.

service point. Specification, to MAINVIEW, of the services required to enable a specific product. Services can be actions, selectors, or views. Each target (for example, CICS, DB2, or IMS) has its own service point.

The PLEX view lists all the defined service points known to the CAS to which the terminal session is connected.

service request block (SRB). Control block that represents a routine to be dispatched. SRB mode routines generally perform work for the operating system at a high priority. An SRB is similar to a task control block (TCB) in that it identifies a unit of work to the system. *See also* task control block.

service select code. Code entered to invoke analyzers, monitors, and general services. This code is also the name of the individual service.

session. Total period of time an address space has been active. A session begins when monitoring can be performed. If the product address space (PAS) starts after the job, the session starts with the PAS.

SG-Auto. *See* MAINVIEW SRM SG-Auto.

SG-Control. *See* MAINVIEW SRM SG-Control.

single system image (SSI). Feature of the MAINVIEW window environment architecture where you can view and perform actions on multiple OS/390 systems as though they were a single system. The rows of a single tabular view can contain rows from different OS/390 or z/OS images.

Skeleton Tailoring Facility. A facility in MAINVIEW AutoOPERATOR that allows skeleton JCL to be used during job submission. Skeleton JCL can contain variables within the JCL statements to be substituted with data values at job submission time. Directive statements can be used in the skeleton JCL to cause the repetition of a set of skeleton statements. This facility functions similar to the TSO skeleton tailoring facility.

SRB. *See* service request block.

SSI. *See* single system image.

SSI context. Name created to represent one or more targets for a given product. *See* context, target.

started task workload. Address spaces running jobs that were initiated programmatically.

statistics interval. For MAINVIEW for DB2, cumulative count within a predefined interval (30-minute default set by the DB2STATS parameter in the distributed BBPARM member BBIISP00) for an analyzer service DELTA or RATE display. Specifying the DELTA parameter displays the current value as the difference between the value sampled by the current analyzer request and the value sampled at the start of the current interval. Specifying the RATE parameter displays the current value by minute (DELTA divided by the number of elapsed minutes).

stem variables. A REXX facility, supported in MAINVIEW AutoOPERATOR REXX EXECs and the Skeleton Tailoring Facility, where variable names end with a period followed by a number, such as &POOL.1. This configuration allows each variable to actually represent a table or array of data, with the zero variable containing the number of entries in the array. For example, &POOL.0 = 5 would indicate variables &POOL.1 through &POOL.5 exist.

StopX37/II. *See* MAINVIEW SRM StopX37/II.

StorageGUARD. *See* MAINVIEW SRM StorageGUARD.

summary view. View created from a tabular view using the Summarize option in view customization. A summary view compresses several rows of data into a single row based on the summarize criteria.

SYSPROG services. Component of MAINVIEW for OS/390. Over 100 services that detect, diagnose, and correct OS/390 or z/OS system problems as they occur. Accessible from the OS/390 Performance and Control Main Menu. Note that this component is also available as a stand-alone product MAINVIEW SYSPROG Services.

system resource. *See* object.

T

target. Entity monitored by one or more MAINVIEW products, such as an OS/390 or z/OS image, an IMS or DB2 subsystem, a CICS region, or related workloads across systems. *See* context, scope, SSI context.

target context. Single target/product combination. *See* context.

TASCOSTR. MAINVIEW for IMS Offline program that summarizes detail and summary IMS Resource Utilization Files (IRUFs) to be used as input to the offline components.

task control block (TCB). Address space-specific control block that represents a unit of work that is dispatched in the address space in which it was created. *See also* service request block.

TCB. *See* task control block.

terminal session (TS). Single point of control for MAINVIEW products, allowing data manipulation and data display and providing other terminal user services for MAINVIEW products. The terminal session runs in a user address space (either a TSO address space or a standalone address space for EXCP/VTAM access).

TDIR. *See* trace log directory.

threshold. Specified value used to determine whether the data in a field meets specific criteria.

TLDS. *See* trace log data set.

total mode. Usage mode in CMFMON wherein certain columns of data reflect the cumulative value between collection intervals. Invoked by the DELta OFF command. *See also* collection interval, delta mode.

trace. (1) Record of a series of events chronologically listed as they occur. (2) Online data collection and display services that track transaction activity through DB2, IMS, or CICS.

trace log data set (TLDS). Single or multiple external VSAM data sets containing summary or detail trace data for later viewing or printing. The trace log(s) can be defined as needed or dynamically allocated by the BBI-SS PAS. Each trace request is assigned its own trace log data set(s).

trace log directory (TDIR). VSAM linear data set containing one entry for each trace log data set. Each entry indicates the date and time of data set creation, the current status of the data set, the trace target, and other related information.

transaction. Specific set of input data that initiates a predefined process or job.

Transaction Accountant. MVIMS Offline component that produces cost accounting and user charge-back records and reports.

TS. *See* terminal session.

TSO workload. Workload that consists of address spaces running TSO sessions.

U

UAS. *See* user address space.

UBBPARM. *See* parameter library.

UBBPROC. *See* procedure library.

UBBSAMP. *See* sample library.

user address space. Runs a MAINVIEW terminal session (TS) in TSO, VTAM, or EXCP mode.

User BBPROF. *See* profile library.

V

view. Formatted data within a MAINVIEW window, acquired from a product as a result of a view command or action. A view consists of two parts: query and form. *See also* form, job activity view, query.

view definition. Meaning of data that appears online, including source of data, selection criteria for data field inclusion and placement, data format, summarization, context, product, view name, hyperlink fields, and threshold conditions.

view command. Name of a view that you type on the COMMAND line to display that view.

view command stack. Internal stack of up to 10 queries. For each command, the stack contains the filter parameters, sort order, context, product, and timeframe that accompany the view.

view help. Online help describing the purpose of a view. To display view help, place the cursor on the view name on the window information line and press PF1 (HELP).

W

window. Area of the MAINVIEW screen in which views and resources are presented. A window has visible boundaries and can be smaller than or equal in size to the MAINVIEW window area. *See* active window, alternate window, current window, MAINVIEW window area.

window information line. Top border of a window. Shows the window identifier, the name of the view displayed in the window, the system, the scope, the product reflected by the window, and the timeframe for which the data in the window is relevant. *See also* window status field.

window number. Sequential number assigned by MAINVIEW to each window when it is opened. The window number is the second character in the window status field. *See also* window status field.

window status. One-character letter in the window status field that indicates when a window is ready to receive commands, is busy processing commands, is not to be updated, or contains no data. It also indicates when an error has occurred in a window. The window status is the first character in the window status field. *See also* window information line, window status field.

window status field. Field on the window information line that shows the current status and assigned number of the window. *See also* window number, window status.

windows mode. Display of one or more MAINVIEW product views on a screen that can be divided into a maximum of 20 windows. A window information line defines the top border of each window. *Contrast with* full-screen mode.

WLM workload. In goal mode in MVS/SP 5.1 and later, a composite of service classes. MAINVIEW for OS/390 creates a workload for each WLM workload defined in the active service policy.

workflow. Measure of system activity that indicates how efficiently system resources are serving the jobs in a workload.

workload. (1) Systematic grouping of units of work (e.g., address spaces, CICS transactions, IMS transactions) according to classification criteria established by a system administrator. (2) In OS/390 or z/OS, a group of service classes within a service definition.

workload activity view. Tracks workload activity as the workload accesses system resources. A workload activity view measures workload activity in terms of resource consumption and how well the workload activity meets its service objectives.

