MAINVIEW® for DBCTL
Analyzers, Monitors, and Traces
Reference Manual

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bmcsoftware

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Before Contacting BMC Software

Before you contact BMC Software, have the following information available so that Customer Support can begin working on your problem immediately:

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  - product version (release number)
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- operating system and environment information
  - machine type
  - operating system type, version, and service pack or other maintenance level such as PUT or PTF
  - system hardware configuration
  - serial numbers
  - related software (database, application, and communication) including type, version, and service pack or maintenance level
- 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

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How to Use This Book

This manual documents the features and functions of the following MAINVIEW® for DBCTL components:

- Resource Analyzer
- Resource Monitor
- Workload Analyzer
- Workload Monitor

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

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

This manual is intended for the system programmer, database administrator, or performance analyst who monitors the status, activity, and performance of the DBCTL feature of IMS with CICS.

MAINVIEW for DBCTL Product Library

MAINVIEW for DBCTL (MVDBC) components are 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, or DB2 subsystem.

The MAINVIEW for DBCTL product library includes the following documents:

MAINVIEW for DBCTL Customization Guide
MAINVIEW for DBCTL IPSM Reference Manual
MAINVIEW for DBCTL Analyzers, Monitors, and Traces Reference Manual
MAINVIEW for DBCTL Release Notes

How This Book Is Organized

This manual is divided into the following parts:

- Part 1 describes techniques to help you use MAINVIEW for DBCTL to optimize IMS performance. It contains references to specific services.
- Part 2 describes how to use MAINVIEW for DBCTL. It includes descriptions of
  - analyzers and monitors and how they are used
  - the online functions that can be used with MAINVIEW for DBCTL 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 describes how to use each of the monitor data collection services.
- Part 5 describes how to use the Workload Analyzer trace data collection and data display services.
- Part 6 describes how to control time-driven monitor services.
- Part 7 has appendixes that contain information about how to analyze dumps and about how the MAINVIEW-distributed libraries are used.

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

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

Customization 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 DBCTL 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 IMS Online – Analyzers Reference Manual*
- *MAINVIEW for IMS Online – 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 that do not have 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 MAINVIEW for DBCTL to optimize system performance.

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Chapter 1. Optimizing System Workflow

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

MVDBC Usage Modes

MVDBC 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 MVDBC 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, such as the last five to ten minutes. You can determine time interval information by making two observations and calculating how many events occurred between the two. By relating these numbers to the length of the time interval chosen, you can calculate rates, such as requests-per-second or I/O-per-second. You can calulate rates such as I/O-per-request by comparing the number of events to any other counter (which is also possible for a specific time span). Such 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, calculations are performed automatically for the most important system variables, and the measurement made by each calculation 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 and compared easily with the DMON service.

Some subsections in this chapter include suggestions for ways to improve performance. The suggestions should be used as guidelines and shouldn't be interpreted as 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.

Scheduling

This section describes analyzing and monitoring scheduler pool utilization.

The scheduling function of IMS is not used by DBCTL, but the scheduler pools for PSBs and DMBs are used and can have a critical impact on CICS-DBCTL thread processing.

Several Resource Monitor monitors are available to monitor pool utilization.

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 the necessary blocks are not already present, they must be loaded into the two 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. All other IMS control region activity is blocked until the open/close activity is completed and the operating system returns control to the IMS control region.

The PSBUT and DMBUT displays (see the service descriptions in Part 3, "Analyzers" on page 47) 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 number 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

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 so that they will 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.

Analyzing Operational Displays

There are six standard operational displays of data concerning the functioning of the IMS dependent regions. The *MAINVIEW for DBCTL 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.

See Part 4, “Monitors” on page 353 for more information about:

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

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 10, “Region Displays” on page 67) 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)

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.

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 DREGN 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 non-swappable 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.

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 method is particularly effective for large subpools. It allows an 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 that the search time is reduced, 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. MAINVIEW for DBCTL 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, which allows data and index control intervals of the same size to be separated into separate pools.

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, which 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 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 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. The OTHR and DBFX values can be tuned 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. 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 with CMF MONITOR or MAINVIEW for OS/390, both BMC Software products, or the IBM Generalized Trace Facility (GTF). These products give a better indication of the actual use or contention of devices and paths. This information can also be estimated by analysis of the database change records. However, that 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.

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:

- 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.

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 field identifies the oldest recovery point that IMS will require in the event of a restart. A very old time in this field could indicate that a BMP or JBP 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 and JBPs. 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. MAINVIEW for DBCTL 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.

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 4.

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.

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.

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:

- IMS manager
- IMS performance analyst and system programmer
- Database administrator

Note: With DBCTL, the MTO message traffic is sent to the OS/390 console.

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 OS/390 console. If MAINVIEW AutoOPERATOR for OS/390 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=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`).

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, 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 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.

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 MAINVIEW for DBCTL

This section describes how to use MAINVIEW for DBCTL. It includes:

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

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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 includes 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, which is shown in the *Using MAINVIEW* manual.

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*.

MAINVIEW for DBCTL (MVDBC) uses the same components as MAINVIEW for IMS (MVIMS), as described on page 26. Throughout this document, all references to MVIMS also apply to MVDBC.

MAINVIEW for DBCTL

DBCTL is a feature of IMS that allows CICS to access DL/I databases through a separate subsystem instead of having all the IMS code and buffers in the CICS region. The DBCTL subsystem is very similar to an IMS DB/DC subsystem and consists of three or four address spaces: a control address space, DLISAS, DBRC, and, optionally, ILRM for locking. In fact, DBCTL is essentially an IMS subsystem without IMS transactions and message queues.

Because DBCTL subsystem functions are the same as functions in an IMS DB/DC subsystem, many of the performance monitoring services provided by the IMS Management Facilities products are also valid for DBCTL, which includes services to monitor:

- The PSB and DMB pools
- Application (region) activity and DL/I status
- The database buffer pools
- Logging
- Program isolation of IRLM locking

All references to an IMS target system also apply to a DBCTL system. The job name of the control address space or the IMS ID are used to identify a specific DBCTL.

IMS application programs run in separate address spaces called dependent regions, so application activity is described in terms of these different types of regions.

- BMP – batch message processing region
- IFP – Fast Path region
- JBP – Java batch message processing region
- DBT – CICS threads (CCTL)
- ODB – ODBA threads

CICS threads run applications under separate subtasks or threads in the CICS region (defined as a CCTL) instead of in IMS regions. CICS threads are identified in region displays and monitors with a type of DBT.

ODBA threads run applications under separate subtasks or threads in the ODBA region instead of in IMS regions. ODBA threads are identified in region displays with a type of ODB. In monitor displays, ODBA threads are included in the count of CICS threads.

Chapter 4. Measuring IMS Activities and Resources

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

- 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 27 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 Measure (Page 1 of 6)

IMS Activity/ Resource Area	**Analyzer Displays**	**Monitors**
Scheduling Pools (`SCHED area`)	"PSBUT, DMBUT - PSB and DMB Pool Utilization" on page 63	
Application program activity in the dependent regions (`REGN area`)	"DLIST - DL/I Call Status" on page 69 "DREGN - Region Detail (Event Collector Data)" on page 75 "DREGN - Region Detail (No Event Collector Data)" on page 91 "REGNS - IMS Regions (Event Collector Data)" on page 107 "REGNS - IMS Regions (No Event Collector Data)" on page 125 "STAT/STATR - System Status" on page 139	"DBTOT - Database Calls per Scheduling by Region" on page 408 "D2CON - IMS Region Connection to DB2 Subsystem" on page 407 "D2SON - DB2 Sign On by Subsystem" on page 407 "D2THD - Active IMS Region Threads to DB2 Subsystem" on page 408 "WAIT - Region in a Long PI Wait" on page 409

Table 2. IMS Activities and Resources Measure (Page 2 of 6)

IMS Activity/ Resource Area	Analyzer Displays	Monitors
Database activity and buffer pool utilization (DB area)	"DBST - OSAM Global Pool Statistics" on page 149 "DBST - OSAM Subpool Statistics" on page 153 "VSST - VSAM Global Pool Statistics" on page 160 "VSST - VSAM Subpool Statistics" on page 163 "FPBST - Fast Path Buffer Pool Statistics" on page 157	"DBIO - Database I/O Count by Subpool" on page 411 "DBSTL - Database Buffer Steals by Subpool" on page 413 "DBHIT - Hit Ratio for OSAM Buffer Pool" on page 412 "SBUSE - Sequential Buffering Storage by Region" on page 415 "VDBIO - VSAM Database I/O by Subpool" on page 416 "VDBWR - VSAM Writes by Subpool" on page 416 "VHIT - VSAM Hit Ratio by Subpool" on page 417 "HPHIT - Hiperspace Hit Ratio by Subpool" on page 414 "HPACC - Hiperspace Access by Subpool" on page 413 "HPSTL - Hiperspace Buffer Steals by Subpool" on page 415

Table 2. IMS Activities and Resources Measure (Page 3 of 6)

IMS Activity/ Resource Area	Analyzer Displays	Monitors
IMS internal functions (`INTNL area`)	"LATCH - Latch Summary" on page 181 "DLTCH - Latch Detail" on page 168 "LOGST - Log Statistics" on page 188 "PI - Program Isolation" on page 193 "POOLS - Pool Summary (Non-CBT Variable and Fixed Pools)" on page 200 "DPOOL - Detail Pool (Non-CBT Variable Pool)" on page 177 "DPOOL - Detail Pool (Non-CBT Fixed Pool)" on page 171 "POOLC - Pool Summary (CBT)" on page 197	"POOLA - Pool Allocated Storage" on page 425 "POOLN - Net Expansion Count" on page 426 "POOLT - Total Expansion/Compression Count" on page 427 "LAWT - Average Latch Wait Time" on page 421 "LMAWT - Maximum Average Latch Wait Time" on page 422 "DBWP - Database Work Area Pool Percentage of Utilization" on page 419 "DMBP - DMB Pool Percentage of Utilization" on page 419 "PIENQ - Program Isolation Enqueues by Region" on page 423 "PIMAX - Maximum Program Isolation Enqueues by Region" on page 424 "PIPL - Program Isolation Pool Percentage of Utilization" on page 424 "PSBP - PSB Pool Percentage of Utilization" on page 427 "PSBW - PSB Work Area Pool Percentage of Utilization" on page 428 "WKAP - General Work Area Pool Percentage of Utilization" on page 428 "DSAP - Dynamic SAP Percentage of Utilization" on page 420 "EPCB - EPCB Pool Percentage of Utilization" on page 420 "OBUFW - OLDS Buffer Waits" on page 422 "OCHKW - OLDS Check Writes" on page 423 "WADIO - WADS I/O" on page 428

Table 2. IMS Activities and Resources Measure (Page 4 of 6)

IMS Activity/ Resource Area	Analyzer Displays	Monitors
IMS and OS/390 interactions (IMVS area)	“DSPST - Dispatcher Statistics” on page 207 “RS - Real Storage” on page 210	“PAGE - Paging (Region)” on page 431 “DPAGE - Demand Paging by Region” on page 430 “CSAUT - CSA Percentage of Utilization” on page 429 “ECSAU - Extended CSA Percent Utilization” on page 431 “CSAFR - CSA Fragmentation” on page 429 “SYSIO - EXCP Count by ddname” on page 432 “DLIO - DL/I EXCP Count by ddname” on page 430

Table 2. IMS Activities and Resources Measure (Page 5 of 6)

IMS Activity/ Resource Area	Analyzer Displays	Monitors
IRLM functions (`LOCK area`)	"IRLM - IRLM IMS Status (IRLM 1.5)" on page 215 "IRLM - IRLM IMS Status (IRLM 2.1 and Later)" on page 255 "IRLMG - IRLM GLOBAL STATUS (IRLM 1.5)" on page 221 "IRLMG - IRLM GLOBAL STATUS (IRLM 2.1 and Later)" on page 261 "LCRES - IRLM Lock Contention by Resource (IRLM 1.5)" on page 229 "LCUSR - IRLM Lock Contention by User (IRLM 1.5)" on page 236 "LHRES - IRLM Locks Held by Resources (IRLM 1.5)" on page 238 "LHUSR - IRLM Locks Held by User (IRLM 1.5)" on page 245 "LUSRD - IRLM Lock User Detail (IRLM 1.5)" on page 247 "LCRES - IRLM Lock Contention by Resource (IRLM 2.1)" on page 270 "LCUSR - IRLM Lock Contention by User (IRLM 2.1)" on page 278 "LHRES - IRLM Locks Held by Resources (IRLM 2.1)" on page 280 "LHUSR - IRLM Locks Held by User (IRLM 2.1)" on page 287 "LUSRD - IRLM Lock User Detail (IRLM 2.1)" on page 289	"LHELD - Number of Locks Held" on page 433 "LSUSP - Number of Suspensions" on page 435 "LDLCK - Number of Deadlocks" on page 433 "LKREQ - Number of Lock Requests" on page 434 "LKMAX - Maximum Locks Held by Region" on page 434 "LWAIT - Region in IRLM Suspend" on page 435 "LWNUM - Number of Suspended IRLM Requests" on page 436 "PTBLK - Number of PTB Locks" on page 436 "VSEND - Number of VTAM Sends" on page 437

Table 2. IMS Activities and Resources Measure (Page 6 of 6)

IMS Activity/ Resource Area	Analyzer Displays	Monitors
IMS Workload `(IWKLD area)`	Chapter 18, “DWAIT - Workload Wait Display” on page 311 Chapter 43, “LTRAC - List of Trace Entries” on page 523 Chapter 44, “STRAC - Summary Trace Data Display” on page 529 Chapter 45, “DTRAC - Detail Trace Data Display” on page 541	Chapter 16, “Requesting Workload Wait Data Collection (MWAIT)” on page 299 Chapter 36, “Requesting Workload Trace Data Collection (MTRAC)” on page 459
IMS workload transactions `(IWTRN area`		“@ELAP - Average Elapsed Time” on page 451 “#PROC - Number of Transactions Processed” on page 453
IMS workload - Fast Path activity `(IWFP area)`		“@OBA - Overflow Buffer Usage” on page 445 “#OBAW - OBA Latch Waits” on page 444 “#CIC - Control Interval Contentions” on page 443
IMS workload - global IMS region calls `(IWGBL area)`		“$CBMP - BMP and JBP Region Calls” on page 447 “$CTOT - All Region Calls” on page 449 “$CDBT - DBCTL Region DLI Calls” on page 448

Chapter 5. Types of Services

The MAINVIEW for DBCTL 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 DBCTL. 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 components 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, the 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 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). 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 38) 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 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 value is the total accumulated in the time the request has been active. It is updated at each interval when a new measurement is made. 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 value 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.

See “Monitor History Display (PLOT)” on page 369 for a sample PLOT display and a complete description of the display contents.

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 46)
- 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 *MAINVIEW for DBCTL 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 40).

(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 38).

(>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 (see page 390).

***** — 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 Chapter 19, “Displaying a List of Active Timer Requests (Primary Menu Option 2)” on page 357). 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 Chapter 20, “Monitor Display Commands” on page 369.

Workload Wait Events

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

As described in Chapter 16, “Requesting Workload Wait Data Collection (MWAIT)” on page 299, 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 18, “DWAIT - Workload Wait Display” on page 311, DWAIT shows wait events by the following transaction processing event components:

- Scheduling
- Application Program
- Sync Point

All or specific transaction processing event components can be viewed.

Workload Trace

The workload 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 option on the Primary Option Menu. Logged traces can be viewed online with the history traces option on the Primary Option Menu.

The Event Collector must be active to implement a trace. As described in Chapter 36, “Requesting Workload Trace Data Collection (MTRAC)” on page 459, 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 with 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 45.

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 Chapter 46, "The SET Timer Request" on page 555) or from the Image log request data entry panel (see "Start Image Log Request (I Line Command)" on page 53.