Workload Analyzer. Online data collection and display services used to analyze IMS workloads and determine problem causes.

workload definition. Workload created through the WKLIST view. Contains a unique name, a description, an initial status, a current status, and selection criteria by which address spaces are selected for inclusion in the workload. *See* Workload Definition Facility.

Workload Definition Facility. In MAINVIEW for OS/390, WKLIST view and its associated dialogs through which workloads are defined and service objectives set.

workload delay view. Tracks workload performance as the workload accesses system resources. A workload delay view measures any delay a workload experiences as it contends for those resources.

Workload Monitor. Online data collection services used to monitor IMS workloads and issue warnings when defined thresholds are exceeded.

workload objectives. Performance goals for a workload, defined in WKLIST. Objectives can include measures of performance such as response times and batch turnaround times.

Index

Symbols

$$IMSDIR 85
(TOTAL) 56, 57
+ qualifier
  ISTAT request 402
  MWAIT request 447
  USER request 433
  workload analyzer request 75
. 18
> indicator
  DREGN display 130, 150

A

activity
  call 129, 149
  DB2 129
  paging 150
  program isolation 130, 150
  system 130, 150
ACTL latch 283
address space 143, 162
AGN
  application group name
    TRANQ 430
ALL (SET operand) 445
allocation
  buffer 231
  failures 262
  fetch request elements (FREs) 84
  fixed pools
    size percentage 270
  normal buffer 138, 158
  overflow buffer 138, 158
  pools 301
    size percentage 301
  requests 241, 249
    to APPC 262
  variable pools
    size percentage 275
allocation directions
  input 243, 249, 255
  LU 252
  output 241, 249, 260
alters 236
alters requests
  OSAM subpool 226
analyzer
  locks
    DREGN program isolation activity 141, 160
    PI service 290
AO exit 517
AOIP pool
  DPOOL display 271
  POOLS display 302
AP
  DWAIT application program events 457
APPC
  allocation requests 262
  connection status 244, 251
  EXPAND 243
  LCRES 334, 343, 377, 387
  LHUSR 345, 389
  LUMC pool 271, 303
  LUMP pool 271, 303
  LUSRD 349, 394
  mode name 258, 263
  REGNS 177, 199
  startup parameter 245, 252
APPCA 250, 256, 261
APPCL 243, 256, 261
  EXPAND 250
APPLCTN macro 11
application group name 430
application program
  DWAIT AP events 457
APSB latch 280
asynchronous conversations 244, 251
asynchronous notify request 315, 321, 357, 364
asynchronous write requests
  logger 287
authorization ID
  DB2 130
average data measurement 54
AWE write request 287

B

background write 233, 238
backup request 315, 322, 357, 364
basic conversation 257, 263
BBIISP00
  interval keyword 442
BBI-SS PAS 52
  Image log 61
    analyzer displays 60
    monitor displays 60
  Journal log 55, 57
BBPARM
  changing 519
BBPARM data set
  time interval default 442
BBPARM/UBBPARM considerations 519
BBPROF/SBBPROF considerations 519
BBSAMP/UBBSAMP considerations 519
BID 329, 338, 350, 372, 382, 396
BLKDBA2 35
BLKIMFW 62
BLKM latch 283
BLKMGR 32

B-lock 329, 338, 350, 372, 382, 396
block
create requests
OSAM buffer handler 222
OSAM subpool 226
lock 329, 338, 350, 372, 382, 396
reads
OLDS 287
size
OLDS 285
queue data sets 89
WADS 285
space
MFS 88
writes
OLDS 287
blocking requests 62
blocks
MFS 88
new OSAM 223
OSAM subpool
written 226
total OSAM written 223
BMP
block loader busy 490
database intent 492
DBWP pool 492
GU 483
not active 483
unschedulable 483
BTAM 480
MFS 478
save area prefix (SAP) 480, 481
buffer
error 223, 237
VSAM 237
Fast Path
fixed availability 230
size 230
fixed
pools 273
handler
number of OSAM requests 222
waits 227
index 236
invalidation
IRLM notify 317, 323, 358, 366
PI 293
latch
overflow 471
log wait 476
OSAM
free space 228
performance 223
overflow 330, 339, 351, 373, 383, 397
Fast Path 292
page fixed 230, 231, 236
pool hit ratios
DBST OSAM global pool display 223
DBST OSAM subpool display 227
pool performance 234, 237
pool utilization 221
pools
Fast Path 229
OSAM 221, 225
subpool size 234, 236
usage
DPOOL 298
WADS 287
buffer handler
work performed 223
buffer handler trace 222, 233

C

call activity 129, 149
calls
DL/I
DAPPC 259
GET NEXT within PARENT 136
SQL
DAPPC 259
STAT 126
token 126
CBSINTVL parameter 402
CBSORTSZ parameter 402
CBT pools 24
summary 294
CBTS
latch 458, 491, 504
CBTS latch 280
CCTL
LATCH 281
CESS pool
description 26
DPOOL display 271
POOLS display 302
change request 315, 321, 357, 364
channels
database I/O queuing 472, 513
check write requests 287
checkpoint
calls 233
cold start 289
log records 289
CHKP 504
CICS
application program 458
CIOP pool
DPOOL display 271
POOLS display 302
tuning 27
CLASQ
sample request 34

class
queuing 8
SET keyword 443
COLD (SET operand)
restart
MWAIT service 443
cold start 253, 262
checkpoint 289
collecting data on an application 440
color
APPCA 239
APPCL 248
DAPPC 255, 260
USER 433
COMCYCL 324
COMMIT 460, 504
communication
I/O buffer pool 271, 303
configuration
data set 519
log data sets 285
confirmations
TP 262
connection
APPC
current status 244, 251
user 247, 258
contention
IRLM request 355, 363, 367
latches 264
OSAM block segment 292
control interval
VSAM 234
control region
CPU wait 495
LPA fault 495
control task
wait 472
CONV latch 281
conversation
active 252, 256, 261
users 434
asynchronous 244, 251
basic 257, 263
ID 241, 246
initiation
TP name 247, 257, 263
input 245, 252
level 257, 263
mapped 257, 263
output 245, 252
synchronous 245, 252
transaction 140, 159
type 257, 263
users
held 434
count data measurement 54
CPI-C
DAPPC (input allocation) 259
REGNS 177, 199
send requests 258, 263
CPU
service units 143, 162
CPU time
TCB 145, 164
CPU wait 474
application program 457
control region 495
dependent region 496
SAS 497
CREATE THREAD 460, 504
cross-memory program call
IRLM 314, 320, 355, 362
CSA
fault 474
application program 457
DB2 461
DL/I 463
sync point manager 508
CURPER
default 439
SET keyword 442
use 447
current period 442, 453
cursor-sensitive fields 243
cylinders
formatted OSAM 223