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 "Using the Resource Monitor Data Entry Panel" on page 387 and "Using the Workload Monitor Data Entry Panel" on page 391 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
```

Table 20 on page 559 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 “Request Initiation” on page 555.

BBPARM member, BLKDBCW, contains a sample starter set of Resource Monitor and 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 analyzer services and describes what each service does. The service descriptions are organized into groups that parallel the transaction processing sequence within IMS.

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Chapter 6. Displaying a List of Analyzer Services (Primary 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
     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 1. 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 51).
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
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
STAT	The service status (LOCK, TEST, 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.
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 53). 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 2. Image Log Request Application

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 Chapter 46, “The SET Timer Request” on page 555.

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 a 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 Services 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 (Primary Menu Option 1)” on page 49).

- 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 a 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 “Start Image Log Request (I Line Command)” on page 53

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 Chapter 19, “Displaying a List of Active Timer Requests (Primary Menu Option 2)” on page 357.

- Using a SET request as described in Chapter 46, “The SET Timer Request” on page 555

  – Purge the request

    Issue a purge (PRG) with a SET request from the Service Display panel, BBPARM (see “Grouping Requests” on page 46), or a 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 a 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 (Primary Menu Option 1)" on page 49 for a complete description of the analyzer display services.

Table 3. Resource Analyzer Service Select Codes (Page 1 of 4)

Service Select Code	Parameter	See
DBST		"DBST - OSAM Global Pool Statistics" on page 149
DBST	`subpoolnum`	"DBST - OSAM Subpool Statistics" on page 153
DLIST	[`regionnum`]	"DLIST - DL/I Call Status" on page 69
DLTCH	[`genltch-id,H|W`]	"DLTCH - Latch Detail" on page 168
DMBUT	[`iteratnnum`]	"PSBUT, DMBUT - PSB and DMB Pool Utilization" on page 63
DPOOL	`{poolname}`	"DPOOL - Detail Pool (Non-CBT Variable Pool)" on page 177 "DPOOL - Detail Pool (Non-CBT Fixed Pool)" on page 171
DREGN	[`regionnum`]	"DREGN - Region Detail (Event Collector Data)" on page 75 "DREGN - Region Detail (No Event Collector Data)" on page 91
DSPST	[`regionnum`]	"DSPST - Dispatcher Statistics" on page 207
FPBST		"FPBST - Fast Path Buffer Pool Statistics" on page 157
IRLM		"IRLM - IRLM IMS Status (IRLM 1.5)" on page 215
RLM		"IRLM - IRLM IMS Status (IRLM 2.1 and Later)" on page 255
IRLMG		"IRLMG - IRLM GLOBAL STATUS (IRLM 1.5)" on page 221
IRLMG		"IRLMG - IRLM GLOBAL STATUS (IRLM 2.1 and Later)" on page 261
LATCH	[`SORT|SO`]	"LATCH - Latch Summary" on page 181

Table 3. Resource Analyzer Service Select Codes (Page 2 of 4)

Service Select Code	Parameter	See
LCRES		“LCRES - IRLM Lock Contention by Resource (IRLM 1.5)” on page 229
LCUSR		“LCUSR - IRLM Lock Contention by User (IRLM 1.5)” on page 236
LHRES		“LHRES - IRLM Locks Held by Resources (IRLM 1.5)” on page 238
LHUSR		“LHUSR - IRLM Locks Held by User (IRLM 1.5)” on page 245
LCRES		“LCRES - IRLM Lock Contention by Resource (IRLM 2.1)” on page 270
LCUSR		“LCUSR - IRLM Lock Contention by User (IRLM 2.1)” on page 278
LHRES		“LHRES - IRLM Locks Held by Resources (IRLM 2.1)” on page 280
LHUSR		“LHUSR - IRLM Locks Held by User (IRLM 2.1)” on page 287
LOGST		“LOGST - Log Statistics” on page 188
LUSRD	[regionnum]	“LUSRD - IRLM Lock User Detail (IRLM 2.1)” on page 289
PI	[regionnum]	“PI - Program Isolation” on page 193
POOLC	[poolid]	“POOLC - Pool Summary (CBT)” on page 197
POOLS	[TYPE=ALL|VAR|FIX]	“POOLS - Pool Summary (Non-CBT Variable and Fixed Pools)” on page 200
PSBUT	[iteratnnum|CSA]	“PSBUT, DMBUT - PSB and DMB Pool Utilization” on page 63

Table 3. Resource Analyzer Service Select Codes (Page 3 of 4)

Service Select Code	Parameter	See
REGNS	[,#D<nnn|>nnn|=nnn ,AGN=xxxxxxxx ,CK<nnn|>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 ,NA=xxxxxxxx ,NI ,OP<nnn|>nnn|=nnn ,OT<nnn|>nnn|=nnn ,PS=xxxxxxxx ,RE<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 (Event Collector Data)” on page 107

Table 3. Resource Analyzer Service Select Codes (Page 4 of 4)

Service Select Code	Parameter	See
REGNS	,AGN=xxxxxxxx ,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 ,NA=xxxxxxxx ,NI ,PS=xxxxxxxx ,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 125
RS	[regionnum]	“RS - Real Storage” on page 210
STAT/ STATR	[regionnum]	“STAT/STATR - System Status” on page 139
VSST		“VSST - VSAM Global Pool Statistics” on page 160
VSST	subpoolnum	“VSST - VSAM Subpool Statistics” on page 163

Chapter 9. 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.

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.

Chapter 10. Region Displays

These displays show application program and thread DL/I 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.

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.

  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

  You can select the REGNS service 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 DREGN can display about a specific region depends upon whether the Event Collector is active. If the Event Collector is active, DREGN 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.

  With the Event Collector:

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

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

  Without the Event Collector:

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

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

In the REGNS and DREGN displays, each 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, 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==>  IMSxxx
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   >                          )
          CEEEDDCD4CEEECC44460000000000000000000000000 5
          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, 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 non-specific 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-MQS	Region active in MQSeries (Event Collector must be active).
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). The region has initialized or started to initialize but has not completed signon or CREATE THREAD processing. For DBCTL, IMS preallocates threads (DBTs) up to the MINTHREAD specified value before they are actually needed. These DBTs will have an INACTIVE status. For other region types, this status should be displayed only briefly, until the region completes the first CREATE THREAD.
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). The block mover latch comprises several smaller latches. Use the LATCH service to determine which BML latch a region is waiting for.
WAIT-DLI	Region waiting for DL/I.
WAIT-INT	Region in scheduling (waiting for database intent).
WAITING	Region in non-specific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see “LATCH - Latch Summary” on page 181.

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 non-specific 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:

BMP Batch message processing region.

FPU Fast Path utility region.

DBT DBCTL CICS thread.

JBP Java batch message processing region.

NDP Non-message-driven Fast Path region.

ODB DBCTL ODBA thread.

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
          100092223991124722000000735230200 03F36049501101000000000803950110108 9
 ==============================================================================
```

If the DL/I call uses a third parameter, this area shows I/O area information.

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
          34236459D342394000E000000000000000000000000D
 ==============================================================================
 SSA-2:   PRODUCT *-(PRODID   >          )
          DDDCECE4564DDDCCC444600000000005
          79644330C0D796494000E0000000000D
```

If the DL/I call uses four or more parameters, this area shows database-related information that 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 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--------------IMS DETAIL REGION SERVICE------------PERFORMANCE MGMT
SERV ==> DREGN             INPUT    10:53:29  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> 002                                          RIW    1 OF 29 SCROLL=> CSR
EXPAND:  DLIST PI LUSRD                 GOTO( DLI OTHR FP DB2 PSB PI SYS PAGING)
                                                      PF10/11 FOR PREV/NEXT REGION
RGNID.....       2         STATUS.... ACTV-USR         ENQ TIME...
JOB NAME.. CICS3302        TRANCODE.. DLZZ             TRN ELAP...   200ms

TYPE......      BMP        PSB....... STBCUSR
MSG SWITCH        0        LTERM..... T002             CLASS....  >1   3   5   2
SEQ BF USG      25K        USER...... DN002            DB2STAT....DB2D-CON
                           DB2 AUTHID DN002

---------------------------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...STBCUSR         DYNAMIC....       0        DELETES....       0
SEL/FCH....       1        DDL........       0        UPDATES....       0
OPENS......       0        OTHER......       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.....    5768
************************ 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.

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.....        2         STATUS.... ACTV-USR         ENQ TIME..
JOB NAME.. CICS3302         TRANCODE.. DLZZ             TRN ELAP..    200ms

TYPE......      BMP         PSB....... STBCUSR
MSG SWITCH 0                LTERM..... T002             CLASS.   >1   3   5   2
SEQ 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
: Classes defined for the region. The currently active class is shown by a > character preceding the class. (This field does not apply to DBCTL threads, region types DBT and ODB.)

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
: Time when the transaction currently being processed was submitted (hh:mm:ss). This value is the time of the originating terminal input transaction for message switches. (This field does not apply to DBCTL threads, region types DBT and ODB.)

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
: Number of message switches to generate this transaction. (This field does not apply to DBCTL threads, region types DBT and ODB.)

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 non-specific 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-MQS	Region active in MQSeries (Event Collector must be active).
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).
	The region has initialized or started to initialize but has not completed signon or CREATE THREAD processing. For DBCTL, IMS preallocates threads (DBTs) up to the MINTHREAD specified value before they are actually needed. These DBTs will have an INACTIVE status. For other region types, this status should be displayed only briefly, until the region completes the first CREATE THREAD.

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). The block mover latch comprises several smaller latches. Use the LATCH service to determine which BML latch a region is waiting for.
WAIT-DLI	Region waiting for DL/I.
WAIT-INT	Region in scheduling (waiting for database intent).
WAITING	Region in non-specific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see “LATCH - Latch Summary” on page 181.
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 non-specific 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:

BMP Batch message processing region.

FPU Fast Path utility region.

DBT DBCTL CICS thread.

JBP Java batch message processing region.

NDP Non-message-driven Fast Path region.

ODB DBCTL ODBA thread.

USER
ID of the user who submitted this transaction. For a DBCTL transaction, this field shows the ID of the CICS user.

```
 Area 2
---------------------------DL/I CALL ACTIVITY---------DB TOT---- 6
DBNAME      ORG    GU   GN   GHU   GHN  GNP  REPL  ISRT  DLET   TOT
-------- ----- ----- ----- ----- ----- ----- ----- ----- -----  -----
MYPART1   HIDAM   2    1      0     0    0    0     0     0      0
MYPART2   HDAM    2    1      0     0    0    0     0     0      0
```

This area shows the amount of DL/I call activity incurred by the transaction currently processing. The descriptions are arranged in alphabetical order.

**TOTAL
Total number of DL/I database calls and I/Os issued by this transaction (This field does not apply to DBCTL threads, region types DBT and ODB.).

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

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 DEDBs and all other calls that are not database calls. (This field does not apply to DBCTL threads, region types DBT and ODB.)

Area 3

```
----------------------------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

Number of CHANGE DC calls issued by this transaction. (This field does not apply to DBCTL threads, region types DBT and ODB.)

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 4

---------------------------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 field shows the high-order three bytes of the control interval RBA.

```
 Area 5

---------------------------DB2 ACTIVITY---------------SQL TOT....       1
DB2NAME....DB2D            CONTROL....       0        INSERTS....       0
PLANNAME...STBCUSR         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 6
----------------------------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 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 7

```
---------------------------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 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
JBP	Currently executing under a Java batch message processing 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
ODM	Currently executing under the ODBA syncpoint mother TCB
ODS	Currently executing under an ODBA syncpoint daughter TCB
RCF	Currently executing under the allocate RCF 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
RWD	Currently executing in the online recovery service daughter TCB
RWM	Currently executing in the online recovery service main 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
`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	Non-swappable
OUT	Swapped out

TCB CPU
: Total region TCB CPU time expressed in seconds.

```
 Area 8
  ----------------------------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....     5768
****************************** 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 number 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 non-swappable, 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   10:53:29  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> 002      ROW  1 OF  29 SCROLL=> CSR
EXPAND:  DLIST PI LUSRD                GOTO( DLI OTHR FP DB2 PI SYS PAGING)
                                                 PF10/11 FOR PREV/NEXT REGION
RGNID.....        2         STATUS.... ACTV-USR         ENQ TIME..
JOB NAME.. CICS3302         TRANCODE.. DLZZ             TRN ELAP..    200MS

 TYPE......      DBT         PSB....... STBCUSR          AGN....... PAYROLL
MSG SWITCH        0         LTERM..... T002             CLASS.   >1   3   5   2
SEQ BF USG        0         USER...... CIR11            DB2STAT... DB2D-CON

 ----------------------------DL/I CALL ACTIVITY--------- DB TOT....       10
DB GU.....        1         DB GNP....        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
----------------------------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....     5768
******************************** 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 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 on page 75 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.

DLI	DL/I CALL ACTIVITY
FP	FP ACTIVITY
OTHR	Other types of DL/I calls than those shown by DL/I CALL ACTIVITY
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..
 JOB NAME.. CICS3302         TRANCODE.. DLZZ             TRN ELAP..    200MS

 TYPE......      DBT         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

Classes defined for the region. The currently active class is shown by a > character preceding the class. (This field does not apply to DBCTL threads, region types DBT and ODB.)

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

Time when the transaction currently being processed was submitted (hh:mm:ss), which is the time of the originating terminal input transaction for message switches. (This field does not apply to DBCTL threads, region types DBT and ODB.)

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
: Number of message switches to generate this transaction. (This field does not apply to DBCTL threads, region types DBT and ODB.)

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 non-specific process.
ACTV-BKO	Region in dynamic backout.
ACTV-MQS	Region active in MQSeries (Event Collector must be active).
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). The region has initialized or started to initialize but has not completed signon or CREATE THREAD processing. For DBCTL, IMS preallocates threads (DBTs) up to the MINTHREAD specified value before they are actually needed. These DBTs will have an INACTIVE status. For other region types, this status should be displayed only briefly, until the region completes the first CREATE THREAD.
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). The block mover latch comprises several smaller latches. Use the LATCH service to determine which BML latch a region is waiting for.
WAIT-DLI	Region waiting for DL/I.
WAIT-INT	Region in scheduling (waiting for database intent).
WAITING	Region in non-specific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see “LATCH - Latch Summary” on page 181.
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 non-specific 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:

BMP	Batch message processing region.
FPU	Fast Path utility region.
DBT	DBCTL CICS thread.
JBP	Java batch message processing region.
NDP	Non-message-driven Fast Path region.
ODB	DBCTL ODBA thread.

USER

ID of the user who submitted this transaction. For a DBCTL transaction, this field shows the ID of the CICS user.

Area 2

```
----------------------------DL/I CALL ACTIVITY--------- DB TOT....       10
DB GU.....        1         DB GNP....        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.

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
: Total calls issued against MSDB databases since PSB scheduling. (This field does not apply to DBCTL threads, region types DBT and ODB.)

Area 3

```
----------------------------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
: Number of CHANGE DC calls issued by this program since PSB scheduling. One PSB scheduling can process multiple transactions. This field contains the count since PSB scheduling. (This field does not apply to DBCTL threads, region types DBT and ODB.)

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 4

```
----------------------------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 field shows the high-order three bytes of the control interval RBA.

Area 5

```
----------------------------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 6
---------------------------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
```

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 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
JBP	Currently executing under a Java batch message processing 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
ODM	Currently executing under the ODBA syncpoint mother TCB
ODS	Currently executing under an ODBA syncpoint daughter TCB
RCF	Currently executing under the allocate RCF 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
RWD	Currently executing in the online recovery service daughter TCB
RWM	Currently executing in the online recovery service main 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
`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	Non-swappable
OUT	Swapped out

TCB CPU
: Total region TCB CPU time expressed in seconds.

```
 Area 7
----------------------------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....     5768
 ******************************** 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 number 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 non-swappable, 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)

```
BMC SOFTWARE---------------      IMS REGIONS        -----------PERFORMANCE MGMT
SERV ==> REGNS   INPUT             10:38:57  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> SO=NA,V=SM                              ROW    1 OF    3 SCROLL=> CSR
VIEW:    SM, 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
  ********************************** 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 ==> SO=NA,V=DLI                             ROW    1 OF    3 SCROLL=> CSR
VIEW:    SM, 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
  -------- ++++++++ --- ----- ----- ---- ---- ---- ---- ---- +++++ ---- ----
  CICSRGN1 DZ33       1     5     4    0    0    0    0    0     9    0    2
  CICSBMPA            2     2     1    0    0    0    0    0     3    0    1
***************************** END OF DATA ************************************
```

REGNS
DB2 View

```
BMC SOFTWARE----------------- IMS REGIONS ---------------------PERFORMANCE MGMT
SERV ==> REGNS            INPUT   16:40:02  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> SO=NA,V=DB2                             ROW    1 OF    3 SCROLL=> CSR
VIEW:    SM, DLI, DB2               EXPAND: FSEL(+), LINESEL(DREGN), MON(RGN)
PF10/11 FOR PREV/NEXT VIEW                                    *EVENT COLLECTOR*
  NAME     TRANCODE FETCH  OPEN ISRT2 DLET2 UPDT2   DDL   DYN  CNTL OTHER  TOT2
  -------- -------- ----- ----- ----- ----- ----- ----- ----- ----- ----- +++++
  CICSRGN3 SM4
  CICSRGN9 LMZ200XX
  CICSRGN1 DZ33
  BMPRGNX  DLX22        2     1     0     0     0     0     0     0     0     3
***************************** 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 on page 125 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.
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 on page 125. 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

The variable nnnnnnnn represents the number of different DL/I databases accessed. In each view, the parameter displays only those regions with transactions that have a DL/I database access count less than (<), greater than (>), or equal to (=) the specified number.

AGN=xxxxxxxx

The variable xxxxxxxxx represents the name of an application group. In each view, the parameter displays 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

The variable nnnnnnnn represents a checkpoint count. In each view, the parameter displays only those regions with transactions that have a total checkpoint call count less than (<), greater than (>), or equal to (=) the specified number.