D

DAPPC
EXPAND 256, 261
DASD
I/O 475
data capture exit 121
data collection
monitor list 52
data entry panel
workload wait request 441
data sampling
MWAIT 447
data set 89
configuration 519
extension 293
long message queue 90
QBLKS 90
queue 90
data sharing
group 355, 362
data sharing group 358, 365
data type 54
database
activity 221
analysis 16

database (continued)
intent 9
BMP 492
DBT 492
MPP 492
lock 313
sharing 380, 389, 395
Database Administrator 35
DB2
activity 129
application program (AP) events 459
application program wait 460
authorization ID 130
connection status
DAPPC 259
CPU time
DWAIT events 459, 460, 461
CPU wait 460
CSA fault 461
LPA fault 461
page fault 459
resource contention 460
SET operand 445
synchronization point (SP) events 504
DBA (Database Administrator) 35
DBAU latch 281
DBBP
latch 282, 475
lock 467, 495
DBCTL
data collection 439
LATCH 281
LCRES 334, 343, 377, 387
LCUSR 336, 380
LHUSR 345, 389
LUSRD 349, 394
REGNS 177, 199
DBFHAGU0 445
DBHIT 17
DBLK latch 281
DBLR latch 280
DBP
DBWP pool 493
DBRC 293
DBSL latch 281
DBST 221
DBST display 17
DBSTL
sample request 33
DBT
block loader busy 491
database intent 492
LUSRD 349, 394
DBT (SET operand) 444
DBTOT
example 35
DBWP pool
BMP 492
DBT 493
DBWP pool (continued)
DPOOL display 274, 276
MPP 493
POOLS display 303
DC monitor 475
latch 461, 493
DCB
number 329, 338, 350, 372, 382, 396
DCLWA 288
DCSL latch 281
DDRB latch 281
DDRP latch 281
dead letter
user queues 434
deadlock 23
cycles 325, 366
exit 317, 323, 358, 366
global 325, 366
local 325, 366
suspends 319, 325
deallocation requests 262
DECB
wait 93
DEDB 18
access control 281
area name 329, 338, 350, 372, 382, 396
latch 505
resource ID 292
synchronization control 281
DEDB events
control interval contention 462
latch 462
resource latch 462
delayed transactions 456
dependent regions
CPU wait 496
detail measurement 53
detail region displays 127, 147
device type
queue data set 90
DFSCLM00 282
DFSDLKX0 317, 323, 358, 366
DFSHASH0
PI service 292
DFSISMN0 24
DFSLU 247, 253, 256, 261
DFSNOTX0 317, 323, 358, 366
DFSRESX0 317, 323, 359, 366
directory
MFS
I/O active 478
I/O queued 478
reads 85
DISP latch 281
display service
ISTAT 401
logging 60, 61
TRANQ 429
Workload Wait 451

DL/I
buffer handler trace
DBST 222
VSST 233
calls
DAPPC 259
details 121
DLIST 120
CPU wait 463
cross memory
CPU wait 466
CSA fault 466
LPA fault 466
DREGN 129, 149
LSO 464
PCB 125
SAS 465
trace table
storage 233
DL/I activity 14–15
DLDP pool
DPOOL display 274, 276
POOLS display 303
DLI
SET operand 445
DLISAS
data sets allocated 34
POOLS display
CBT pools 296
wait 500
DLIST
use 14
DLMP pool
DPOOL display 274, 276
POOLS display 303
DLTCH
generic detail statistics 264
DMB
I/O active 493
I/O queued 493
DMB pool 26
intent failure 9
tuning 11
DMBB latch 281
DMBE
latch 475
lock 467, 495
DMBP latch 281
DMBP pool
BMP 494
DBT 494
DPOOL display 276
MPP 494
POOLS display 303
DMBW pool
DPOOL display 276
POOLS display 303
use 26
DMON
monitor service title 56
use 3
DMSH latch 281
DMSY latch 281
DOPT option 11
DPOOL 298
DPSB pool
DPOOL display 274, 276
POOLS display 303
DPST pool
tuning 24
DREGN 256
description
Event Collector data 127
No Event Collector data 147
program isolation 141, 160
use
Paging Activity area 31
Program Isolation Activity area 13
PSB/Transaction area 15
System Activity area 15
DRRN translations 91
DUMPQ 289
dumps
analysis 517
Event Collector 517
MAINVIEW AutoOPERATOR for IMS 517
AO exit 517
IMS 517
symptoms 517
DWAIT
current period 442
description 451
event definitions 456
MWAIT display 439
requesting 449
DWARN
definition 58
monitor service title 56
warnings 57
DXRJPROC
IRLM 314, 320, 355, 362
IRLMG 324
dynamic transactions 259
dynamic users 434

E

elapsed time 134, 154
active region 163
EMHB pool
DPOOL display 271
POOLS display 303
enqueue
held 142, 161, 291
messages to LTERM 437
outstanding 290

EPCB pool
DPOOL display 274
POOLS display 303
tuning 27
error buffers
OSAM 223
VSAM 237
ESDS inserts 236
ESDS resource ID 292
ETO
dynamic terminals 401
Event Collector
DREGN display
with data from 127
without data from 147
dump analysis 517
events
application program 457
DWAIT definitions 456
DWAIT queue exclusion 456
input communications 474
input queue 483
output queue 487
scheduling 490
synchronization point 504
exclusive
enqueue 161
lock
current state 328, 337, 371, 381
held 335
waiters 334, 343, 378, 387
mode, users 434
exclusive locks 344
exit routines
IRLM 317, 323, 358, 366
EXPAND feature
APPC 243
APPCL 250
DAPPC 256, 261
LATCH 279
LCUSR 335, 379
LHUSR 344, 388
LUSRD 346, 391
PI 290
POOLS 299
USER 436
VSST 232
external storage
VSAM access 237

F

Fast Path 229
BALG queuing 9
buffer
overflow 292
pool 229
size 230
wait 472
Fast Path (continued)
checkpoint synchronization 282
command 282
DEDB resource ID
PI service 292
DEDB share area name
DLTCH service 264
DEDB sync area name
DLTCH service 265
EPCB pool 276, 303
exclusive enqueue 161
Expedited Message Handler 246, 258
FPWP pool 271, 303
IFP
DPOOL 271
POOLS 303
lock 329, 330, 338, 339, 350, 351, 372, 373, 382, 383, 396, 397
MSDB name
DLTCH service 265
MSDB resource ID
PI service 292
REGNS
FPU parameter 177, 199
resource latch 467
SYNC point latch 506
transaction waiting 484
Fast Path buffer pool
synchronization point latch 506
FETCH
I/O active 494
I/O queued 495
fetch request elements (FREs) 84
filters
workload wait 443
fixed pools
APPC 271, 303
block expansions/compressions 270, 273, 301
buffers 273
tuning tips 273, 298, 304
net expansions 270, 273, 301
non-CBT 299
ownership 271
size 270
wasted space 272, 304
flow components 490
application program 457
input communications 474
input queue 483
output communications 486
output queue 487
synchronization point 504
FP
SET operand 445
FPU (SET operand) 444
FPWP pool
DPOOL display 271
POOLS display 303

fragmented pool 277
MFS 88
FRE
MFS queue 86
unavailable 478
FRE (fetch request element) 84, 86
free block request 85
free space
MFS pool 87, 88
OSAM buffer pool 228
program isolation pool 291
FREEMAIN 295
frequency distribution 53
FSEL(+) field 243

G

generic latches
contention statistics 278
generic qualifier 75
get next requests
OSAM 222
GET NEXT within PARENT calls 136
GETMAIN 295
global
deadlocks 325, 366
IRLM display
sharing group 358, 365
lock 329, 338, 350, 372, 382, 396
group
data sharing
IRLM 355, 358, 362, 365
grouping requests 62

H

HDAM
lock 329, 338, 350, 373, 383, 396
resource ID 292
held enqueues 142, 161
held resource 329, 338, 350, 372, 382, 396
high-water mark 53
CBT pool 295
non-CBT pool percentage
DPOOL display 270, 275
POOLS display 301
non-CBT pools
allocation size 270, 275, 302
sequential buffer storage 224
HIOP pool
DPOOL display 271
POOLS display 303
tuning 27
Hiperspace
page stolen 238
reads 238
writes 238
Hiperspace buffers 18
number defined 234
statistics 238
subpool number 236
VSAM control interval 234, 237
historical data
long-term 53
short-term 53
history
DWAIT display 453
HISTORY (SET keyword)
use 447
hit ratio 17
analyzer displays
DBST OSAM global 223
DBST OSAM subpool 227
VSST VSAM global 233
VSST VSAM subpool 234, 237
VSAM 238
HOT (SET operand)
restart
MWAIT service 443
HPHIT monitor 18
hyperlink
DREGN 149

I

I/O
application program 457
errors 86
paged-fixed blocks 236
queuing 92
request processing 85
service units 144, 163
VSAM 237
WADS requests 288
IC
DWAIT input communications events 474
identify request 315, 322
IFP
DPOOL 271
GU 484
POOLS 303
IFP (SET operand) 444
Image log 61
immediate request 86
IMRPRINT 60
IMS
dump analysis 517
internal services displays 239
Manager 32
monitoring 3
restart
global pool statistics 221
subsystem ID 346, 392
IMS performance analyst and system programmer 33
IMSPLEX
description 355, 363

IMS-related data 258
in-core format index 85
index buffer 236
information 12
input
allocation direction 243
display 255
communications
DWAIT IC events 474
conversations 245, 252
queue
DWAIT IQ events 483
input queue (IQ) 456, 483
inserts
ESDS 236
KSDS 236
intent
failures
TRANSACT macro 492
intent lists
I/O active 498
I/O queued 498
internal functions
APPCA 239
APPCL 248
DAPPC 255, 260
LATCH 279
logging 285
program isolation 290
interprocessor environment
IRLM 314, 320, 355, 362
interval
historical data 53
specifying 442
INTERVAL (SET keyword) 442
use 447
intraprocessor environment
IRLM 314, 320, 355, 362
IQ
DWAIT input queue events 483
IRLM
data sharing group 355, 362
identified subsystems 326
intraprocessor/interprocessor environment 314, 320, 355, 362
lock types 330, 351, 383, 397 339, 373
partner
failure 316, 323
lock holders 329, 338, 352, 372, 382, 395
lock waiters 331, 340, 353, 374, 398
recovery 314, 320
release number 314, 320, 355, 362
request contention 355, 363
scope 314, 320, 355, 362
services
IRLM (IRLM 2.1 and later status) 354
sharing subsystems 314, 320, 355, 362
status 358, 365
IRLM (continued)
status exit 315, 322, 357, 364
subsystem name 314, 320, 355, 362
suspensions 356
VTAM APPL names 324
wait 467
sync point 509
XES
lock table 355, 362
OSAM table 355, 362
VSAM table 355, 362
IRLM services
IRLM (IRLM 1.5 status) 313
IRLMG (IRLM 1.5 global status) 319
IRLMG (IRLM 2.1 and later global status) 361
LCRES (lock contention by resource) 328, 371
LCUSR (lock contention by user) 335, 379
LHRES (locks held by resources) 337, 381
LHUSR (locks held by user) 344, 388
LUSRD (lock user detail) 346, 391
ISI security 430
ISL 317, 359
ISTAT 401
ITASK 474, 477, 480
analysis 27
DWAIT
IC events 474, 475, 480
SC events 497

J

Journal 35

K

key retrieves 222, 237
KSDS
inserts 236
resource ID 292

L

LATCH 278
ACTL 283
APSB 280
BLKM 283
CBTS 280, 458, 491, 504
CCTL 281
contention 264
CONV 281
DBAU 281
DBBP 282
DBLK 281
DBLR 280
DBSL 281
DC Monitor 493
DCSL 281
DDRB 281
DDRP 281

LATCH (continued)
DEDB 505
DISP 281
DMBB 281
DMBP 281
DMSH 281
DMSY 281
EXPAND 279
Fast Path 282
Fast Path SYNC point 506
generic 495
logger 499
LOGL 282
LUBT 280
LUML 282
MSDB 282, 511
transactions waiting 469
other 502
PDRB 282
PDRP 282
PI enqueue/dequeue 471, 502
PSBB 282
PSBP 282
QBSL 282
QMGR 282
SCHD 283
SMGT 283
storage management 503
SUBQ 283
TCTB 283
TERM 283
USER 283
VLQB 280
VTCB 280
wait time 284
XCNQ 282
latch
CBTS 474
DC Monitor 461, 475
generic 467, 475
logical log 476
other 470, 479
overflow buffer 471
PI enqueue/dequeue 479
storage management 472
latch summary 279–284
LCRE 288, 289
LCRES (lock contention by resource) display 328, 371
LCUSR (lock contention by user) display 335, 379
LGMSG 24
I/O active 475, 499
application program 468
sync point manager 509
I/O queued 476, 499
application program 468
sync point manager 509
LHRES (locks held by resources) display 337, 381
LHUSR (locks held by user) display 344, 388
lines
busy 487
unavailable 487
local lock 329, 338, 350, 372, 382, 396
locate requests
OSAM subpool 226
locates 222
lock
deadlocks 366
global resource request 357, 364
local resource request 357, 364
request 315, 322
lock manager
local 314, 320, 355, 362
lock table
XES, IRLM 355, 362
locks
analyzer
DREGN program isolation activity 141, 160
PI service 290
contention
dependent regions 335, 379
deadlocks 325
Fast Path 330, 339, 351, 373, 383, 397
held 128
held by region 335, 352, 398
holder 290
holders 372, 382
in transition
LCRES (IRLM 1.5) 328, 334
LCRES (IRLM 2.1) 371, 378
LHRES (IRLM 1.5) 337, 343
LHRES (IRLM 2.1) 381, 387
PTB
process 319, 326
requests 314, 321
regions waiting for 345
LCUSR (IRLM 1.5) 336
LCUSR (IRLM 2.1) 380
LHUSR (IRLM 1.5) 345
LHUSR (IRLM 2.1) 389
LUSRD (IRLM 1.5) 350
LUSRD (IRLM 2.1) 395
request handler requests 314, 321
state 352, 397, 398
structure capacity 368
table 368
types 330, 339, 351, 373, 383, 397
log buffer wait 476
LOG DISPLAY 55
log statistics (LOGST) 285
logger
activity 286
asynchronous write requests 287
check write requests 287
latch 499
wait write requests 288

logging
buffer wait 499
displays 60, 61
logical logger latch 476
LOGL latch 282
logs
configuration display 285
long message queue data set 90
long term
history 53
page fixing option 226
LPA
fault 476
application program 457
control region 495
DB2 461
dependent region 496
DL/I 463
SAS 498
sync point manager 509
GFA 477
LTERM
assigned 437
input status messages 407
messages enqueued 437
monitoring 8
unavailable 488
LU
allocation directions 252
partner 256
status 243
LU name
APPCA
partner LU 246
route connections 245
APPCL
partner LU 253
route connections 252
DAPPC (input allocation)
partner LU 256
DAPPC (output allocation)
partner LU 261
deallocation requests 262
requests queued 247, 253, 262
stopped 247, 253, 257, 261
trace 253, 257, 261
LUBT latch 280
LUMC pool
DPOOL display 271
POOLS display 303
LUML latch 282
LUMP pool
DPOOL display 271
POOLS display 303
LUSRD (lock user detail) display 346, 391
LWA wait 468, 477, 499