CN|CNTL<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

The variable nnnnnnnn represents a DB2 control-type SQL call count (GRANT, for example). In each view, the parameter displays 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

The variable nnnnnnnn represents a DB2 Data Definition Language (DDL) count. In each view, the parameter displays 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

The variable nnnnnnnn represents a DL/I database delete count. In each view, the parameter displays 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

The variable nnnnnnnn represents a DB2 database delete count. In each view, the parameter displays 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

The variable nnn represents the total DL/I call count. In each view, the parameter displays 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

The variable nnnnnnnn represents a DB2 dynamic call count. In each view, the parameter displays 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

The variable nnnnnnnn represents a GET NEXT and GET NEXT within PARENT count. In each view, the parameter displays 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

The variable nnnnnnnn represents a GET UNIQUE count. In each view, the parameter displays 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

The variable nnnnnnnn represents a GET HOLD NEXT and GET HOLD NEXT within PARENT count. In each view, the parameter displays 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

The variable nnnnnnnn represents a GET HOLD UNIQUE count. In each view, the parameter displays 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

The variable nnnnnnnn represents a DL/I I/O count. In each view, the parameter displays 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

The variable nnnnnnnn represents a region number. In each view, the parameter displays only those regions with a region number less than (<), greater than (>), or equal to (=) the specified number.

IS|ISRT<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

The variable nnnnnnnn represents an INSERT count. In each view, the parameter displays 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

The variable nnnnnnnn represents a DB2 INSERT count. In each view, the parameter displays 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

The variable nnnnnnnn represents a PI or IRLM enqueue count. In each view, the parameter displays only those regions currently executing transactions with either outstanding PI enqueues or IRLM locks less than (<), greater than (>), or equal to (=) the specified number.

LT=xxxxxxxx

The variable xxxxxxxx represents an LTERM name. In each view, the parameter displays 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*`

NA|NAME=xxxxxxxx

The variable xxxxxxxxx represents a region name. In each view, the parameter displays 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

In each view, the parameter displays only those regions that are not idle (active).

OP|OPEN<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

The variable nnnnnnnn represents a DB2 OPEN cursor count. In each view, the parameter displays 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

The variable nnnnnnnn represents a count of other DB2 SQL calls. In each view, the parameter displays 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.

PS|PSB=xxxxxxxx

The variable xxxxxxxxx represents a PSB name. In each view, the parameter displays 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`.

RE|REPL<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

The variable nnnnnnnn represents a database REPLACE count. In each view, the parameter displays only those regions with transactions that have a database REPL count less than (<), greater than (>), or equal to (=) the specified number.

SO|SORT=cc

The variable 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).

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).

NA Sorts the list by NAME (default; ascending).

OP Sorts the list by OPEN (descending).

OT Sorts the list by OTHER (descending).

PS Sorts the list by PSB name (ascending).

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

The variable nnnnnnnn represents an SQL call count. In each view, the parameter displays 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=

In each view, the parameter displays 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 118 can be specified with the STATUS parameter.

TO|TOT<nnn|>nnn|=nnn

The variable nnn represents a total DL/I database call count. In each view, the parameter displays 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

The variable 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

The variable xxxxxxxx represents a transaction code. In each view, the parameter displays 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

The variable 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

The variable xxx represents a region type. Multiple regions can be displayed by using an * or + qualifier; for example, `TYP=M*`.

BMP	Displays batch message processing regions.
DBT	Displays DBCTL CICS threads.
FPU	Displays Fast Path utility regions.
JBP	Displays Java batch message processing regions.
NDP	Displays non-message-driven Fast Path regions.
ODB	Displays DBCTL ODBA threads.

U2|UPDT2<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

The variable nnnnnnnn represents a DB2 update count. In each view, the parameter displays 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

The variable xxxxxxxx represents a user ID. In each view, the parameter displays 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||DLI|DB2

Displays the specified view:

SM	Displays the REGNS summary status view (default).
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.

SQL

You can hyperlink from this field to MAINVIEW for DB2.

TOT2

You can hyperlink from this field to MAINVIEW for DB2.

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.

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 ==> SO=NA,V=SM                                ROW    1 OF    3 SCROLL=> CSR
VIEW:    SM, 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
******************************** 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

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. (This field does not apply to DBCTL threads, region types DBT and ODB.)

STATUS

Region status:

ACTIVE	Active in a non-specific process.
ACTV-BKO	Region in dynamic backout.
ACTV-MQS	Region active in MQSeries (Event Collector must be active).
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). The region has initialized or started to initialize but has not completed signon or CREATE THREAD processing. For DBCTL, IMS preallocates threads (DBTs) up to the MINTHREAD specified value before they are actually needed. These DBTs will have an INACTIVE status. For other region types, this status should be displayed only briefly, until the region completes the first CREATE THREAD.
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). The block mover latch comprises several smaller latches. Use the LATCH service to determine which BML latch a region is waiting for.
WAIT-DLI	Region waiting for DL/I.
WAIT-INT	Region in scheduling (waiting for database intent).
WAITING	Region in non-specific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see “LATCH - Latch Summary” on page 181.
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 non-specific 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.

TFN-ELAP
: Current elapsed time calculated by subtracting transaction start time from current time.

Note: If you have more than one system clock set, they must be synchronized for TRN-ELAP to be accurate.

TYP
: Type of region processing a transaction:

BMP	Batch message processing region
FPU	Fast Path utility region
DBT	DBCTL CICS thread
JBP	Java batch message processing region
NDP	Non-message-driven Fast Path region
ODB	DBCTL ODBA thread

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.

```
DL/I View

BMC SOFTWARE--------------       IMS REGIONS        -----------PERFORMANCE MGMT
SERV ==> REGNS  INPUT              11:44:25  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> SO=NA,V=DLI                              ROW    1 OF    3 SCROLL=> CSR
VIEW:    SM, 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
  -------- ++++++++ --- ----- ----- ---- ---- ---- ---- ---- +++++ ---- ----
  CICSRGN1 DZ33       1     5     4    0    0    0    0    0     9    0    2
  CICSBMPA            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   16:40:02  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> SO=NA,V=DB2                            ROW    1 OF    3 SCROLL=> CSR
VIEW:    SM, DLI, DB2               EXPAND: FSEL(+), LINESEL(DREGN), MON(RGN)
PF10/11 FOR PREV/NEXT VIEW                                    *EVENT COLLECTOR*
  NAME     TRANCODE FETCH  OPEN ISRT2 DLET2 UPDT2   DDL   DYN  CNTL OTHER  TOT2
  -------- -------- ----- ----- ----- ----- ----- ----- ----- ----- ----- +++++
  CICSRGN3 SM4
  CICSRGN9 LMZ200XX
  CICSRGN1 DZ33
  BMPRGNX  DLX22        2     1     0     0     0     0     0     0     0     3
***************************** END OF DATA ************************************
```

This view shows DB2 transaction activity. The descriptions are arranged in alphabetical order.

CNTL
: Total number of SQL control-type calls, such as REVOKE, issued to DB2 by the transaction currently processing. (This field does not apply to DBCTL threads, region types DBT and ODB.)

DDL
: Total number of Data Definition Language calls issued to DB2 by the transaction currently processing. (This field does not apply to DBCTL threads, region types DBT and ODB.)

DLET2
: Total number of SQL DELETE calls issued to DB2 by the transaction currently processing. (This field does not apply to DBCTL threads, region types DBT and ODB.)

DYN
: Total number of dynamic SQL calls issued to DB2 by the transaction currently processing. (This field does not apply to DBCTL threads, region types DBT and ODB.)

FETCH
: Total number of SQL SELECT and FETCH calls issued to DB2 by the transaction currently processing. (This field does not apply to DBCTL threads, region types DBT and ODB.)

ISRT2
: Total number of SQL INSERT calls issued to DB2 by the transaction currently processing. (This field does not apply to DBCTL threads, region types DBT and ODB.)

NAME
: Job name or started task procedure name of the region.

OPEN

Total number of SQL OPEN calls issued to DB2 by the transaction currently processing. (This field does not apply to DBCTL threads, region types DBT and ODB.)

OTHER

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. (This field does not apply to DBCTL threads, region types DBT and ODB.)

TOT2

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. (This field does not apply to DBCTL threads, region types DBT and ODB.)

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

Total number of SQL UPDATE calls issued to DB2 by the transaction currently processing. (This field does not apply to DBCTL threads, region types DBT and ODB.)

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 ==> SO=NA,V=SM                              ROW    1 OF    3 SCROLL=> CSR
VIEW:    SM, 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  NO     1
    3 CICS3302 DBT IDLE     ABEM003T ABMAIL   CIR11        4  NO
********************************* END OF DATA *********************************
```

REGNS
DL/I View

```
BMC SOFTWARE---------------      IMS REGIONS        -----------PERFORMANCE MGMT
SERV ==> REGNS   INPUT             10:38:57  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> SO=NA,V=DLI                             ROW    1 OF    3 SCROLL=> CSR
VIEW:    SM, DLI                    EXPAND: FSEL(+), LINESEL(DREGN), MON(RGN)
PF10/11 FOR PREV/NEXT VIEW
  NAME     TRANCODE    GU    GN   GHU   GHN  REPL  ISRT  DLET   TOT CHKP  I/O
  -------- ++++++++ ----- ----- ----- ----- ----- ----- ----- +++++ ---- ----
  CICS3302
  CICS3302 DLZZ         1     9     0     0     0     0     0     0    0   10
  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 on page 107 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.
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.

AGN=xxxxxxxx

The variable xxxxxxxx represents the name of an application group. In each view, the parameter displays 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.

DT|DLET<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

The variable nnnnnnnn represents a DL/I database delete count. In each view, the parameter displays 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

The variable nnnnnnnn represents the total DL/I call count. In each view, the parameter displays 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

The variable nnn represents elapsed time in seconds. In each view, the parameter displays 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

The variable nnnnnnnn represents a Fast Path database call count. In each view, the parameter displays 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

The variable nnnnnnnn represents a GET NEXT and GET NEXT within PARENT count. In each view, the parameter displays 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

The variable nnnnnnnn represents a GET UNIQUE count. In each view, the parameter displays 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

The variable nnnnnnnn represents a GET HOLD NEXT and GET HOLD NEXT within PARENT count. In each view, the parameter displays 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

The variable nnnnnnnn represents a GET HOLD UNIQUE count. In each view, the parameter displays 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

The variable nnn represents a region number. In each view, the parameter displays only those regions with a region number less than (<), greater than (>), or equal to (=) the specified number.

IS|ISRT<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

The variable nnnnnnnn represents an INSERT count. In each view, the parameter displays 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

The variable nnnnnnnnn represents a PI or IRLM enqueue count. In each view, the parameter displays 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

The variable xxxxxxxx represents an LTERM name. In each view, the parameter displays 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.

NA|NAME=xxxxxxxx

The variable xxxxxxxxx represents a region name. In each view, the parameter displays 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

In each view, the parameter displays only those regions that are not idle (active).

PS|PSB=xxxxxxxx

The variable xxxxxxxxx represents a PSB name. In each view, the parameter displays 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.

RE|REPL<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

The variable nnnnnnnn represents a database REPLACE count. In each view, the parameter displays only those regions with transactions that have a database REPL count less than (<), greater than (>), or equal to (=) the specified number.

SO|SORT=cc

The variable 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.

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).

NA Sorts the list by NAME (default; ascending).

PS Sorts the list by PSB name (ascending).

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=

In each view, the parameter displays 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 135 can be specified with the STATUS parameter.

TO|TOT<nnnnnnnn|>nnnnnnnn| =nnnnnnnn

The variable nnnnnnnn represents a total DL/I database call count. In each view, the parameter displays 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

The variable xxxxxxxx represents a transaction code. In each view, the parameter displays 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

The variable 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:

BMP	Displays batch message processing regions.
DBT	Displays DBCTL CICS threads.
FPU	Displays Fast Path utility regions.
JBP	Displays Java batch message processing regions.
NDP	Displays non-message-driven Fast Path regions.
ODB	Displays DBCTL ODBA threads.

US|USR=xxxxxxxx

The variable xxxxxxxx represents a user ID. In each view, the parameter displays 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||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.

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 133.

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.

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 on page 133.

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 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 ==> SO=NA,V=SM                                ROW    1 OF    3 SCROLL=> CSR
VIEW:    SM, 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  NO     1
    3 CICS3302 DBT IDLE     ABEM003T ABMAIL   CIR11        4  NO
******************************** 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.

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 non-specific 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-MQS	Region active in MQSeries (Event Collector must be active).
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). The region has initialized or started to initialize but has not completed signon or CREATE THREAD processing. For DBCTL, IMS preallocates threads (DBTs) up to the MINTHREAD specified value before they are actually needed. These DBTs will have an INACTIVE status. For other region types, this status should be displayed only briefly, until the region completes the first CREATE THREAD.
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). The block mover latch comprises several smaller latches. Use the LATCH service to determine which BML latch a region is waiting for.
WAIT-DLI	Region waiting for DL/I.
WAIT-INT	Region in scheduling (waiting for database intent).
WAITING	Region in non-specific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see “LATCH - Latch Summary” on page 181.
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 non-specific 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.

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 the transaction:

BMP Batch message processing region.

FPU Fast Path utility region.

DBT DBCTL CICS thread.

JBP Java batch message processing region.

NDP Non-message-driven Fast Path region.

ODB DBCTL ODBA thread.

USR/LTRM

ID of the user who submitted this transaction or CICS terminal ID (LTRM) where transaction was submitted. An * character indicates a terminal ID was used instead of a user ID.

```
DL/I View

BBMC SOFTWARE---------------      IMS REGIONS        -----------PERFORMANCE MGMT
SERV ==> REGNS   INPUT             10:38:57  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> SO=NA,V=DLI                              ROW    1 OF    3 SCROLL=> CSR
VIEW:    SM, DLI                    EXPAND: FSEL(+), LINESEL(DREGN), MON(RGN)
PF10/11 FOR PREV/NEXT VIEW
  NAME     TRANCODE    GU    GN   GHU   GHN  REPL  ISRT  DLET   TOT CHKP  I/O
  -------- ++++++++ ----- ----- ----- ----- ----- ----- ----- +++++ ---- ----
  CICS3302
  CICS3302 DLZZ         1     9     0     0     0     0     0     0    0   10
  CICS3302
******************************** END OF DATA ********************************
```

This view shows transaction activity in each active IMS dependent region. The descriptions are arranged in alphabetical order.

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==>       IMSxxx
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
   LONG
   QBLKS
   ACBLIBA  MODBLKSB      SYSTEM: DBCTL
   FORMATA  DFSOLP00     RELEASE: 6.1
--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:    0   TRANS:    0   DB'S:   33   RTCDE'S:    0
                      NODES:    0    PGMS:    0
--RESTART DATA--   12/15/yy  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  DBT  DBT  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
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 region
DBT	DBCTL CICS thread
FPU	Fast Path utility region
JBP	Java batch message processing region
NDP	Non-message-driven Fast Path region
ODB	DBCTL ODBA thread

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
LONG
QBLKS
```

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

Long message queue data set utilization. (This field does not apply to DBCTL threads, region types DBT and ODB.)

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 147.

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

QBLKS message queue data set utilization. (This field does not apply to DBCTL threads, region types DBT and ODB.)

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 147.

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

Short message queue data set utilization. (This field does not apply to DBCTL threads, region types DBT and ODB.)

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 147.

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: DBCTL
FORMATA  DFSOLP00      RELEASE: 6.1
```

The third area shows the ddnames in use, IMS system type, and current release.

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 the IBM book *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

FORMATA DFSOLP00

Current IMS ddnames in use.

RELEASE

IMS system release

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:   0  TRANS:   0  DB'S:  33  RTCDE'S:   0
                      NODES:   0   PGMS:   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

DB'S — The number of databases currently stopped (stopped, locked, not open, inquiry only). Uninitialized databases are not included in this count.

LINES — The number of communication lines currently stopped (no input, no output, no queuing, idle). (This field does not apply to DBCTL threads, region types DBT and ODB.)

NODES — VTAM stopped nodes. (This field does not apply to DBCTL threads, region types DBT and ODB.)

PGMS — Number of programs (PSBs) currently stopped.

RTCDE'S — The number of routing codes currently stopped if Fast Path is installed. (This field does not apply to DBCTL threads, region types DBT and ODB.)