M

MAIN pool
DPOOL display 274, 276
POOLS display 303
main storage service units 144, 163
MAINVIEW AutoOPERATOR for IMS
dump analysis 517
mapped conversation 257, 263
mark buffer altered requests 222
Master Terminal Operator 30
MDP (SET operand) 444
measurements 54
message
switches 131, 151
message formatting service (MFS)
MFSUT 87
messages
application program 457
enqueued to LTERM 437
input communications 474
input queue 259, 483
output queue 487
scheduling 490
segment
relocate request 91
synchronization point 504
transaction queue status 429
MFBP pool
DPOOL display 274, 276
POOLS display 303
tuning 26
MFS
FRE unavailable 478
I/O active 477
I/O queued 477
pool failure 478
test mode
users 434
MFS (Message Format Service)
block 84
block space 88
data set
first extent 84
format block 85
in-core format index 85
pool 83
status 87
tuning 11
utilization (MFSUT) 87
queue 86
request statistics 85
MFSTEST
control blocks 26
MFSUT 87
mode
name
conversation 258, 263

monitor
parameter 442
request title 56
restart 52
MWAIT 443
service title 56
starting and stopping 52
stop time 443
workload wait selection criteria 443
monitoring
specific resources 445
techniques 3
MPP
block loader busy 491
class not active 484
database intent 492
DBWP pool 493
GU 484
not scheduled 484
MPP (SET operand) 444
MPR busy 483
MSC
delays 487
logical link unavailable 488
physical link busy 488
physical link unavailable 488
MSCCLOCK operand (TERM SET keyword) 445
MSDB 469
latch 282, 469, 511
transactions waiting 469
lock 329, 338, 350, 373, 382, 396
resource ID 292
multiple requests 62
MVIMS sync point processing 505
MWAIT 439
current period 442
start time 443

N

name
application group
TRANQ 430
name qualifier
workload analyzer request 75
net expansions
fixed pools 270, 301
network stopped
MFS pool 478
MFSP pool 478
SAP 480, 481
NOBK indicator 13
NOCOMM 444
node
busy 488
ID 435
name
user 437
unavailable 489
users allocated 434
non-CBT pools 24–27
fixed detail 268
summary 297
normal buffer allocation 138, 158
notify exit 317, 323, 358, 366
notify request
XCF 357, 365
N-way sharing group 380, 389, 395

O

OLDS (online log data set) 21, 22
allocated 286
archiving 287
block size 285
blocks read 287
blocks written 287
statistics display 285
operating system
information 143, 162
OQ
DWAIT output queue events 487
OS wait 470, 479
OS/390 subpool 295
OSAM 225
buffer pool
DBST global pool display 221
performance 223
buffers 223, 227
latch 282
HDAM resource ID
PI service 292
I/O active 470, 511
I/O queued 470, 511
pools (DBST) 221
queuing 6
reads 223
resource ID 292
segment contention 292
writes 16, 223
OSAM buffer pool 21
OSAM table
XES
IRLM 355, 362
output
allocation direction
display 260
communications
DWAIT events 486
conversations 245, 252
delays 487
messages 487
queue
DWAIT OQ events 487
threads 230
output queue 456
overflow buffer
allocation 231
latch 471
overflow buffer allocation 138, 158

P

page fault 508
  application program 458
  CSA GFA
    application program 457
  GFA
    application program 458
  GFA queue 477, 480
  LPA 476
  message processing 475
  private area 479, 497
  sync point 508
page fixing option
  long term 226
page-fixed buffers 236
paging
  activity 150
parameter
  resource monitor request 442
partner IRLM
  failure 316, 323
  lock contention 337, 381
  lock holders
    LCRES (IRLM 1.5) 329
    LCRES (IRLM 2.1) 372
    LHRES (IRLM 1.5) 338
    LHRES (IRLM 2.1) 382
    LUSRD (IRLM 1.5) 352
    LUSRD (IRLM 2.1) 395
  lock waiters
    LCRES (IRLM 1.5) 331
    LCRES (IRLM 2.1) 374
    LHRES (IRLM 1.5) 340
    LHRES (IRLM 2.1) 384
    LUSRD (IRLM 1.5) 353
partner LU 246, 253, 256, 261
PCB 92, 125
PDRB latch 282
PDRP latch 282
percent data measurement 54
period 60
PI
  enqueue/dequeue latch 471, 502, 512
PI (program isolation) 9, 13
  activity 130, 150
  display service 290
  enqueue/dequeue latch 479
PIENQ
  example of 35
plan name 139
P-lock 329, 338, 350, 372, 382, 396
PLOT 53
  definition 58
  range distribution 58
plot 30–35
pool analysis 10–12
pool space failure 10, 11
POOLC 294
POOLS
  EXPAND 299
pools 297
  current definition 222
  fixed 299
  FPBST, Fast Path buffer pool 229
  index buffers 236
  MFS 83, 87
    failure 478
    fragmentation 88
    free space 88
  MFSUT, MFS pool 87
  ownership 276, 303
  program isolation 11, 290
  program isolation (PI) 290
  tuning tips 301
  variable 299
  VSST, VSAM pool 232
  VSST, VSAM subpool 235
pop-up window 340, 374, 384
positional qualifier 75
positionally 75
PREFETCH 86
preset mode
  users 435
priority
  cutoffs 9
PROCLIM
  reschedule 485
program isolation 479
  activity 130, 150
  DREGN 141, 160
  pool tuning 11
  service 290
PSB
  I/O active 502
  I/O queued 502
  work area 141, 159
PSB name
  DREGN 131, 151
  LCUSR 335, 379
  LHUSR 344, 388
  LUSRD 347, 392
PSB pool
  DLMP 26, 276, 303
  DPSB 26, 276, 303
  intent failure 9
  LSO 11
  resident 26
  tuning 11
  use 10, 26
PSBB latch 282
PSBC pool
  DPOOL display 276
  POOLS display 303
PSBD pool
  DPOOL display 276
  POOLS display 303
PSBNAME 259

PSBP latch 282
PSBW pool
  description 26
  DPOOL display 274, 276
  POOLS display 303
  use 26
PST 347, 392
PTB
  lock requests 314, 319, 321, 326
  size 324
PUR (SET operand)
  restart
    MWAIT service 443
purge calls 233
purge request
  IRLM 315, 322, 357, 364
  OSAM subpool 226
purging
  requests
    MWAIT restart 443
    QUEST 91
  wait 93

Q

QBLKS
  data set 90
  I/O active 471, 502
  I/O queued 471, 503
QBSL latch 282
QBUF pool
  DPOOL display 274, 276
  POOLS display 303
  tuning 24
QIS
  SET keyword
    MWAIT service 442
  SET operand
    MWAIT service restart 443
QMGR latch 282
qualifier 75
query request 315, 322, 357, 364
QUEST service 89
queue
  buffer size 476
  data set
    block size 89
    device type 90
    record length 90
    volume 90
  dead letter 434
  events
    excluding from DWAIT display 456
  I/O activity 92
  long message data set 90
  manager
    calls 91
    requests 91
  statistics (QUEST) 89
queue (continued)
  type 90
  users 435
  waits 92
queued transactions
  resource status 89
queuing analysis 6–7
quit request 315, 322