TRANS — The number of transaction codes currently stopped (no queuing, no scheduling, locked, locked for /DBD).

```
Area 5

--RESTART DATA--   12/15/yy  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 6.1 or later is running, UTC (Universal Time Clock) time is used. When IMS 5.1 is running, local time is used.

12/15/yy
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

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. (This field does not apply to DBCTL threads, region types DBT and ODB.)

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

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). (This field does not apply to DBCTL threads, region types DBT and ODB.)

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 11. 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 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==>  IMSxxx
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 153).

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 either in the overflow area or in an ISAM data set 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. 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==> IMSxxx
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 149) 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==>  IMSxxx
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==>  IMSxxx
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 163).

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==> IMSxxx
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 160) 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

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. subpool.

UNSUCCESSFUL WRITES
: The number of unsuccessful writes to Hiperspace.

Chapter 12. IMS Internals Displays

This chapter describes the displays that show the status of IMS resources when internal IMS functions are invoked for transaction processing.

DLTCH - Latch Detail

```
BMC SOFTWARE  ------------------- LATCH DETAIL -------------- PERFORMANCE MGMT
SERV ==> DLTCH  INPUT   13:21:09  INTVL=> 3  LOG=> N   TGT==>  IMSA
PARM ==> DMSH-CUSTDB1                                          SCROLL => N/A
             --WAIT-COUNT--        ------OWNER------  ----WAITING REGIONS-----
LATCH ID     CUM       CURR  STAT  RGN STAT  PSBNAME  RGN1 RGN2 RGN3 RGN4 RGN5
------------- --------- ----  ----  --- ---- --------  ---- ---- ---- ---- ----
DMSH-CUSTDB1       N/A    0  EXCL  001 ACTV PSB1DEDB   002
DMSH-CUSTDB2       N/A    2  EXCL  008 ACTV PSB2DEDB   007  006
DMSH-CUSTDB3       N/A    0  EXCL  002 ACTV PSB3DEDB
```

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

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

,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
 ------------- --------- ----
 DMSH-AREA1      N/A       0
 DMSH-AREA2      N/A       2
 DMSH-AREA3      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   16:39:06  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> CESS,SORT=BS                       ROW      1 OF      8 SCROLL=> CSR

NAME: CESS        SP: 231   HI-MARK:  13,424    %HI:   0      EXP+CMP:       6
TYPE: FIXED      LOC: EPRV     CURR:       0    %CU:   0      EXP-CMP:       0
 RGN: CTL                    MAX-SZ: NOLIMIT                   WASTED:     162

BUFFER  -BFR/BLOCK-        -----BLOCK COUNT----                 ---BFR COUNT---
SIZE     PRI   SEC  WA/BFR  CURR   FREE  HI-MRK EX+CMP EX-CMP    CURR   HI-MRK
------- ----- ----- ------ ------ ------ ------ ------ ------   ------- -------
 16,384     4     2      0      0      0      0      0      0         0       0
  8,192     8     4      0      0      0      0      0      0         0       0
  4,096    16     8      0      0      0      0      0      0         0       0
  2,048    32    16      0      0      0      0      0      0         0       0
  1,024    32    16      0      0      0      0      0      0         0       0
    512    32    16      0      0      0      0      0      0         0       0
    256    32    16     75      0      0      1      4      0         0       1
    128    32    16     12      0      0      1      2      0         0       1
******************************** END OF DATA ********************************
```

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 The variable *id* must be one of the following fixed pool IDs:

- AOIP
- CESS
- FPWP

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*

The variable *cc* can be any of the two characters listed below. 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.

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: CESS        SP: 231   HI-MARK:  13,424    %HI:   0      EXP+CMP:       6
TYPE: FIXED      LOC: EPRV     CURR:       0    %CU:   0      EXP-CMP:       0
 RGN: CTL                    MAX-SZ: NOLIMIT                   WASTED:     162
```

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.

FPWP
: A Fast Path fixed work 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:

FIXED

IMS allows up to 32 different buffer sizes 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  -BFR/BLOCK-        -----BLOCK COUNT----                 ---BFR COUNT---
SIZE     PRI   SEC  WA/BFR  CURR   FREE  HI-MRK EX+CMP EX-CMP    CURR   HI-MRK
------- ----- ----- ------ ------ ------ ------ ------ ------   ------- -------
 16,384     4     2      0      0      0      0      0      0         0       0
  8,192     8     4      0      0      0      0      0      0         0       0
  4,096    16     8      0      0      0      0      0      0         0       0
  2,048    32    16      0      0      0      0      0      0         0       0
  1,024    32    16      0      0      0      0      0      0         0       0
    512    32    16      0      0      0      0      0      0         0       0
    256    32    16     75      0      0      1      4      0         0       1
    128    32    16     12      0      0      1      2      0         0       1
******************************** END OF DATA ********************************
```

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 (only one, for example), 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
- PSBW (default)

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.

PSBW
PSB work 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==> IMSxxx
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 non-generic 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.
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.
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.
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==>  IMSxxx
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 field shows 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==>  IMSxxx
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 in 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.

  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==>  IMSxxx
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
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
DBWP/DMBW VAR DLS ECSA 231      0   0    672   2  24576     N/A     N/A     N/A
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
```

Description: This display shows summary information for all non-CBT variable and fixed pools.

Fixed pools allow up to 32 different buffer sizes 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
 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
 DBWP/DMBW VAR DLS ECSA 231      0   0    672   2  24576     N/A     N/A     N/A
 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
```

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.

  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.

FPWP
: Fast Path fixed work pool.

MAIN/WKAP
: The MAIN (WKAP) pool is the general work pool.

PSBW
: PSB work 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 13. 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          12,415        13
    0    CONTROL    33   184         219,421        18
    0    DLIS      123   178          11,345         0
    1    DBT        62   180         293,161        20
    2    DBT        62   180         293,161        20
    3    BMP       102   180           3,244         4


        ******IMS DISPATCHER******
          3 DYNAMIC SAPS

         3 DEPENDENT REGIONS
     1 ACTIVE BMP    0 ACTIVE MDP
     0 ACTIVE MPP    0 ACTIVE NDP              317 TOTAL ITASKS DISPATCHED
     2 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	BBI-SS product address space
BMP	Batch message processing region
CONTROL	Control region
DBT	DBCTL CICS thread
FPU	Fast Path utility region
JBP	Java batch message processing region
NDP	Non-message-driven Fast Path region
ODB	DBCTL ODBA thread

```
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
0 ACTIVE MPP          0 ACTIVE NDP
2 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 and JBP regions scheduled currently.

ACTIVE DBT
: The number of active DBCTL CICS and ODBA threads. ODBA threads are identified as ODB type regions in the OS DISPATCHER section of DSPST.

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==> IMSxxx
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     BMP  PDRIVER    TDRIVER      20   14          6    14   14      42
```

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-LSQA 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 number includes both local and LSQA page frames.

```
Area 3

 REGION TYPE  PROGRAM    TRANSACT  TOTAL LSQA NLSQA PAGE FIXED FIXB   SLOTS
   1     BMP  PDRIVER    TDRIVER      20   14          6    14   14      42
```

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-LSQA 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 number includes both local and LSQA page frames.

TRANSACT
: Contains the transaction code if the transaction is scheduled.

TYPE

Region type:

BMP	Batch message processing region
DBT	DBCTL CICS thread
FPU	Fast Path utility region
JBP	Java batch message processing region
NDP	Non-message-driven Fast Path region
ODB	DBCTL ODBA thread

Chapter 14. 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. IRLM 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 (PC0 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.......... ..1
  PTB LOCK..............59
  RH LOCK...............49
  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 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.

This area shows the number of times an exit routine is called by this IRLM for any IMS.

```
Area 5

                          EXIT ROUTINES CALLED:
                            SUSPEND.............0
                            RESUME..............0
                            STATUS..............0
                            NOTIFY..............0
                            DEADLOCK............0
                            TIMEOUT.............0
```

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 field 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:
: 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 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

```
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 field shows the 4-byte subsystem ID. For IMS batch and CICS local DL/I, the field shows 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 non-specific 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-MQS	Region active in MQSeries (Event Collector must be active).

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). The region has initialized or started to initialize but has not completed signon or CREATE THREAD processing. For DBCTL, IMS preallocates threads (DBTs) up to the MINTHREAD specified value before they are actually needed. These DBTs will have an INACTIVE status. For other region types, this status should be displayed only briefly, until the region completes the first CREATE THREAD.
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). The block mover latch comprises several smaller latches. Use the LATCH service to determine which BML latch a region is waiting for.
WAIT-DLI	Region waiting for DL/I.
WAIT-INT	Region in scheduling (waiting for database intent).

WAITING	Region in non-specific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see “LATCH - Latch Summary” on page 181.
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 non-specific 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 field shows the subsystem ID of that IMS. For an IMS internal task, the field shows the 3-byte field task ID (for example, XFP for Fast Path internal task).

T
Region type. Possible types:

B Batch message processing (BMP) or Java batch message processing (JBP)

D DBCTL thread (CICS or ODBA)

L Local batch IMS

S IMS internal task

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 — Batch message processing (BMP) or Java batch message processing (JBP)
- D — DBCTL thread (CICS or ODBA)

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 field shows the subsystem ID of that IMS. For an IMS internal process, the field shows the 3-byte IMS internal task field name; for example, XFP for Fast Path internal task.

T — Region type. Possible types:

- B — Batch message processing (BMP) or Java batch message processing (JBP)
- D — DBCTL thread (CICS or ODBA)
- F — IFP (Fast Path)
- M — Message processing (MPP) or Java message processing (JMP)
- T — TPI (explicit APPC program)

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 non-specific 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-MQS Region active in MQSeries (Event Collector must be active).

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). The region has initialized or started to initialize but has not completed signon or create thread processing. For DBCTL, IMS preallocates threads (DBTs) up to the MINTHREAD specified value before they are actually needed. These DBTs will have an INACTIVE status. For other region types, this status should be displayed only briefly, until the region completes the first create thread.
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). The block mover latch comprises several smaller latches. Use the LATCH service to determine which BML latch a region is waiting for.
WAIT-DLI	Region waiting for DL/I.
WAIT-INT	Region in scheduling (waiting for database intent).
WAITING	Region in non-specific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see “LATCH - Latch Summary” on page 181.

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 non-specific 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 Batch message processing (BMP) or Java batch message processing (JBP)

D DBCTL thread (CICS or ODBA)

L Local batch IMS

S IMS internal task

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. Possible regions:

- B — Batch message processing (BMP) or Java batch message processing (JBP)
- D — DBCTL thread (CICS or ODBA)

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. Possible types:

- B — Batch message processing (BMP) or Java batch message processing (JBP)
- D — DBCTL thread (CICS or ODBA)
- F — IFP (Fast Path)
- M — Message processing (MPP) or Java message processing (JMP)
- T — TPI (explicit APPC program)

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 non-specific 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-MQS	Region active in MQSeries (Event Collector must be active).
	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).
		The region has initialized or started to initialize but has not completed signon or create thread processing. For DBCTL, IMS preallocates threads (DBTs) up to the MINTHREAD specified value before they are actually needed. These DBTs will have an INACTIVE status. For other region types, this status should be displayed only briefly, until the region completes the first create thread.
	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). The block mover latch comprises several smaller latches. Use the LATCH service to determine which BML latch a region is waiting for.
WAIT-DLI	Region waiting for DL/I.
WAIT-INT	Region in scheduling (waiting for database intent).
WAITING	Region in non-specific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see “LATCH - Latch Summary” on page 181.
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 non-specific 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 CICS thread
FPU	Fast Path utility
JBP	Java batch message processing
NDP	Non-message-driven Fast Path
ODB	DBCTL ODBA thread

```
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  IRLM 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. IRLM 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

```
IRLM 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 number 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

Y19H           ACTIVE     REMOTE   UPDATE       NORMAL              002
               PRIMARY             SHARE
****************************** END OF DATA ***********************************
```

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 non-specific 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-MQS	Region active in MQSeries (Event Collector must be active).
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).
	The region has initialized or started to initialize but has not completed signon or create thread processing. For DBCTL, IMS preallocates threads (DBTs) up to the MINTHREAD specified value before they are actually needed. These DBTs will have an INACTIVE status. For other region types, this status should be displayed only briefly, until the region completes the first create thread.
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). The block mover latch comprises several smaller latches. Use the LATCH service to determine which BML latch a region is waiting for.
WAIT-DLI	Region waiting for DL/I.
WAIT-INT	Region in scheduling (waiting for database intent).
WAITING	Region in non-specific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see “LATCH - Latch Summary” on page 181.
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 non-specific 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 Batch message processing (BMP) or Java batch message processing (JBP)

D DBCTL thread (CICS or ODBA)

L Local batch IMS

S IMS internal task

X 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
  : Batch message processing (BMP) or Java batch message processing (JBP)

  D
  : DBCTL thread (CICS or ODBA)

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 asterisk (for example, *001).

  T
  : Region type. Possible types:

    B
    : Batch message processing (BMP) or Java batch message processing (JBP)

    D
    : DBCTL thread (CICS or ODBA)

    L
    : Local batch IMS

    S
    : IMS internal task

    X
    : 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 non-specific 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-MQS	Region active in MQSeries (Event Collector must be active).
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).
	The region has initialized or started to initialize but has not completed signon or create thread processing. For DBCTL, IMS preallocates threads (DBTs) up to the MINTHREAD specified value before they are actually needed. These DBTs will have an INACTIVE status. For other region types, this status should be displayed only briefly, until the region completes the first create thread.
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). The block mover latch comprises several smaller latches. Use the LATCH service to determine which BML latch a region is waiting for.
WAIT-DLI	Region waiting for DL/I.
WAIT-INT	Region in scheduling (waiting for database intent).
WAITING	Region in non-specific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see "LATCH - Latch Summary" on page 181.
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 non-specific 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 Batch message processing (BMP) or Java batch message processing (JBP)

D DBCTL thread (CICS or ODBA)

L Local batch IMS

S IMS internal task

X 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 — Batch message processing (BMP) or Java batch message processing (JBP)
- D — DBCTL thread (CICS or ODBA)

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 — Batch message processing (BMP) or Java batch message processing (JBP)
- D — DBCTL thread (CICS or ODBA)
- L — Local batch IMS
- S — IMS internal task
- X — 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:

ACTIVE	Active in a non-specific 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-MQS	Region active in MQSeries (Event Collector must be active).
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).
	The region has initialized or started to initialize but has not completed signon or create thread processing. For DBCTL, IMS preallocates threads (DBTs) up to the MINTHREAD specified value before they are actually needed. These DBTs will have an INACTIVE status. For other region types, this status should be displayed only briefly, until the region completes the first create thread.
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). The block mover latch comprises several smaller latches. Use the LATCH service to determine which BML latch a region is waiting for.
WAIT-DLI	Region waiting for DL/I.
WAIT-INT	Region in scheduling (waiting for database intent).
WAITING	Region in non-specific wait.
WLT-xxxx	Region waiting for a latch with IMS latch ID of xxxx. For more information see “LATCH - Latch Summary” on page 181.
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 non-specific 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 CICS thread
FPU	Fast Path utility
JBP	Java batch message processing
NDP	Non-message-driven Fast Path
ODB	DBCTL ODBA thread

```
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*  OO4-IMSMSG04  005-IMSMSG0
```

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 15. Workload Analyzer Displays (Quick Reference)

The following table shows the service select code and parameters for the Workload Analyzer Workload Wait services. It also lists the page where you can find a complete description of each service.

Table 4. Workload Wait Service Select Codes

Service Select Code	**Parameter**	**See**
`MWAIT`	`[parm]` `[keywords]`	Chapter 16, “Requesting Workload Wait Data Collection (MWAIT)” on page 299 For a description of the keyword parameters that can be used with an MWAIT request, see Table 5 on page 302
`DWAIT`	[parm] {FORMAT=%|#} {FLOWCOMP=SC|AP|SP|COMP|ALL} {TRANS=ACTIVE|ALL}	Chapter 17, “Requesting Workload Wait Data Display (DWAIT)” on page 309 Chapter 18, “DWAIT - Workload Wait Display” on page 311

Chapter 16. 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 Chapter 21, "Displaying a List of Data Collection Monitors (SM Command)" on page 379).

  A data entry panel, shown in Figure 3 on page 301, is displayed so that you can specify request options (which are described in Table 5 on page 302):

  – 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 Chapter 19, “Displaying a List of Active Timer Requests (Primary Menu Option 2)” on page 357.

  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 “Multiple Requests” on page 556).

- Starting MWAIT from a 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=IMSVSx
  ```

  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 3, for requesting the MWAIT monitor service:

1. Enter an SM command as described in Chapter 21, “Displaying a List of Data Collection Monitors (SM Command)” on page 379.
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 3. Start Workload Wait Request

These options are SET keywords for MWAIT and are described in Table 5 in alphabetical order.

Table 5. SET Keywords to Activate a Workload Wait (MWAIT) Service (Page 1 of 4)

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`	The variable `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 (Page 2 of 4)

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 "Multiple Requests" on page 556). 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 (Page 3 of 4)

Keyword	Operand	Description
PGMTYPE| PTYP	BMP DBT|NOTDBT FPU	Qualifies an MWAIT request by program type. Multiple program types can be specified. The types are: BMP Batch message processing program or Java batch message processing program (JBP) DBT DBCTL thread (CICS or ODBA) FPU Fast Path utility Default is all types. DBT selects only programs that use a DBCTL thread. NOTDBT selects programs that do not use a DBCTL thread. **Note:** Program types MPP, JMP, MDP, IFP, and TPI are not valid for DBCTL.
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	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`
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 (Page 4 of 4)

Keyword	Operand	Description
TERM	lterm	For DBCTL threads, qualifies an MWAIT request by the 4-character ID of the CICS terminal. 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+` **Note:** The MSCCLOCK and SYNCLOCK operands are not applicable to DBCTL.
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 a trace request by transaction type: ALL — All transaction types DLI — Transactions that make DL/I database calls DB2 — Transactions that access DB2 (not a valid operand for DBCTL MWAIT requests) FP — Transactions that make Fast Path database calls
USERID	userid	Qualifies an MWAIT request by the name of the CICS sign-on user ID. Valid entries are 1- to 8-character alphanumeric CICS 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.

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 Chapter 19, “Displaying a List of Active Timer Requests (Primary Menu Option 2)” on page 357.

- 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 Chapter 19, “Displaying a List of Active Timer Requests (Primary Menu Option 2)” on page 357.

- 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 a 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 11 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	User IDs

Chapter 17. Requesting Workload Wait Data Display (DWAIT)

As described in Chapter 16, “Requesting Workload Wait Data Collection (MWAIT)” on page 299, 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 Chapter 19, “Displaying a List of Active Timer Requests (Primary Menu Option 2)” on page 357). 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 Chapter 46, “The SET Timer Request” on page 555).

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.

Chapter 18. DWAIT - Workload Wait Display

```
BMC SOFTWARE  ------------- DISPLAY WORKLOAD WAIT   -----------PERFORMANCE MGMT
 SERV ==> DWAIT           INPUT    12:02:41  INTVL=> 8  LOG=> N  TGT==> IMSxxx
 PARM ==>                                                         SCROLL=> N/A
 EVENTS - Active Trans.      --- CURRENT PERIOD ---       ------ HISTORY -------
                           %  0________50_______100%    %  0________50_______100%
 SCHEDULING             10.53|->  .    .    .    .|  10.53|->  .    .    .    .|
   MISC IMS-SAS WAIT  (10.53)|->  .    .    .    .|(10.53)|->  .    .    .    .|
 APPLICATION PROGRAM    84.21|---------------->  .|  84.21|---------------->  .|
   DL/I-XMEM USING CPU(21.05)|--->.    .    .    .|(21.05)|--->.    .    .    .|
   VSAM DB I/O ACTIVE  (7.89)|->  .    .    .    .| (7.89)|->  .    .    .    .|
   APPL IN CICS       (55.27)|---------->   .    .|(55.27)|---------->   .    .|
 SYNC POINT              5.26|->  .    .    .    .|   5.26|->  .    .    .    .|
   LWA Wait            (5.26)|->  .    .    .    .| (5.26)|->  .    .    .    .|
                             +--------------------+       +--------------------+
 RESPONSE TIME (SEC)     1.39|      171 SAMPLES   |   1.39|      771 SAMPLES   |
 # OF TRANS COMPLETED      67|     0 MIN/34 SEC   |     67|     2 MIN/34 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
SC	Scheduling
AP	Application program
SP	Synchronization point

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`.

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

```
Area 1

EVENTS - Active Trans.
                          %
 SCHEDULING             10.53
   MISC IMS-SAS WAIT  (10.53)
 APPLICATION PROGRAM    84.21
   DL/I-XMEM Using CPU(21.05)
   VSAM DB I/O Active  (7.89)
   Appl In CICS       (55.27)
 SYNC POINT              5.26
   LWA WAIT            (5.26)

 RESPONSE TIME (SEC)     1.39
 # OF TRANS COMPLETED      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:

SCHEDULING
APPLICATION PROGRAM
SYNC POINT

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 and JBPs are excluded from this count.

EVENTS

Identifies the events being displayed as specified by the TRANS parameter.

RESPONSE TIME

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 and JBPs are excluded from this count.

Area 2

```
                    --- CURRENT PERIOD ---
                %  0________50_______100%
              10.53|->  .    .    .    .|
            (10.53)|->  .    .    .    .|
              84.21|---------------->  .|
            (21.05)|--->.    .    .    .|
             (7.89)|->  .    .    .    .|
            (55.27)|---------->   .    .|
               5.26|->  .    .    .    .|
             (5.26)|->  .    .    .    .|
                    +--------------------+
               1.39|      171 SAMPLES   |
                 67|     0 MIN/34 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________50_______100%
                                                    10.53|->  .    .    .    .|
                                                  (10.53)|->  .    .    .    .|
                                                    84.21|---------------->  .|
                                                  (21.05)|--->.    .    .    .|
                                                   (7.89)|->  .    .    .    .|
                                                  (55.27)|---------->   .    .|
                                                     5.26|->  .    .    .    .|
                                                   (5.26)|->  .    .    .    .|
                                                          +--------------------+
                                                     1.39|      771 SAMPLES   |
                                                       67|     2 MIN/34 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.

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)
- 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.

The same as “AP: Appl Prv Fault” on page 316, 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 316, 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 316, except that the application program was accessing data or instructions in LPA.

AP: Appl LPA GFA

The same as “AP: Appl Prv GFA” on page 316, 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 332 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 332, 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 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" on page 317 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 318 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" on page 317 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 318 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 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 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 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 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 317 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 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 317 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 317 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 317 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 317 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 317 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 318 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 318 except that the DB2 interface code was processing a service call.

AP: DB2S-Dep Wait

The same as “AP: DB2N-Dep Wait” on page 318 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 321, 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 321, 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 322, 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 321, 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 322, 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 321, 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 322, 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 322, 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” on page 321, 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 322, 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” on page 321, 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 322, 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. These are examples of DL/I configurations that may result in considerable CPU needs:

- 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 321, 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 321, 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” on page 322, 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 321, 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 322, 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 321, 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 322, 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 322, 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 321, 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 320, 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 322, 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 320, 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 322, 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 320, 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 322, 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 322, 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 321, 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 321, 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 322, 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 321, 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 322, 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 321, 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 322, 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 322, 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: Log Buffer Wait

The same as "SC: Log Buffer Wait" on page 338, except that it occurred during application DL/I processing.

AP: Logical Log Latch

The same as "SC: Logical Log Latch" on page 339, 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 338 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: 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.

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
- 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: Misc DLI-Dep Wait” on page 326, 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” on page 328., 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: SAS SYNC I/O Active

The same as “SC: SAS SYNC I/O Active” on page 342, 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 342., except that the application program processing has begun.

AP: Storage Mgt Latch

The same as “SC: Storage Mgt Latch” on page 342, 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.

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 or JBP region was attempting to allocate the needed PSB and DMBs. Before the BMP or JBP 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 or JBP that needed the services of the block loader, but it was in use by another dependent region. This BMP or JBP 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. 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”, but the scheduler is executing in a DBT region.

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 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 or JBP 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 or JBP 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: 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" on page 332, but the scheduler is executing in a DBT region.

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" on page 333, but the scheduler is executing in a DBT region.

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

SC: FETCH I/O Queued

The same as -, 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 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

SC: IMS-CTL CPU Wait

The same as “SC: IMS-Dep CPU Wait” on page 335, 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 336, 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 336, 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 336, 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 336, 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 336, 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 336, 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 337, 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

The same as “SC: IMS-Dep Prv Fault”, except that the scheduler was accessing data or instructions in CSA.

SC: IMS-Dep CSA GFA

The same as “SC: IMS-Dep Prv GFA”, except that the scheduler was accessing data or instructions in CSA.

SC: IMS-Dep LPA Fault

The same as “SC: IMS-Dep Prv Fault”, except that the scheduler was accessing data or instructions in LPA.

SC: IMS-Dep LPA GFA

The same as “SC: IMS-Dep Prv GFA”, 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 335, 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" on page 336, 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" on page 336, 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 336, 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 336, 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 336, 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", 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 336, 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: 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" on page 338 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" on page 339, 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" on page 339, 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", but the scheduler is executing in a DBT region.

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: PSBP Pool - BMP" on page 340, but the scheduler is executing in a DBT region.

SC: OS Wait-CTL

Similar to "SC: OS Wait-Dep" on page 341, 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: 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" on page 342, 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: 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 332, 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 332, except that it occurred during sync point processing.

SP: DB2S-DEP CPU Wait

The same as "AP: DB2S-Dep CPU Wait" on page 318 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 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 317 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 317 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 317 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 317 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 317 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 318 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 318 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 318 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 333, 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 334, 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 346, 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 347, 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 347, 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 347, 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 347, 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 347, 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 347, 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 347, 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 or JBPs.

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 347, 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 347, 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 347, 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 346, 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” on page 347, 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 347, 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 347, 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 347, 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 347, 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 347, 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 347, 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 325, except that it occurred during sync point processing.

SP: Log Buffer Wait

The same as “SC: Log Buffer Wait” on page 338, except that it occurred during sync point processing.

SP: Logical Log Latch

The same as “SC: Logical Log Latch” on page 339, except that it is the sync point manager that needs the latch.

SP: LWA Wait

The same as “AP: LWA Wait” on page 326, 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” on page 349, except that the sync point manager is executing under the DL/I serial task in the DL/I subordinate address space.

SP: OS Wait-CTL

The same as “SP: OS Wait-Dep” on page 350, 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 JBP 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 can 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 351, 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 341, 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 329, 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: SAS SYNC I/O Active

The same as "SC: SAS SYNC I/O Active" on page 342, 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 342, except that it occurred during sync point processing.

SP: Storage Mgt Latch

The same as “SC: Storage Mgt Latch” on page 342, 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” on page 351, 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. Monitors

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

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Chapter 19. Displaying a List of Active Timer Requests (Primary Menu Option 2)

The Active Timer Requests list can be accessed with the D line command from the Data Collection Monitors list application (see Chapter 21, “Displaying a List of Data Collection Monitors (SM Command)” on page 379) or by selecting Primary Menu Option 2:

- Using the D line command displays the active timer requests for the selected service only.
- Selecting the Active Timer Requests list as a menu option displays all the active timer requests (monitor service requests, workload wait service requests, and Image log requests for analyzer or monitor summary service displays) that you are authorized to view.

```
BMC SOFTWARE  -------------- ACTIVE TIMER REQUESTS --------- COMMAND(S) ISSUED
COMMAND ===>                                                  TGT ===> IMSxxx

                                  INPUT  INTVL ==> 3        TIME --  14:32:27
 COMMANDS: SM (START MONITORS), SORT, AREA, X ON/OFF, DM (DMON), DW (DWARN)
 LC CMDS:  S (SELECT), W (SHOW),      M (MODIFY)
           P (PURGE),  R (REPLICATE), H (HELP), Z (STOP)                    >>>
 LC   SERV  PARM     TITLE                  CURRENT  WVAL  -8-6-4-2-0+2+4+6+8+
      DBIO           DB I/O COUNT BY SUBPOOL     36    10| *********W********* |
      DBIO  1        DB I/O COUNT BY SUBPOOL      0      |                     |
      DBIO  3        DB I/O COUNT BY SUBPOOL     13      |                     |
      DBIO  2        DB I/O COUNT BY SUBPOOL      0      |                     |
      DBHIT          OSAM HIT RATIO BY SP        93   <80| *******  W          |
      DBHIT 1        OSAM HIT RATIO BY SP         0   <90|          W          |
      DBHIT 3        OSAM HIT RATIO BY SP       100   <80| ******   W          |
      VHIT           VSAM HIT RATIO BY SP       100      |                     |
      OBUFW          OLDS BUFFER WAITS            0     1|          W          |
      OCHKW          OLDS CHECK WRITES           13     1| *********W********* |
      WADIO          WADS I/O                    15     1| *********W********* |
      DPAGE          DEMAND PAGING BY REGION    498   500| *********W          |
      CSAUT          CSA % UTILIZATION           56    80| ******   W          |
      ECSAU          ECSA % UTILIZATION          61    60| *********W          |
      DLIO  ++++++++ DL/1 EXCP COUNT BY DDNAM    31      |                     |
      SYSIO ++++++++ EXCP COUNT BY DDNAME        21      |                     |
      LHELD          IRLM LOCKS HELD              2      |                     |
      LKREQ          IRLM LOCK REQUESTS           0      |                     |
      LSUSP          IRLM SUSPENSIONS             0      |                     |
       *************************** END OF REQUESTS ****************************
```

Figure 4. List Active Timer Requests Application (Before Scrolling Right)

```
BMC SOFTWARE  -------------- ACTIVE TIMER REQUESTS ---------- FUNCTION COMPLETE
  COMMAND ===>        TGT ===> IMSxxx
                                  INPUT    INTVL ==> 3      TIME --  07:46:04
  COMMANDS: SM (START MONITORS), SORT, AREA, X ON|OFF, DM (DMON), DW (DWARN)
  LC CMDS:  S (SELECT), W (SHOW),      M (MODIFY),
            P (PURGE),  R (REPLICATE), H (HELP),   Z (STOP),                 <<<
  LC   SERV  PARM     TITLE                      USER ID  TARGET  SEC AREA  STAT
       DBIO           DB I/O COUNT BY SUBPOOL    LAA1     IMSxxx   A  DB    ACTV
       DBIO  1        DB I/O COUNT BY SUBPOOL    LAA1     IMSxxx   A  DB    ACTV
       DBIO  3        DB I/O COUNT BY SUBPOOL    LAA1     IMSxxx   A  DB    ACTV
       DBIO  2        DB I/O COUNT BY SUBPOOL    LAA1     IMSxxx   A  DB    ACTV
       DBHIT          OSAM HIT RATIO BY SP       LAA1     IMSxxx   A  DB    ACTV
       DBHIT 1        OSAM HIT RATIO BY SP       LAA1     IMSxxx   A  DB    ACTV
       DBHIT 3        OSAM HIT RATIO BY SP       LAA1     IMSxxx   A  DB    ACTV
       VHIT           VSAM HIT RATIO BY SP       LAA1     IMSxxx   A  DB    ACTV
       OBUFW          OLDS BUFFER WAITS          LAA1     IMSxxx   A  INTNL ACTV
       OCHKW          OLDS CHECK WRITES          LAA1     IMSxxx   A  INTNL ACTV
       WADIO          WADS I/O                   LAA1     IMSxxx   A  INTNL ACTV
       DPAGE          DEMAND PAGING BY REGION    LAA1     IMSxxx   A  IMVS  ACTV
       CSAUT          CSA % UTILIZATION          LAA1     IMSxxx   A  IMVS  ACTV
       ECSAU          ECSA % UTILIZATION         LAA1     IMSxxx   A  IMVS  ACTV
       DLIO  ++++++++ DL/1 EXCP COUNT BY DDNAM   LAA1     IMSxxx   A  IMVS  ACTV
       SYSIO ++++++++ EXCP COUNT BY DDNAME       LAA1     IMSxxx   A  IMVS  ACTV
       LHELD          IRLM LOCKS HELD            LAA1     IMSxxx   A  LOCK  ACTV
       LKREQ          IRLM LOCK REQUESTS         LAA1     IMSxxx   A  LOCK  ACTV
       LSUSP          IRLM SUSPENSIONS           LAA1     IMSxxx   A  LOCK  ACTV
        *************************** END OF REQUESTS ***************************
```

Figure 5. List Active Timer Requests Application (After Scrolling Right)

A select line command for an active monitor request provides direct access to a plot display of data collected by the selected monitor. Other line commands can be used to view current timer request options, access data entry panels to replicate or change the current options to make another unique SET timer request for that service, or confirm a purge of the selected request.

Timer requests are shown in the Active Timer Requests list as they are processed. This list can be scrolled left and right and up and down. It allows service selection by line command and shows all the active requests, parameters specified for each requested service, the latest measured value, the specified warning threshold, a plot for the current sampling, the user logon identification, the target IMS of the request, the service security classification, the area of IMS being monitored, and the service status by:

Field Name	**Description**
INTVL	Screen refresh field. You can specify a refresh interval for this application. Entering GO in the COMMAND field or pressing PF6/18 starts the refresh cycle.
LC	A line command input field. One-character line commands can be entered in this field to view, modify, or replicate the options for a selected request; purge a request; or display HELP information about the service (see“Line Commands” on page 363).
SERV	A scrollable list of services for all active timer requests by service select code. The Active Timer Requests list application also can be displayed by using the D line command from the Data Collection Monitors list, as described in “Line Commands” on page 381. Only those requests that are active for that service are shown.

PARM This field shows the parameters that were defined for the active requests.

TITLE The service title.

CURRENT The latest measured value.

Note: If the request is not active, its status (as defined in the STAT field) is displayed in this column.

WVAL The warning threshold.

`-8-6-4-2-0+2+4+6+8+0`

A plot for the current sampling and a warning threshold (W marker) if the WVAL keyword was specified with the SET request. Plot characters indicate a trend:

< Shows a downward trend from the preceding sampled values.

> Shows an upward trend from the preceding sampled values.

* Shows no change from the preceding sampled values.

If you have a color monitor, the graph is displayed in these colors:

Red	Warning status
Turquoise	Normal values for the current interval
Yellow	Maximum thresholds: values for the current period are greater than the values for the previous period Minimum thresholds: values for the current period are less than the values for the previous period

USER ID The logon identification of the user who made the request.

TARGET The IMS subsystem defined as the target of the requested service either by default or user-specified.

SEC The security code for user access to the service.