R

range distribution 58
RBA 292
  lock display 329, 338, 350, 372, 382, 396
RBA retrieves 237
read only lock
  LCRES (IRLM 1.5) 328, 334
  LCRES (IRLM 2.1) 371, 378
  LHRES (IRLM 1.5) 337, 343
  LHRES (IRLM 2.1) 381, 387
reads
  hiperspace 238
  OSAM 223, 227
real storage analysis 28
RECA pool 27
record length
  queue data sets 90
record lock 329, 338, 350, 372, 382, 396
recovery
  IRLM 314, 320
recovery block 288
region
  execution 143, 162
  holding resource 293
  identification
    DREGN service 131, 151
  status
    DLIST service 121
    DREGN service 131, 151
  type 134, 154
REGION (SET keyword) 444
region displays
  detail data 127, 147
REGND
  program isolation 141, 160
REGNS
  use 14
request
  contention
    IRLM 355, 363
  IRLM
    suspended 356
  multiple 62
  status 62
request handler lock requests 314, 321
requests
  free block 85
  message segment
    relocate 91

requests (continued)
notify
XCF 357, 365
prefetch 85
queue manager 91
Resource Analyzer
description 49
resource displays 221
resource ID 292
Resource Monitor 49
resource selection 445
resource status
queued transactions 89
resources
IRLM request contention 355, 363
response mode
users 435
response time
DWAIT display 453
workload wait events 439, 451
restart
global pool statistics 221
restart service
MWAIT 443
resume exit 317, 323, 359, 366
retrieves
key 222, 237
RBA 237
VSAM 237
RID 329, 338, 350, 372, 382, 396
RPL blocks
storage 233
RST (SET keyword)
MWAIT service 443

S

sampling interval
MWAIT 447
specifying 442
SAP (save area prefix) 28
shortage 481
unavailable 480
SAP pool
tuning 24
SAS
fault 498
I/O active
SYNC point 512
I/O queued
SYNC point 512
SYNC I/O active 503
sync I/O active 472
SYNC I/O queued 503
task wait 473
SBBPROF/BBPROF considerations 519
SC
DWAIT scheduling events 490
SCHD latch 283
scheduling
DWAIT SC events 490
priority 140, 159
scope
IRLM 314, 320, 355, 362
scrolling
APPCA 244
APPCL 251
DAPPC 256, 261
ISTAT 402
LATCH 280
PI 290
POOLS 300
USER 437
VSST 232, 235
search buffer requests
VSAM 237
security
ISI 430
segment 141, 160
segment contention
OSAM block 292
selecting
IMS subsystem activities 41
selection criteria
workload wait 443
sequential buffering 131, 151, 224
service select code 290
APPCA 239
APPCL 248
DAPPC 255, 260
DLTCH 264
DPOOL 268, 274
DWAIT 451
FPBST 229
IRLM
IRLM 1.5 313
IRLM 2.1 354
IRLMG
IRLM 1.5 320
IRLM 2.1 361
ISTAT 402
LATCH 279
LCRES 328, 371
LCUSR 335, 379
LHRES 337, 381
LHUSR 344, 388
LOGST 285
LUSRD 346, 391
MFSST 83
POOLC 294
POOLS 298
QUEST 89
USER 433
VSST 232
service units 143, 144, 162, 163

service(s)
database 221
IMS internals 239
IRLM
1.5 313
2.1 and later 354
IRLMG
IRLM 1.5 319
IRLM 2.1 and later 361
MFS 83
region activity
DREGN 127, 147
title 55, 56
user status 433
workload wait 451
SET request 53, 61
block requests 62
SEV1 status 429
SEV2 status 429
SEV3 status 429
share lock
held 335, 344
LCRES (IRLM 1.5) 328, 334
LCRES (IRLM 2.1) 371, 378
LHRES (IRLM 1.5) 337, 343
LHRES (IRLM 2.1) 381, 387
sharing group
IRLM 355, 363
lock structure capacity 368
N-way 380, 389, 395
sharing subsystems
IRLM 314, 320, 355, 362
SHMSG 24
I/O active 472, 481, 503
I/O queued 472, 482, 503
short message queue
data set 90
shutdown 52
SIDEINFO 246, 253, 261, 263
size
fixed pools 270
allocation 270
percentage 270
OSAM subpool 225
pools 275, 302
percentage 301
POOLS display 301
subpool 236
variable pools
allocation 275
percentage 275
skeleton tailoring
defined 531
SLDS (system log data set) 22
SLM 356, 357, 363, 364
SMGT latch 283
snap request 315, 322
SNAPQ 289
SORT
APPCA 241
APPCL 250
DPOOL 268
POOLS 298, 299
USER 435
SP
DWAIT synchronization point events 504
SPA
I/O active 482
I/O queued 482
space
wasted
fixed pools 272, 304
space release algorithm 87
SPQB 438
blocks 283
SQL call
DAPPC 259
DWAIT event 459
SSQ status 429
START (SET keyword)
MWAIT service 443
start time
MWAIT request 443
starting
monitors 52
workload wait 439
startup 52
STAT call 126
STAT/STATR
techniques 12
static users 433, 434, 436
statistics
pool
global 221
status
APPC connection 244, 251
data measurement 54
exit
routine call 317, 323, 359, 366
subsystem response 315, 357, 364
IRLM 358, 365
MFS pool 87
requests 62
resource 89
user 437
status exit
IRLM 322
STM task compression 295
STOP (SET keyword)
MWAIT service 443
stop time
monitor request 443
stopped
users 436
stopping
monitors 52
workload wait 446

storage
external access 234
management latch 472, 482
pool allocation
fixed pool 270
POOLS display 300, 302
variable pool 275
RPL blocks 233
sequential buffering maximum 224
service units 144, 163
VSAM pool 233
storage management
latch 503
structure capacity
locks 368
subpool
ID 234
OSAM
current definition 225
database 222
display 225
number of requests 226
performance 226
size 225
relative number 234
requests 236
size 234, 236
type 234
SUBQ latch 283
subsystem
identified to IRLM 326
subsystem ID 346, 392
IRLM 314, 320, 355, 362
summary periods 53
suspend exit 317, 323, 359, 366
suspends 319, 325
IRLM request 356
swapping status 145, 164
SYNC 504
synchronization
level 258, 263
synchronization point (SP) 504
synchronous conversations 245, 252
synchronous notify request 315, 322, 357, 364
SYNCLOCK operand (TERM SET keyword) 445
syntax notation xvii
system activity 130, 150