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

Field Data	**Description**
DB	Database activity and buffer pool utilization
IMVS	IMS and OS/390 interactions
INTNL	IMS internal functions
IWKLD	IMS workload
LOCK	RLM functions
REGN	Application program activity in the dependent regions
SCHED	Scheduling of application programs in the dependent region

STAT The service request status which could be:

Field Data	Description
ACTV	The request is active.
COMP	The request executed and completed normally.
HELD	The request is being held and is pending release.
INIT	The request is being invoked for the first time (a start time was specified, but it has not been reached).
INV	The request terminated because of an invalid parameter or measurement. The BBI-SS PAS Journal log contains a descriptive message of the error.
LOCK	A LOCK command was issued for the service or the service abended.
QIS	The service is quiesced, because the target IMS is not active.
RST	The target IMS restarted. The request is waiting until the current interval expires before performing restart processing as specified by the RST keyword in the original request.

Application Transfer Commands

The following related application transfer commands can be entered in the COMMAND field of the Active Timer Requests list application showing all timer requests:

AN (Analyzer Display Services)
AT (Active Timer Requests)
CT | VT (View Current Traces)
DM (DMON)
DW (DWARN)
MN (Data Collection Monitors)
HT (History Traces)
SM | MN (Start Monitors)
ST (Start Traces)

AN (Analyzer Display Services)

AN displays the analyzer display services application, which lists all the analyzers that you are authorized to view and allows selection of analyzers with the S line command. The application shows allowable parameters for each service, the service security classification, the area of IMS being analyzed, and the service status.

AT (Active Timer Requests)

AT displays the active timer requests application, which lists all the monitors that have been activated and allows selection of monitors with the S line command. Activated monitors are started either manually (with the SM command) or automatically (by a BLK member defined to start automatically using the BBPARM member BBIISP00). The application also shows workload wait service requests and image log requests for analyzers.

CT | VT (View Current Traces)

CT displays the Current Traces application, which lists all currently active traces. From this application, you can use the S line command to display collected trace data.

DM (DMON)

DM displays the DMON service (see “Active Monitor Summary Display (DMON)” on page 375), which displays global data about the status and operation of active monitor services. If a warning threshold (WVAL) is specified with the monitor request, a graphic trend display is shown.

DW (DWARN)

DW displays the DWARN service (see “Active Monitor Warning Display (DWARN)” on page 377), which displays the status of active monitor services that are currently exceeding the threshold limit set with the WVAL parameter of the monitor request.

HT (History Traces)

HT displays the History Traces application, which is used to manage trace log data sets where traces are recorded (see Chapter 37, “Logging a Trace” on page 477).

SM (Start Monitors)

SM displays the Data Collection Monitors application which lists all of the data collection monitor services you are authorized to view. From this panel, you can use the S line command to select the data entry panel to start a timer request for any of the listed monitors.

ST (Start Traces)

ST displays the MTRAC data entry panel to start a trace request. Specify the keyword parameters, selection criteria, and exception filters in successive panels to activate data collection for a summary or detail trace.

SORT Primary Command

When the list of active timer requests is displayed initially, the list is sorted in the order requests are made. SORT can be entered in the COMMAND field of the display to sort the list by any of the column headings. The first two characters of the column heading are used with SORT as:

```
SORT cc
```

where `cc` can be any of the following two characters, which are described below in alphabetical order.

AR	Sorts the list by the resource area (AREA column).
CU	Sorts the numerical values in descending order (CURRENT column).
SC	Sorts the list alphabetically by the security code.
SE	Sorts the list alphabetically by service name (SERV column).
ST	Sorts the list alphabetically by the service status displayed (STAT column).
TA	Sorts the list alphabetically by target ID (TARGET ID column).
TI	Sorts the list alphabetically by service title (TITLE column).
US	Sorts the list alphabetically by user ID (USER ID column).
WV	Sorts the numerical values in descending order (WVAL column).

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.

X ON|OFF Primary Command

To display only the requests that are in warning status, type X ON in the command line and press ENTER. To display all requests, type X OFF in the command line and press ENTER. The default is to display all requests.

Line Commands

Entering one of the following one-character line commands in the LC field for a service executes the line command function. Multiple selections can be entered at one time by selecting a series of services and pressing the ENTER key. Each display in a series is processed by pressing the END key. Each data entry timer request panel in a series that is to be modified or purged is submitted by pressing the ENTER key and then the END key to process the next request.

S SELECT. Displays a plot of collected data.

Selecting an active request for a resource or workload monitor service displays a plot of the data collected by the selected request (see "History PLOT Display (S Line Command for Monitor Request)" on page 364).

Note: The S line command (SELECT a plot) is not valid for an active Image log request of an analyzer or general service display.

W SHOW. Shows a display panel of the timer request options defined for the selected request for viewing only (see "Show Timer Request (W Line Command)" on page 368).

M MODIFY. Shows a data entry panel of the timer request options defined for the selected request so the options can be changed (see "Modify Timer Request (M Line Command)" on page 364).

P PURGE. Displays a PURGE panel to verify a purge of the selected request (see "Purge Request (P Line Command)" on page 366).

R REPLICATE. Shows a data entry panel of the timer request options defined for the selected request so that the options can be repeated or changed to make a new request for that service (see "Replicate Timer Request (R Line Command)" on page 367). The request must be unique (defined by the service select code plus a parameter).

H HELP. Displays HELP information about the service for the selected request.

Using H for a display service request shows the service title, describes what the service does, and defines any parameters.

Using H for a monitor request shows the service title, describes the value measured by that monitor service, defines any parameters, and shows the format of the monitor warning message.

Z STOP. Stops the request and retains collected data. The STOP time equals the current time.

History PLOT Display (S Line Command for Monitor Request)

The S line command displays a graphic history plot of the data collected by the selected monitor service. It generates the display described in “Monitor History Display (PLOT)” on page 369.

Modify Timer Request (M Line Command)

Selecting a request with the M line command displays a data entry panel with the options that were defined to activate data collection for a workload or monitor service or Image logging for a display service. Previously defined options that are prefixed by `===>` can be changed, as shown by the example in Figure 6.

```
BMC SOFTWARE  --------- MODIFY RESOURCE MONITOR REQUEST -----  PERFORMANCE MGMT
COMMAND ===>                                                     TGT ===> IMSA
                     DBIO  - DB I/O COUNT BY SUBPOOL
 PARM:                                   (Resource Selection Parameter)
 INTERVAL:   00:01:00  START:   14:26:00   STOP ==>                QIS ==> YES
 WVAL    ==> 10       WMSG  ==>           WLIM ==> 10  WIF ==> 1   WIN ==> 1
 RST     ==> HOT                          (Restart Option: HOT,COLD,PUR,QIS)
 TITLE:      DB I/O COUNT BY SUBPOOL      (Title)
 PLOTMAX ==>                              (Maximum PLOT X-Axis Value)
 RANGES:                                  (1-4 Range Distr. Upper Limits)
 LOG     ==> NO                           (NO,ATSTOP,ATPD,ATINTVL,ATWARN)
```

Figure 6. Modify Timer Request Panel (M Line Command)

Options shown with a colon (:) suffix cannot be changed. 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 Active Timer Requests list.

Resource Monitor Request

The M line command for a resource monitor service displays the timer request options used to start data collection (see “Start Data Collection Timer Request (S Line Command)” on page 382). As shown in Figure 6 on page 364, the following options have fields prefixed by `===>`, which means their displayed values can be changed:

SET Option	Description
STOP	Service stop time
QIS	Service quiesce state
WVAL	Warning threshold
WMSG	Warning message routing
WLIM	Maximum warning messages
WIF	Number of intervals before first warning
WIN	Number of intervals between warnings
RST	Service restart
PLOTMAX	Maximum X-axis value for plot display
LOG	Automatic BBI-SS PAS Image logging of PLOT display (default is NO)

Workload Monitor Request

The options that can be modified for workload monitor requests are the same as those listed for resource monitor requests.

Note: Workload monitor selection criteria cannot be modified.

Workload Wait Request

The following options can be modified for workload wait requests:

SET Option	Description
STOP	Service stop time
RST	Service restart

Workload Trace Request

The following options can be modified for workload trace requests:

SET Option	Description
STOP	Service stop time
RST	Service restart
WRAP	Trace data wrap If you request trace logging with the MTRAC request, see "Modify a Trace Log Request (M Line Command)" on page 491 for the logging options that you can modify after a trace is active.

Image Log Request

The M line command for an analyzer or monitor summary service displays the SET timer request options used to log the service display to the BBI-SS PAS Image log (see "Start Image Log Request (I Line Command)" on page 53). The following options have fields prefixed by ===>, which means their displayed values can be changed:

SET Option	Description
STOP	Service stop time
QIS	Service quiesce state
RST	Service restart

Purge Request (P Line Command)

Selecting a service with the P line command displays a purge confirmation panel, shown by Figure 7.

```
BMC SOFTWARE  --------------- CONFIRM PURGE REQUEST ---------- PERFORMANCE MGMT
COMMAND ===>        TGT ===> IMSA


                       DBIO  - DB I/O COUNT BY SUBPOOL


 PARM:                                       Parameter / Identifier
 STATUS:        ACTV

 START:         14:26:00  (0    days)
 STOP:


   INSTRUCTIONS:

     Press ENTER key to confirm purge request.

     Enter END command to cancel purge request.
```

Figure 7. Purge Request Application (P Line Command)

Pressing the ENTER key confirms a purge of the selected service request. 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 Active Timer Requests list.

To stop a request and retain online plot or trace, use the modify command and enter a stop time. This allows information to remain after collection stops. If a request is purged, all data is lost.

Replicate Timer Request (R Line Command)

The R line command displays a data entry panel for the selected service, as shown in Figure 8.

```
BMC SOFTWARE  -------- REPLICATE RESOURCE MONITOR REQUEST ---  PERFORMANCE MGMT
COMMAND ===>        TGT ===> IMSA

                       DBIO  - DB I/O COUNT BY SUBPOOL

 PARM     ==>                                (Resource Selection Parameter)

 INTERVAL ==> 00:01:00 START ==>             STOP ==>                QIS ==> YES

 WVAL     ==> 10       WMSG  ==>             WLIM ==> 10  WIF ==> 1   WIN ==> 1

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

 TITLE    ==> DB I/O COUNT BY SUBPOOL        (Title)

 PLOTMAX  ==>                                (Maximum PLOT X-Axis Value)

 RANGES   ==>                                (1-4 Range Distr. Upper Limits)

 LOG      ==> NO                             (NO,ATSTOP,ATPD,ATINTVL,ATWARN)
```

Figure 8. Replicate Timer Request Panel (R Line Command)

The options that were defined to start the request are displayed (see “Start Data Collection Timer Request (S Line Command)” on page 382). All values prefixed by an arrow (==>) can be modified. This application can be used to start a new request for the selected service. Each request must be unique and is defined by the service select code and an optional parameter. The display is preset with the service select code.

Note: If the request specified a STOP time, it appears as nnnn, where nnnn is the number of intervals remaining until the monitor stops.

Pressing the ENTER key submits the request. 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 Active Timer Requests list.

Monitor or Trace Request

Using the R line command for a monitor or trace service displays all of the options previously defined to start data collection for the selected request (see “Start Data Collection Timer Request (S Line Command)” on page 382). All the option values can be replicated or changed and submitted by using the ENTER key, as long as the request is unique.

Image Log Request

Using the R line command for a display service shows all of the options previously defined to log the display to the BBI-SS PAS Image log (see “Start Image Log Request (I Line Command)” on page 53). All the option values can be replicated or changed and submitted by using the ENTER key, as long as the request is unique.

Show Timer Request (W Line Command)

The W line command can be used for any request shown in the Active Timer Requests list. The request types in the list are either for time-driven data collection monitor services, workload collection requests, or Image logging requests of monitor summary (DMON or DWARN) or analyzer service displays. Selecting a request with the W line command generates a display panel of the previously defined options for that SET timer request, as shown by the example in Figure 9.

```
BMC SOFTWARE  ----------- SHOW RESOURCE MONITOR REQUEST -----  PERFORMANCE MGMT
COMMAND ===>        TGT ===> IMSA

                        DBIO  - DB I/O COUNT BY SUBPOOL

   PARM:                                      (Resource Selection Parameter)

   INTERVAL:   00:01:00  START:   14:26:00   STOP:                   QIS:   YES

   WVAL:       10        WMSG:               WLIM:   10   WIF:   1    WIN:   1

   RST:        HOT                           (Restart Option: HOT,COLD,PUR,QIS)

   TITLE:      DB I/O COUNT BY SUBPOOL       (Title)

   PLOTMAX:                                  (Maximum PLOT X-Axis Value)

   RANGES:                                   (1-4 Range Distr. Upper Limits)

   LOG:        NO                            (NO,ATSTOP,ATPD,ATINTVL,ATWARN)
```

Figure 9. Show Timer Request Panel (W Line Command)

Each option is suffixed by a colon, which means the option value cannot be changed. Press the END key to redisplay the Active Timer Requests list.

Monitor Request

Selecting a request for a monitor, workload wait, or workload trace service with the W line command shows the options that were requested to activate data collection by that service. It is used to only view the options not to change them. Figure 9 is an example of a resource monitor request.

Image Log Request

The W line command for a monitor summary (DMON or DWARN) or analyzer service display shows the previously defined options for BBI-SS PAS Image logging with a colon (:) suffix (see “Start Image Log Request (I Line Command)” on page 53). It is used to only view the options not to change them.

Chapter 20. Monitor Display Commands

The monitor display commands are used to activate services that display monitor-collected data. These services are:

PLOT — Graphic plot display of data collected by a requested monitor

DMON — Status display of active monitors

DWARN — Activity summary and status display of monitor warnings

Monitor History Display (PLOT)

```
BMC SOFTWARE  -------------    MONITOR HISTORY      -----------PERFORMANCE MGMT
  SERV ==> PLOT   INPUT    14:41:46  INTVL=> 3  LOG=> N  TGT==> IMSA
  PARM ==> DBIO                 SCROLL=> N/A
  TOTAL         348       DB I/O COUNT BY SUBPOOL                 START  14:26:00
     15 SAMPLES      PERIOD  00:10:00   INTERVAL  00:01:00      ELAPSED  00:15:00
  AVG/INTVL--. ----+----I----+----I----+----I----+----I----+----- .--- AVG/SEC --
    TOTAL    . *********W*************                             .      .39
    PREV PD  .          W                                         .
    CURR PD  . *********W************************                  .      .57
  INTERVALS--. ----+----I----+----I----+----I----+----I----+----- .
   14:32:00  . *********W***************************               .      .60
   14:33:00  . *********W************************                  .      .57
   14:34:00  . *********W**********************                    .      .53
   14:35:00  . *********W********************                      .      .50
   14:36:00->. *********W***************************               .      .62
   14:37:00  . *******  W                                         .      .12
   14:38:00  .          W                                         .
   14:39:00  .          W                                         .
   14:40:00  .          W                                         .
   14:41:00  .          W                                         .
             . ----+----I----+----I----+----I----+----I----+----- .
             0        10        20        30        40        50 MAX AT 14:28:00
         MAX=====>40
```

Figure 10. PLOT Sample Display

Description: The PLOT service generates a graphic display of historical data collected by a monitor service. It can be requested with:

- An S line command for an active monitor from the active timer list application (Primary Option Menu 2)
- A PLOT command as shown in Figure 10

Color: If you have a color monitor:

Red	Indicates a warning status.
Turquoise	Indicates normal values for the current interval.
Yellow	Indicates maximum thresholds: values for the current period are greater than the values for the previous period. Indicates minimum thresholds: values for the current period are less than the values for the previous period.

Select Code: PLOT

Parameter: reqid

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

Area 1 - Monitor Statistics

```
TOTAL 348 DB I/O COUNT BY SUBPOOL START  14:26:00
  15 SAMPLES PERIOD  00:10:00 INTERVAL  00:01:00  ELAPSED  00:15:00
```

The field descriptions are arranged in alphabetical order.

ELAPSED The cumulative active time for the request. If the request is not currently active, this field contains the elapsed time at the point when the request became inactive.

INTERVAL The request sampling interval.

PERIOD The elapsed time for one period. It is equal to 10 times the interval value.

SAMPLES The number of data samples collected by this request.

START The request start time. The request may go inactive at start time if the IMS subsystem is not active and `QIS=YES` (the default) was specified when the service was requested.

TOTAL Displayed for count-type services only. This field shows the sum of all values collected by this request.

Area 2 - Averages Per Interval

```
AVG/INTVL--. ----+----I----+----I----+----I----+----I----+----- .--- AVG/SEC --
  TOTAL    . *********W*************    .      .39
  PREV PD  .    W                          .
  CURR PD  . *********W***********************                 .      .57
```

The field descriptions are arranged in alphabetical order.

CURR PD — The average sample value over the most recently completed period of 10 interval samples. At the end of the period, the PREV PD value is replaced with this average.

PREV PD — The average sample value for the preceding period of 10 interval samples.

TOTAL — The average sample value over the life of the service.

W — The warning threshold marker (a WVAL warning threshold must be defined with the SET request for the service). If the PLOTMAX value is less than the WVAL value, the W marker is not displayed.

Area 3 - Interval Sample Values

```
INTERVALS--. ----+----I----+----I----+----I----+----I----+----- .
 14:32:00  . *********W*************************                .      .60
 14:33:00  . *********W************************                  .      .57
 14:34:00  . *********W*********************                     .      .53
 14:35:00  . *********W*******************                       .      .50
 14:36:00->. *********W***************************                .      .62
 14:37:00  . *******  W                                           .      .12
 14:38:00  .          W                                           .
 14:39:00  .          W                                           .
 14:40:00  .          W                                           .
 14:41:00  .          W                                           .
           . ----+----I----+----I----+----I----+----I----+----- .
           0        10        20        30        40        50 MAX AT 14:28:00
```

Each line shows the time the sample was taken. The X-axis scale value to be plotted is automatically adjusted to the next highest multiple of 50. If PLOTMAX is specified, values exceeding this limit are expressed with an asterisk extending beyond the right side of the graph.

->	Designates that this interval sample value and all interval sample values above this line are included in the CURR PD, shown in the Area 2 sample display.
MAX AT or MIN AT	The time the maximum or minimum sample value was measured.

Area 4 - Monitor Measurements

```
For count services:      |   For average services:
                         |
        --- AVG/SEC ---  |   --- EVENTS ---
     57.21               |       13,817
     74.99               |        1,706
     42.62               |        1,520
                         |
     19.17               |          163
     15.78               |          181
     91.15               |          140
    109.57               |          132
     22.97               |          158
     29.08               |          119
     21.55               |          129
     30.32               |          132
     45.33               |          196
     75.97               |          165
```

This area is displayed for count-type or average-type services only.

For services that measure a count, the rates per second are shown for the displayed time intervals. These values are calculated by dividing the number of event occurrences by the elapsed time.

For services that measure an average, the event counts used to calculate the averages, such as the number of transactions for which response time was measured, are shown.

Area 5 - Range Limits and Distribution

```
RANGE:    0->1220  1221->2440  2441->3660  3661->4880  4881->6758 ---TOTAL---
DISTR:    2    7%     8   29%     7   25%     4   14%     7   25%    28  100%
```

This area is displayed only if the RANGES keyword is specified with the SET timer request for the service. Otherwise, only the maximum or minimum value ever measured is shown as MAX or MIN value.

The descriptions are arranged in alphabetical order.

DISTR: The number and relative percentage of sample values falling into each range.

RANGE: The user-defined range limits. Four upper-range limits can be defined with the RANGES keyword of the SET request. The first low range is set to zero. Each successive lower-range limit is equal to the preceding upper-range limit +1.

The fifth upper-range limit is the sample value that exceeded the maximum range limit specified by the RANGES keyword of the SET request. It is always the maximum observed sample value. If no sample value exceeds the maximum specified range limit, the maximum value encountered is displayed.

Active Monitor Summary Display (DMON)

```
BMC SOFTWARE  -------------    MONITOR SUMMARY      -----------PERFORMANCE MGMT
SERV ==> DMON            INPUT    14:42:30  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> 15             IM1714I CURRENT DISPLAY POSITION =   1.  SCROLL=> N/A
EXPAND:  LINESEL(PLOT)
--------------------------------- STATISTICS---------------------------------
STATUS  - ACTIVE        10:51:25 IMF-SS STARTED      EVENT COLLECTOR - ACTIVE
MONITOR STATUS:  26 ACTIVE     0 COMPLETE     0 QUIESCED    4 CURRENT WARNINGS
------------------------------MONITOR STATISTICS------------------------------
REQUEST                  --PARM-- CURRENT WVAL| -8-6-4-2-0+2+4+6+8+ |INTVL WARN
DB I/O COUNT BY SUBPOOL                 0    10|          W          | 1M
DB I/O COUNT BY SUBPOOL  1              0      |                     | 1M
DB I/O COUNT BY SUBPOOL  3              0      |                     | 1M
DB I/O COUNT BY SUBPOOL  2              0      |                     | 1M
OSAM HIT RATIO BY SP                    0   <80|          W          | 1M     5M
OSAM HIT RATIO BY SP     1              0   <90|          W          | 1M    15M
OSAM HIT RATIO BY SP     3              0   <80|          W          | 1M     5M
VSAM HIT RATIO BY SP                    0      |                     | 1M
OLDS BUFFER WAITS                       0     1|          W          | 1M
OLDS CHECK WRITES                       0     1|          W          | 1M
WADS I/O                                0     1|          W          | 1M
DEMAND PAGING BY REGION               315   500| >>>>>    W          | 1M
CSA % UTILIZATION                      56    80| >>>>>>   W          | 1M
ECSA % UTILIZATION                     61    60| >>>>>>>>>W          | 1M    12M
```

Figure 11. DMON Sample Display

Description: The DMON service displays the current status

DMON of all active monitors. It shows each request, the current sampling, the defined threshold, and a graphic summary of all the current measured values compared to defined thresholds.

It can be requested with a:

- DM
- DMON

command as shown in Figure 11.

There is a one-line display for each request. Each line shows the:

- Full request title (REQUEST)
- Request parameter (PARM)
- Latest measured value (CURRENT)
- Warning threshold (WVAL) (minimum thresholds are prefixed by <)
- Plot for the current sampling and a warning threshold (W marker) if the WVAL keyword was specified with the SET request
- Sampling interval (INTVL)
- Duration of the current warning condition (WARN)

A -100 to +100 warning threshold percentage can be plotted. The plot characters indicate a trend:

< Shows a downward trend from the preceding sampled values

> Shows an upward trend from the preceding sampled values

* Shows no change from the preceding sampled values

Previous period to current period (see the "Area 2" description in "Monitor History Display (PLOT)" on page 369) comparison determines the trend direction.

Color: If you have a color monitor:

Red	Indicates a warning status.
Turquoise	Indicates normal values for the current interval.
Yellow	Indicates maximum thresholds: values for the current period are greater than the values for the previous period. Indicates minimum thresholds: values for the current period are less than the values for the previous period.

Select Code: DMON

Parameter: Specifies the monitor requests to be displayed. The status of 15 requests are displayed. They can be selected by:

- Entering the relative request number (1 to 3 digits); the default is 1. DMON displays 15 monitor requests beginning with the selected request. Press ENTER to see the remaining currently defined monitor requests in groups of 15.
- Entering a valid reqid (see "Service Request ID (reqid)" on page 555). DMON displays 15 monitor requests beginning with the specified request. Press ENTER to see the remaining currently defined monitor requests in groups of 15.
- Entering a 0. DMON displays only the first 15 monitor requests. The parameter remains at 0 until either a relative number or reqid is entered.

Expand: The DMON display can be EXPANDed to the following display:

LINESEL(PLOT)
PLOT for a specific monitor can be selected by positioning the cursor in one of the request lines and pressing ENTER.

Active Monitor Warning Display (DWARN)

```
BMC SOFTWARE  -------------    WARNING SUMMARY      -----------PERFORMANCE MGMT
SERV ==> DWARN           INPUT    14:42:50  INTVL=> 3  LOG=> N  TGT==> IMSA
PARM ==> 1              IM1714I CURRENT DISPLAY POSITION =   1.  SCROLL=> N/A
EXPAND:  LINESEL(PLOT)
--------------------------------- STATISTICS---------------------------------
STATUS  - ACTIVE        10:51:25 IMF-SS STARTED       EVENT COLLECTOR - ACTIVE
MONITOR STATUS:  26 ACTIVE     0 COMPLETE     0 QUIESCED    4 CURRENT WARNINGS
--------------------------CURRENT WARNING CONDITIONS--------------------------
REQUEST                       --PARM-- CURRENT WVAL     0+2+4+6+8+ |INTVL WARN
DBHIT OSAM HIT RATIO BY SP                   0   <80     W          | 1M     5M
DBHIT OSAM HIT RATIO BY SP     1             0   <90     W          | 1M    15M
DBHIT OSAM HIT RATIO BY SP     3             0   <80     W          | 1M     5M
ECSAU ECSA % UTILIZATION                    61    60     W          | 1M    12M
------------------------------END REQUEST BLOCKS------------------------------
```

Figure 12. DWARN Sample Display

Description: The DWARN service displays only those active monitors currently in a warning condition. It shows each active warning request, the current sampling, the defined threshold, and a graphic summary of the measured values that exceeded defined thresholds.

It can be requested with a:

- DW
- DWARN

command as shown in Figure 12.

There is a one-line display for each request. Each line shows the:

- Full request title (REQUEST)
- Request parameter (PARM)
- Latest measured value (CURRENT)
- Warning threshold (WVAL) (minimum thresholds start with <)
- Plot for the current sampling and a warning threshold (W marker)
- Sampling interval (INTVL)
- Duration of the current warning condition (WARN)

A -100 to +100 warning threshold percentage can be plotted. The plot characters indicate a trend:

< Shows a downward trend from the preceding sampled values

> Shows an upward trend from the preceding sampled values

* Shows no change from the preceding sampled values

Previous period to current period (see the “Area 2” description in “Monitor History Display (PLOT)” on page 369) comparison determines the trend direction.

Color: If you have a color monitor:

Red	Indicates a warning status.
Turquoise	Indicates normal values for the current interval.
Yellow	Indicates maximum thresholds: values for the current period are greater than the values for the previous period. Indicates minimum thresholds: values for the current period are less than the values for the previous period.

Select Code: DWARN

Parameter: Specifies the warning monitor requests to be displayed. The status of 15 requests in a warning condition are displayed. They can be selected by:

- Entering the relative request number (1 to 3 digits); the default is 1. DWARN displays 15 warning monitor requests beginning with the selected request. Press ENTER to see the remaining currently defined warning monitor requests in groups of 15.
- Entering a valid reqid (see "Service Request ID (reqid)" on page 555). DWARN displays 15 warning monitor requests beginning with the specified request. Press ENTER to see the remaining currently defined warning monitor requests in groups of 15.
- Entering a 0. DWARN displays only the first 15 warning monitor requests. The parameter remains at 0 until either a relative number or reqid is entered.

Expand: The DWARN display can be EXPANDed to the following display:

LINESEL(PLOT)
PLOT for a specific monitor can be selected by positioning the cursor in one of the request lines and pressing ENTER.

Chapter 21. Displaying a List of Data Collection Monitors (SM Command)

This application is a scrollable list of all the data collection monitor services. To view a list of all data collection monitors:

1. Select Primary Option Menu 2, MONITORS, from the Primary Option Menu for a list of active monitor requests.
2. Enter SM in the COMMAND line. A scrollable list of all the data collection monitors that you are authorized to view is displayed as shown below.

```
 BMC SOFTWARE  -------------- DATA COLLECTION MONITORS -------- PERFORMANCE MGMT
 COMMAND ===>                                                  TGT ===> IMSxxx

COMMANDS: SORT,AREA
 LC CMDS: S(SET UP), D(DISPLAY ACTIVE), H(HELP)
 LC   SERV    # ACTIVE  TITLE                     PARM TYPE    SEC  AREA   STAT
      MWAIT             MONITOR WORKLOAD WAIT     (IDENTIFIER)  A   IWKLD
      MTRAC        1    WORKLOAD TRACE            (IDENTIFIER)  A   IWKLD
      DBTOT             DB CALLS/SCHED BY RGN     (IDENTIFIER)  A   REGN
      DBIO              DB I/O COUNT BY SUBPOOL   (POOLID)      A   DB
      DBSTL             DB BFR STEALS BY SUBPOOL  (POOLID)      A   DB
      DBHIT             OSAM HIT RATIO BY SP      (POOLID)      A   DB
      SBUSE             SB STORAGE BY REGION      (IDENTIFIER)  A   DB
      VDBIO             VSAM DB I/O BY SUBPOOL    (POOLID)      A   DB
      VDBWR             VSAM WRITES BY SUBPOOL    (POOLID)      A   DB
      VHIT              VSAM HIT RATIO BY SP      (POOLID)      A   DB
      HPACC             H/S ACCESS BY SUBPOOL     (POOLID)      A   DB
      HPHIT             H/S HIT RATIO BY SUBPOOL  (POOLID)      A   DB
      HPSTL             H/S BUFFER STEALS BY SP   (POOLID)      A   DB
      DSAP              DYN SAP % UTILIZATION                   A   INTNL
      WKAP              WKAP % UTILIZATION                      A   INTNL
      PSBW              PSB WORK POOL % UTIL                    A   INTNL
      DBWP              DB WORK POOL % UTIL                     A   INTNL
      PSBP              PSB POOL % UTILIZATION                  A   INTNL
      DMBP              DMB POOL % UTILIZATION                  A   INTNL
      EPCB              EPCB POOL % UTILIZATION                 A   INTNL
      OBUFW             OLDS BUFFER WAITS                       A   INTNL
      OCHKW             OLDS CHECK WRITES                       A   INTNL
      WADIO             WADS I/O                                A   INTNL
      PAGE              PAGING (REGION)           (IDENTIFIER)  A   IMVS
      DPAGE             DEMAND PAGING BY REGION   (IDENTIFIER)  A   IMVS
      CSAUT             CSA % UTILIZATION                       A   IMVS
      ECSAU             ECSA % UTILIZATION                      A   IMVS
      CSAFR             CSA FRAGMENTATION                       A   IMVS
      DLIO              DL/1 EXCP COUNT BY DDNAM  (IDENTIFIER)  A   IMVS
      SYSIO             EXCP COUNT BY DDNAME      (IDENTIFIER)  A   IMVS
```

Figure 13. List Data Collection Monitors Application

This application allows service selection by line command and shows how many monitors are already active, the allowable parameters for each service, the service security classification, the area of IMS being monitored, and the service status by:

Field Name	Description
LC	A line command input field. One-character line commands can be entered in this field. The line commands can be used to access a data entry panel to

define the options to activate a new SET timer request, display HELP information, or show a list of active timer requests for the selected monitor (see "Line Commands" on page 381). The Active Timer Requests list can be used with line commands to view, modify, or replicate the data collection options for a selected request, as described in Chapter 19, "Displaying a List of Active Timer Requests (Primary Menu Option 2)" on page 357.

SERV — A scrollable list of all the data collection monitor services by service select code.

ACTIVE — The number of timer requests already active for the service.

TITLE — The service title.

PARM TYPE — A short description of the parameters that can be used, if the service allows parameters.

SEC — The security code for user access to the service.

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

Field Data	Description
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, TEST, or blank).

SORT Primary Command

When the list of data collection monitor services is displayed initially, the list is sorted by resource area. 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).
AC — Sorts the list in a numerically descending order (# ACTIVE column).
TI — Sorts the list alphabetically by service title (TITLE column).
SC — Sorts the list alphabetically by the security code.

AR Sorts the list alphabetically by the resource area (AREA column) and by the service name within the area (default).
ST Sorts the list alphabetically by the service status displayed (STATUS column).

SORT without parameters sorts the list by resource 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 selections can be entered at one time by selecting a series of services and pressing the ENTER key. Each data-collection timer request in a series is submitted by pressing the ENTER key and then the END key to process the next request.

Line Command	Description
S	SETUP. Displays a data entry panel showing the valid request options to start timer-driven data collection (see "Start Data Collection Timer Request (S Line Command)" on page 382). Each timer-driven request must be unique and is defined by the service select code and an optional parameter.
D	DISPLAY. Displays only those timer-driven requests that are active for the selected monitor, as shown by "Active Timer Requests for a Selected Monitor (D Line Command)" on page 383.
H	HELP. Displays the HELP information for the service. This shows the service title, describes the measured value, defines any parameters, and shows the format of the monitor warning message.

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. A service can be locked by the use of the LOCK command or a service ABEND.

Start Data Collection Timer Request (S Line Command)

The S line command can be used to start a data collection timer request. There are three types of data collection timer services. These types are:

- Monitor Workload Wait service
- Workload Trace service
- Monitor services

By default, the Data Collection Monitors list is sorted by AREA (see "SORT Primary Command" on page 380).

The Workload Monitors have a unique, one-character prefix (@, #, $).

Each service type has its own set of request options. When S is used to start a monitor request, a data entry panel containing the request options is displayed. The service field is preset with the code of the selected service. The input fields are prefixed with a highlighted `===>` symbol. Any default values for a field are displayed.

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 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 Data Collection Monitors list.