T

takeover request 315, 322, 357, 364
TCB
CPU time 145, 164
execution status 143, 162
TCTB latch 283
TERM (SET keyword) 445
TERM latch 283
terminals
dynamic 401
test mode
users 436
thread
output 230
threshold
defining 55
exceeding 56
use 52
value 57
warning message 57
time 11
time interval 442
specifying
MWAIT request 442
timer request panel
workload wait request 441
title
defining of 56
token 126
TP
requests queued 253, 262
TP name
confirmations 262
conversation initiation 247, 257, 263
deallocation requests 262
message type received 246, 258
requests queued 253, 262
stopped 247, 254, 262
trace 262
transaction code scheduled 247, 259
TPI
DAPPC (input allocation) 259
LCRES 334, 343, 377, 387
LHUSR 345, 389
LUSRD 349, 394
TPI (SET operand)BMP (SET operand) 444
trace
DL/I buffer handler
DBST 222
VSST 233
LU name 253, 257, 261
TP name 262
TRANQ 256
TRANSACT macro 246, 247, 258
transaction flow
component display 451
DWAIT events 456
transactions
APPC
type 259
conversational 140, 159, 246
dynamic 259
elapsed time 134, 154
response time
display 453
scheduling priority 140, 159
translations
DRRN 91
TRANTYPE (SET keyword) 445

tuning tip
LOGST 288

U

UBBPARM/BBPARM considerations 519
UBBSAMP/BBSAMP considerations 519
unlock
request 316, 322, 357, 365
update lock 334
held 335, 344
LCRES (IRLM 1.5) 328
LCRES (IRLM 2.1) 371, 378
LHRES (IRLM 1.5) 337, 343
LHRES (IRLM 2.1) 381, 387
USER
EXPAND 436
latch 283
user
active conversation 434
dynamic 434
exclusive mode 434
MFS test mode 434
node name 437
preset mode 435
response mode 435
static 436
static ISC 434
stopped 436
test mode 436
user ID 436
USERID (SET keyword) 445

V

variable pools
allocated blocks 277
fragmentation 277
free spaces 277
non-CBT 299
size 275
verify request 316, 322, 357, 365
VHIT monitor 17
VIO slots 146, 164
VLQB latch 280
volume
queue data set 90
VSAM
buffer handler
requests 236
buffer pool 232
control interval 234
database pool 233
error buffers 237
ESDS resource ID
PI service 292
external storage 237
get requests 237
VSAM (continued)
hiperspace
buffers 234
reads 238
writes 238
I/O 237, 472
active 512
queued 513
KSDS resource ID
PI service 292
lock 330, 339, 351, 373, 383, 396
retrieve requests 237
search buffer requests 237
subpool 234
defined 236
ID 234, 236
performance 233, 234
writes
user 234, 238
VSAM table
XES
IRLM 355, 362
VSBP
latch 475
lock 467, 495
VSST 17, 18
service description 232
VTAM 478
MFS 478
node
busy 488, 489
save area prefix (SAP) 480, 481
VTCB latch 280

W

WADS (write-ahead data set) 22
block size 285
buffer 287
I/O requests 288
segments written 288
statistics display 285
wait
buffer enqueue/dequeue 92
buffer handler 227
DECB 93
IMS internal 479
latch 280
OS 479
PI 290
purge 93
queuing 92
resource 329, 338, 350, 372, 382, 396
workload 441
wait time
latch 284
wait write requests 288
warning condition
description 55

warning message 56
format 56
ID 56
number of 55
sending of 55
time interval 55
title 56
wasted space
fixed pools 272, 304
WIF (SET keyword) 55
WIN (SET keyword) 55
WKAP pool
DPOOL display 276
POOLS display 303
use 24
WLIM (SET keyword) 55
WMAX keyword 55, 57
WMSG (SET keyword) 55
work area
PSB 141, 159
workload
events 59, 451
definitions 456
trace 59
wait
selection criteria 443
wait data entry panel 441
Workload Analyzer
displays, alphabetical reference 399
DWAIT display 451
Workload Monitor
description 49
Workload Wait (DWAIT) 449
writes
background 233, 238
hiperspace 238
OSAM 223, 227
VSAM 234, 238
written blocks
OSAM subpool 226
total OSAM 223
WTO (write-to-operator SET operand) 55
WVAL keyword
threshold, warning message 55, 57

X

XCF
notify request 357, 365
XCNQ latch 282
XES 355, 362
delay 368
XRF
backup request 315, 322, 357, 364
IRLM 316, 323
LU name 245, 252
takeover 330, 339, 351, 373, 383, 397

STOP!

IMPORTANT INFORMATION - DO NOT INSTALL THIS PRODUCT UNLESS YOU HAVE READ ALL OF THE FOLLOWING MATERIAL

By clicking the YES or ACCEPT button below (when applicable), or by installing and using this Product or by having it installed and used on your behalf, You are taking affirmative action to signify that You are entering into a legal agreement and are agreeing to be bound by its terms, EVEN WITHOUT YOUR SIGNATURE. BMC is willing to license this Product to You ONLY if You are willing to accept all of these terms. CAREFULLY READ THIS AGREEMENT. If You DO NOT AGREE with its terms, DO NOT install or use this Product; press the NO or REJECT button below (when applicable) or promptly contact BMC or your BMC reseller and your money will be refunded if by such time You have already purchased a full-use License.

SOFTWARE LICENSE AGREEMENT FOR BMC PRODUCTS

SCOPE. This is a legally binding Software License Agreement (**"License"**) between You (either an individual or an entity) and BMC pertaining to the original computer files (including all computer programs and data stored in such files) contained in the enclosed Media (as defined below) or made accessible to You for electronic delivery, if as a prerequisite to such accessibility You are required to indicate your acceptance of the terms of this License, and all whole or partial copies thereof, including modified copies and portions merged into other programs (collectively, the **"Software"**). **"Documentation"** means the related hard-copy or electronically reproducible technical documents furnished in association with the Software, **"Media"** means the original BMC-supplied physical materials (if any) containing the Software and/or Documentation, **"Product"** means collectively the Media, Software, and Documentation, and all Product updates subsequently provided to You, and **"You"** means the owner or lessee of the hardware on which the Software is installed and/or used. **"BMC"** means BMC Software Distribution, Inc. unless You are located in one of the following regions, in which case "BMC" refers to the following indicated BMC Software, Inc. subsidiary: (i) Europe, Middle East or Africa --BMC Software Distribution, B.V., (ii) Asia/Pacific -- BMC Software Asia Pacific Pte Ltd., (iii) Brazil -- BMC Software do Brazil, or (iv) Japan -- BMC Software K.K. **If You enter into a separate, written software license agreement signed by both You and BMC or your authorized BMC reseller granting to you the rights to install and use this Product, then the terms of that separate, signed agreement will apply and this License is void.**

FULL-USE LICENSE. Subject to these terms and payment of the applicable license fees, BMC grants You this non-exclusive License to install and use one copy of the Software for your internal use on the number(s) and type(s) of servers or workstations for which You have paid or agreed to pay to BMC or your BMC reseller the appropriate license fee. If your license fee entitles You only to a License having a limited term, then the duration of this License is limited to that term; otherwise this License is perpetual, subject to the termination provisions below.

TRIAL LICENSE. If You have not paid or agreed to pay to BMC or your BMC Reseller the appropriate license fees for a full use license, then, **NOTWITHSTANDING ANYTHING TO THE CONTRARY CONTAINED IN THIS LICENSE**: (i) this License consists of a non-exclusive evaluation license ("Trial License") to use the Product for a limited time ("Trial Period") only for evaluation; (ii) during the Trial Period, You may not use the Software for development, commercial, production, database management or other purposes than those expressly permitted in clause (i) immediately above; and (iii) your use of the Product is on an ***AS IS*** basis, and **BMC, ITS RESELLERS AND LICENSORS GRANT NO WARRANTIES OR CONDITIONS (INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE) TO YOU AND ACCEPT NO LIABILITY WHATSOEVER RESULTING FROM THE USE OF THIS PRODUCT UNDER THIS TRIAL LICENSE.** If You use this Product for other than evaluation purposes or wish to continue using it after the Trial Period, you must purchase a full-use license. When the Trial Period ends, your right to use this Product automatically expires, though in certain cases You may be able to extend the term of the Trial Period by request. Contact BMC or your BMC reseller for details.

TERM AND TERMINATION. This License takes effect on the first to occur of the date of shipment or accessibility to You for electronic delivery, as applicable (the **"Product Effective Date"**). You may terminate this License at any time for any reason by written notice to BMC or your BMC reseller. This License and your right to use the Product will terminate automatically with or without notice by BMC if You fail to comply with any material term of this License. Upon termination, You must erase or destroy all components of the Product including all copies of the Software, and stop using or accessing the Software. Provisions concerning Title and Copyright, Restrictions (or Restricted Rights, if You are a U.S. Government entity) or limiting BMC's liability or responsibility shall survive any such termination.

TITLE AND COPYRIGHT; RESTRICTIONS. All title and copyrights in and to the Product, including but not limited to all modifications thereto, are owned by BMC and/or its affiliates and licensors, and are protected by both United States copyright law and applicable international copyright treaties. You will not claim or assert title to or ownership of the Product. To the extent expressly permitted by applicable law or treaty notwithstanding this limitation, You may copy the Software only for backup or archival purposes, or as an essential step in utilizing the Software, but for no other purpose. You will not remove or alter any copyright or proprietary notice from copies of the Product. You acknowledge that the Product contains valuable trade secrets of BMC and/or its affiliates and licensors. Except in accordance with the terms of this License, You agree (a) not to decompile, disassemble, reverse engineer or otherwise attempt to derive the Software's source code from object code except to the extent expressly permitted by applicable law or treaty despite this limitation; (b) not to sell, rent, lease, license, sublicense, display, modify, time share, outsource or otherwise transfer the Product to, or permit the use of this Product by, any third party; and (c) to use reasonable care and protection to prevent the unauthorized use, copying, publication or dissemination of the Product and BMC confidential information learned from your use of the Product. **You will not export or re-export any Product without both the written consent of BMC and the appropriate U.S. and/ or foreign government license(s) or license exception(s).** Any programs, utilities, modules or other software or documentation created, developed, modified or enhanced by or for You using this Product shall likewise be subject to these restrictions. BMC has the right to obtain injunctive relief against any actual or threatened violation of these restrictions, in addition to any other available remedies. Additional restrictions may apply to certain files, programs or data supplied by third parties and embedded in the Product; consult the Product installation instructions or Release Notes for details.

LIMITED WARRANTY AND CONDITION. If You have purchased a Full-Use License, BMC warrants that (i) the Media will be, under normal use, free from physical defects, and (ii) for a period of ninety (90) days from the Product Effective Date, the Product will perform in substantial accordance with the operating specifications contained in the Documentation that is most current at the Product Effective Date. BMC's entire liability and your exclusive remedy under this provision will be for BMC to use reasonable best efforts to remedy defects covered by this warranty

and condition within a reasonable period of time or, at BMC's option, either to replace the defective Product or to refund the amount paid by You to license the use of the Product. BMC and its suppliers do not warrant that the Product will satisfy your requirements, that the operation of the Product will be uninterrupted or error free, or that all software defects can be corrected. This warranty and condition shall not apply if: (i) the Product is not used in accordance with BMC's instructions, (ii) a Product defect has been caused by any of your or a third party's malfunctioning equipment, (iii) any other cause within your control causes the Product to malfunction, or (iv) You have made modifications to the Product not expressly authorized in writing by BMC. No employee, agent or representative of BMC has authority to bind BMC to any oral representations, warranties or conditions concerning the Product. **THIS WARRANTY AND CONDITION IS IN LIEU OF ALL OTHER WARRANTIES AND CONDITIONS. THERE ARE NO OTHER EXPRESS OR IMPLIED WARRANTIES OR CONDITIONS, INCLUDING THOSE OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, REGARDING THIS LICENSE OR ANY PRODUCT LICENSED HEREUNDER. THIS PARAGRAPH SHALL NOT APPLY TO A TRIAL LICENSE.** Additional support and maintenance may be available for an additional charge; contact BMC or your BMC reseller for details.

LIMITATION OF LIABILITY. Except as stated in the next succeeding paragraph, BMC's and your BMC reseller's total liability for all damages in connection with this License is limited to the price paid for the License. **IN NO EVENT SHALL BMC BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL, INCIDENTAL, PUNITIVE OR INDIRECT DAMAGES OF ANY KIND ARISING OUT OF THE USE OF THIS PRODUCT (SUCH AS LOSS OF PROFITS, GOODWILL, BUSINESS, DATA OR COMPUTER TIME, OR THE COSTS OF RECREATING LOST DATA), EVEN IF BMC HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.** Some jurisdictions do not permit the limitation of consequential damages so the above limitation may not apply.

INDEMNIFICATION FOR INFRINGEMENT. BMC will defend or settle, at its own expense, any claim against You by a third party asserting that your use of the Product within the scope of this License violates such third party's patent, copyright, trademark, trade secret or other proprietary rights, and will indemnify You against any damages finally awarded against You arising out of such claim. However, You must promptly notify BMC in writing after first receiving notice of any such claim, and BMC will have sole control of the defense of any action and all negotiations for its settlement or compromise, with your reasonable assistance. BMC will not be liable for any costs or expenditures incurred by You without BMC's prior written consent. If an order is obtained against your use of the Product by reason of any claimed infringement, or if in BMC's opinion the Product is likely to become the subject of such a claim, BMC will at its option and expense either (i) procure for You the right to continue using the product, or (ii) modify or replace the Product with a compatible, functionally equivalent, non-infringing Product, or (iii) if neither (i) nor (ii) is practicable, issue to You a pro-rata refund of your paid license fee(s) proportionate to the number of months remaining in the 36 month period following the Product Effective Date. This paragraph sets forth your only remedies and the total liability to You of BMC, its resellers and licensors arising out of such claims.

GENERAL. This License is the entire understanding between You and BMC concerning this License and may be modified only in a mutually signed writing between You and BMC. If any part of it is invalid or unenforceable, that part will be construed, limited, modified, or, severed so as to eliminate its invalidity or unenforceability. This License will be governed by and interpreted under the laws of the jurisdiction named below, without regard to conflicts of law principles, depending on which BMC Software, Inc. subsidiary is the party to this License: (i) BMC Software Distribution, Inc. - the State of Texas, U.S.A., (ii) BMC Software Distribution, B.V. - The Netherlands, (iii) BMC Software Asia Pacific Pte Ltd. -- Singapore (iv) BMC Software do Brazil -- Brazil, or (v) BMC Software K.K. -- Japan. Any person who accepts or signs changes to the terms of this License promises that they have read and understood these terms, that they have the authority to accept on your behalf and legally obligate You to this License. Under local law and treaties, the restrictions and limitations of this License may not apply to You; You may have other rights and remedies, and be subject to other restrictions and limitations.

U.S. GOVERNMENT RESTRICTED RIGHTS. UNPUBLISHED -- RIGHTS RESERVED UNDER THE COPYRIGHT LAWS OF THE UNITED STATES. Use, duplication, or disclosure by the U.S. Government is subject to restrictions set forth in FAR Section 52.227-14 Alt. III (g)(3), FAR Section 52.227-19, DFARS 252.227-7014 (b) or DFARS 227.7202, as amended from time to time. Contractor/Manufacturer is BMC Software, Inc., 2101 CityWest Blvd., Houston, TX 77042-2827, USA. Any contract notices should be sent to this address.

Notes

100042164