The use of the data entry panel for each service type is described with the applicable service descriptions on:

Page	Data Entry Panel
301	Start Workload Analyzer Wait Request
460	Start IMS Trace Request
387	Start Resource Monitor Request
391	Start Workload Monitor Request
397	Start Workload Monitor Global Region Call Request

Active Timer Requests for a Selected Monitor (D Line Command)

This list application shows each active timer request for only the service selected from the Data Collection Monitors list with the D line command. Its use is described in Chapter 19, “Displaying a List of Active Timer Requests (Primary Menu Option 2)” on page 357.

```
BMC SOFTWARE  ------------- ACTIVE TIMER REQUESTS ---------- FUNCTION COMPLETE
  COMMAND ===>                                                TGT ===> IMSA
                                  INPUT    INTVL ==> 3      TIME --  07:46:04
  COMMANDS: SM (START MONITORS), SORT, AREA, X ON|OFF, DM (DMON), DW (DWARN)
  LC CMDS:  S (SELECT), W (SHOW),      M (MODIFY),
            P (PURGE),  R (REPLICATE), H (HELP),   Z (STOP),                 >>>
  LC   SERV  PARM     TITLE                 CURRENT  WVAL  -8-6-4-2-0+2+4+6+8+
       DBIO           DB I/O COUNT BY SUBPOOL     32   30|  *********W          |
       DBIO  1        DB I/O COUNT BY SUBPOOL      0   NZ|           W          |
       DBIO  3        DB I/O COUNT BY SUBPOOL     10   10|  *********W          |
       DBIO  2        DB I/O COUNT BY SUBPOOL      0   NZ|           W          |
       *************************** END OF REQUESTS ****************************
```

Figure 14. Selected Monitor Active Timer Requests List

Chapter 22. Requesting a Monitor

These services measure and collect data about IMS resource and workload performance over time and detect when conditions exceed a user-defined threshold. You activate a service by issuing a request for it.

You can issue requests to:

- Access the monitors easily through ISPF-like menus and scrollable lists
- View plot or graphic monitor summary displays that can be refreshed in a user-defined cycle
- Start or stop a monitor from a MAINVIEW AutoOPERATOR EXEC
- Start a series of monitors automatically when the system starts or at your request
- Print a screen image of a monitor plot or graphic summary display to the online BBI-SS PAS Image log automatically, or to the TS Image log, or your BBISPRNT data set

All Workload Monitor services, except the global region call monitors, measure data from the transaction records passed to the BBI-SS PAS from the Event Collector at transaction completion (SYNC point). These records contain an identification of the specific transaction, timestamps, elapsed timings, and activity indicators. The many identification fields allow flexible workload selections by transaction, program, PSB, region, program type, and transaction type.

Note: If the SAPEXIT is installed as described in the *MVIMS Customization Guide*, the SAP identifier replaces the IMS transaction code in the transaction records. This allows the monitors to collect data based on the SAP identifier instead of the transaction code.

The data collected by these monitors is affected by the following:

- Data items from the transaction records are posted only at transaction completion (sync point). All transactions completing within a requested monitor sampling interval are included in the value calculated for that interval. This means, for example, that a program currently in a loop does ***not*** show up immediately in an increased measured response time (the transaction does not complete; therefore, it cannot be posted).
- To provide valid averages per transaction, monitors collecting Fast Path activity collect data only from transactions that made at least one Fast Path call.
- For MVDBC to calculate meaningful values over time, only response-type transactions (those running under DBCTL threads) can be evaluated. This means that BMP and JBP transactions are not measured by these monitors, because they would skew the results.

  For example, the average elapsed time of 100 DBCTL transactions is measured at one second. If a BMP transaction that ran for two hours (7200 seconds) were included with the DBCTL transactions, the average elapsed time would be 72.3 seconds. The same is true of counts, such as DB2 calls. If DB2 calls were made by this BMP transaction, these calls would be posted only when the BMP transaction completes even though they occur throughout the two-hour life of the transaction.

To avoid this skewing problem and to provide measures of total system activity, other workload monitor services measure call activity as it occurs in the regions. These services, described in Chapter 32, “Global Region Call Monitors” on page 447, are global services because they can measure BMP, JBP, and DBCTL workloads and they do not require that a transaction complete before its effects can be seen. These methods are described in the following sections.

Starting a Monitor

A monitor can be started by:

- Selecting one or more services from a monitor service list
  - Access the Data Collection Monitors list with the SM application transfer command from the list of active timer requests (Primary Menu Option 2).
  - Use the S line command to select a service (see Chapter 21, “Displaying a List of Data Collection Monitors (SM Command)” on page 379).
- Replicating an active monitor request from the Active Timer list application (Primary Menu Option 2)

  You can replicate a monitor service request by using the R line command in the Active Timer list.
  - Access the Active Timer list application directly from the Primary Option Menu (Primary Menu Option 2) to view all active monitors.
  - Use the D line command from the Data Collection Monitors service list application (SM command) to access the Active Timer list for only the selected service.
- Starting a monitor 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 “Multiple Requests” on page 556).
- Starting a monitor service from a MAINVIEW AutoOPERATOR EXEC

  Write an EXEC that starts a monitor 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 SET REQ=DBTOT I=00:06:00 TARGET=PROD1
  ```

Using the Resource Monitor Data Entry Panel

Each Resource Monitor is a monitoring service that measures an IMS resource over time and issues warning messages whenever user-defined thresholds are exceeded. To display the data entry panel, shown in Figure 15, for requesting a resource monitor service

1. Enter an SM command as described in Chapter 21, “Displaying a List of Data Collection Monitors (SM Command)” on page 379.
2. Use an S line command to select any of the Resource Monitor services shown in the display list of monitor services.

```
BMC SOFTWARE  ---------- START RESOURCE MONITOR REQUEST -----  PERFORMANCE MGMT
COMMAND ===>                                                  TGT ===> IMSA

                      LKREQ - IRLM LOCK REQUESTS

 PARM     ==>                              (Resource Selection Parameter)

 INTERVAL ==> 00:01:00 START ==>           STOP ==>                QIS ==> YES

 WVAL     ==>          WMSG  ==>           WLIM ==> 10  WIF ==> 1   WIN ==> 1

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

 TITLE    ==>                              (Title)

 PLOTMAX  ==>                              (Maximum PLOT X-Axis Value)

 RANGES   ==>                              (1-4 Range Distr. Upper Limits)

 LOG      ==>                              (NO,ATSTOP,ATPD,ATINTVL,ATWARN)
```

Figure 15. Start Resource Monitor Request

These options are SET keywords for a monitor service request. These keywords are described in Table 8 on page 388 in alphabetical order.

Table 8. SET Keywords to Activate a Resource Monitor Service (Page 1 of 3)

Keyword	Operand	Description
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.
LOG		Specifies if and when automatic logging occurs. Analyzer, DMON or DWARN, or PLOT displays can be logged to the BBI-SS PAS Image log. For the monitors, a PLOT of the latest data is written to the BBI-SS PAS Image log.
	NO	Specifies no logging. Default for monitor services. `LOG=NO` is the only valid option for monitors that only measure a condition against a warning threshold (data measurement type of warning only).
	ATSTOP	Causes logs to display when processing of this request is stopped. If `QIS=Y` has been specified in the request, `LOG=ATSTOP` is invoked at IMS termination and at BBI-SS PAS termination.
	ATPD	Causes logs to display at each period of 10 intervals.
	ATINTVL	Causes logs to display at each interval as specified by the user with the INTERVAL parameter or in the BBIISP00 member of the BBPARM data set. Default for analyzers. ATINTVL is the default for logging images of the analyzer services to the BBI-SS PAS Image log.
	ATWARN	Causes a plot to be logged whenever a warning message is generated by the associated monitor. NO is the default for the monitor services.
PARM	id	If you want to run multiple requests, specify an ID in the PARM field to make this request unique. The id is a unique 1- to 8-character identifier). 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.
PLOTMAX	n	Specifies the maximum value for the X-axis of a PLOT graph. Minimum is 50. The specified value is adjusted to the nearest multiple of 50. Percentages displayed by some services are always set at 100.
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 8. SET Keywords to Activate a Resource Monitor Service (Page 2 of 3)

Keyword	Operand	Description
RANGES	n [,n,n,n]	Up to four upper-limit values can be specified for the distribution range of any data collection monitor service. An implied limit of the maximum data measurement value is always defined internally. This information is used to produce a frequency distribution of the data measurement value at the bottom of the plot display (see "Monitor History Display (PLOT)" on page 369). If RANGES is defined, the distribution is updated at each interval with the current measurement value. A plot of the history displays this distribution. Default is no ranges. **Note:** The MOD keyword cannot be used to change this option. The request must be purged and a new request must be made.
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 "Multiple Requests" on page 556). 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.
TITLE|T	'c...c'	Defines a service display title and the contents of a warning message (1 to 24 characters). This user-defined title replaces the default service title. If the title is specified with SET as a single request or in a BBPARM member as a series of requests, it must be enclosed in single quotation marks. **Note:** The MOD keyword cannot be used to change this option. The request must be purged and a new request must be made.

Table 8. SET Keywords to Activate a Resource Monitor Service (Page 3 of 3)

Keyword	Operand	Description
WIF	n	Defines the number of times the exception is to be detected before the first message is sent. Default is 1.
WIN	n	Defines the number of times the exception is to be detected between messages. Default is 1.
WLIM	n	Defines the maximum number of warning messages to be sent for one continuous occurrence of the warning condition. Resets automatically when condition no longer exists. Default is 10.
WMAX| WVAL	n|<n	Specifies a warning threshold. The warning condition exists if the current data measurement exceeds the defined threshold. If <n is specified, a warning is issued when the sampled value is less than or equal to the threshold.
	NZ	NZ (not zero) issues a warning when the measured value is greater than zero. Default is 0 or no warnings. **Note:** If the service measures time, the measurement units are specified in seconds and tenths of seconds (optional).
WMSG	WTO|LOG	Directs warning messages to the system console(WTO). Warning messages are always written to the active BBI-SS PAS Journal log. Default is to write only to the log. An existing WTO warning message can be reset to the Journal log by using the LOG operand on a modify request. Routing and descriptor codes can be specified for WTO messages in the BBIISP00 member of the BBPARM data set.

Using the Workload Monitor Data Entry Panel

Each Workload Monitor (WM) is a monitoring service that measures a key IMS workload indicator over time and issues warning messages whenever user-defined thresholds are exceeded. To display the data entry panel, shown in Figure 16, for requesting a workload monitor service:

1. Enter an SM command as described in Chapter 21, “Displaying a List of Data Collection Monitors (SM Command)” on page 379.
2. Use an S line command to select any of the services shown in the display list of monitor services that start with a # or @ character. An S line command for a WM service displays the request data entry panel shown in Figure 16.

```
BMC SOFTWARE ----------- START WORKLOAD MONITOR REQUEST -----  PERFORMANCE MGMT
COMMAND ===>                                                  TGT ===> IMST

                       @ELAP - AVG ELAPSED TIME

PARM     ==>                                (Workload Monitor Identifier)
INTERVAL ==> 00:01:00 START ==>             STOP ==>                 QIS ==> YES
WVAL     ==>          WMSG  ==>             WLIM ==> 10  WIF ==> 1   WIN ==> 1
TITLE    ==>                                (Title)
RST      ==> HOT                            (Restart Option: HOT,COLD,PUR,QIS)
PLOTMAX  ==>                                (Maximum PLOT X-Axis Value)
RANGES   ==>                                (1-4 Range Distr. Upper Limits)
LOG      ==>                                (NO,ATSTOP,ATPD,ATINTVL,ATWARN)
Specify Workload Selections:
   TRANTYPE ==>                             (ALL, DLI, DB2, FP)
   TRAN     ==>
   CLASS    ==>
   PROG     ==>
   PSB      ==>
   REGION   ==>
   RGNID    ==>
   TERM     ==>                             (name, SYNCLOCK, MSCCLOCK)
   USERID   ==>
   PGMTYPE  ==>                             (MPP,MDP,IFP,FPU,TPI,BMP,DBT,NOTDBT)
```

Figure 16. Start Workload Monitor Request

These options are SET keywords for a monitor service request. These keywords are described in Table 9 on page 392 in alphabetical order.

Table 9. SET Keywords to Activate a Workload Monitor Service (Page 1 of 5)

Keyword	Operand	Description
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.
LOG		Specifies if and when automatic logging occurs. Analyzer, DMON or DWARN, or PLOT displays can be logged to the BBI-SS PAS Image log. For the monitors, a PLOT of the latest data is written to the BBI-SS PAS Image log.
	NO	No logging. Default for monitor services. **Note:** `LOG=NO` is the only valid option for monitors that only measure a condition against a warning threshold (data measurement type of warning only).
	ATSTOP	Logs display when processing of this request is stopped. If `QIS=Y` has been specified in the request, `LOG=ATSTOP` is invoked at IMS termination and at BBI-SS PAS termination.
	ATPD	Logs display at each period of 10 intervals.
	ATINTVL	Logs display at each interval as specified by the user with the INTERVAL parameter or in the BBIISP00 member of the BBPARM data set. Default for analyzers. ATINTVL is the default for logging images of the analyzer services to the BBI-SS PAS Image log
	ATWARN	Logs a plot whenever a warning message is generated by the associated monitor. NO is the default for the monitor services.
PARM	`id`	The variable `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.
PLOTMAX	n	Specifies the maximum value for the X-axis of a PLOT graph. Minimum is 50. The specified value is adjusted to the nearest multiple of 50. Percentages displayed by some services are always set at 100.

Table 9. SET Keywords to Activate a Workload Monitor Service (Page 2 of 5)

Keyword	Operand	Description
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.
RANGES	n [,n,n,n]	Up to four upper-limit values can be specified for the distribution range of any data collection monitor service. An implied limit of the maximum data measurement value is always defined internally. This information is used to produce a frequency distribution of the data measurement value at the bottom of the plot display (see "Monitor History Display (PLOT)" on page 369). If RANGES is defined, the distribution is updated at each interval with the current measurement value. A plot of the history displays this distribution. Default is no ranges. **Note:** The MOD keyword cannot be used to change this option. The request must be purged and a new request must be made.
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 "Multiple Requests" on page 556). 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.

Table 9. SET Keywords to Activate a Workload Monitor Service (Page 3 of 5)

Keyword	Operand	Description
TITLE|T	'c...c'	Defines a service display title and the contents of a warning message (1 to 24 characters). This user-defined title replaces the default service title. If the title is specified with SET as a single request or in a BBPARM member as a series of requests, it must be enclosed in single quotes. **Note:** The MOD keyword cannot be used to change this option. The request must be purged and a new request must be made.
WIF	n	Defines the number of times the exception is to be detected before the first message is sent. Default is 1.
WIN	n	Defines the number of times the exception is to be detected between messages. Default is 1.
WLIM	n	Defines the maximum number of warning messages to be sent for one continuous occurrence of the warning condition. Resets automatically when condition no longer exists. Default is 10.
WMAX| WVAL	n | <n	Specifies a warning threshold. The warning condition exists if the current data measurement exceeds the defined threshold. If <n is specified, a warning is issued when the sampled value is less than or equal to the threshold.
	NZ	NZ (not zero) issues a warning when the measured value is greater than zero. Default is 0 or no warnings. **Note:** If the service measures time, the measurement units are specified in seconds and tenths of seconds (optional).
WMSG	WTO|LOG	Directs warning messages to the system console (WTO). Warning messages are always written to the active BBI-SS PAS Journal log. Default is to write only to the log. An existing WTO warning message can be reset to the Journal log by using the LOG operand on a modify request. Routing and descriptor codes can be specified for WTO messages in the BBIISP00 member of the BBPARM data set.

Table 9. SET Keywords to Activate a Workload Monitor Service (Page 4 of 5)

Keyword	Operand	Description
Note: The following workload selection keywords act as filters to limit data collection to a specific part of the IMS workload		
CLASS	class	Qualifies a monitor 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.
PGMTYPE| PTYP	BMP DBT|NOTDBT FPU	Qualifies a monitor request by program type. Multiple program types can be specified. The types are: BMP Batch message processing program or Java batch message processing program DBT DBCTL thread (CICS or ODBA) FPU Fast Path utility Default is all types. DBT selects only programs that use a DBTCL thread. NOTDBT selects programs that do not use a DBTCL thread. **Note:** Program types MPP, JMP, MDP, IFP, and TPI are not valid for DBCTL.
PROG	program name	Qualifies a monitor 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 a monitor 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	Qualifies a monitor 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`
RGNID	region number	Qualifies a monitor 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 9. SET Keywords to Activate a Workload Monitor Service (Page 5 of 5)

Keyword	Operand	Description
TERM	lterm	For DBCTL threads, qualifies a monitor request by the 4-character ID of the CICS terminal. 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+` **Note:** The MSCCLOCK and SYNCLOCK operands are not applicable to DBCTL.
TRAN	trancode	Qualifies a monitor 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 a monitor request by transaction type: ALL All transaction types DB2 Those that access DB2 (not applicable for DBCTL) DLI Those that make DL/I database calls FP Those that make Fast Path database calls
USERID	userid	Qualifies a monitor request by the name of the CICS sign-on user ID. Valid entries are 1- to 8-character alphanumeric CICS sign-on user IDs, which can be used with the plus qualifier (+). Multiple user IDs can be specified; for example: `USERID ==> USER1 USER2 USER6`

Using the Workload Global Region Call Monitor Data Entry Panel

Each Workload Global Region Call Monitor is a monitoring service that measures region, database, and message queue calls over time and issues warning messages whenever user-defined thresholds are exceeded. To display the data entry panel, shown in Figure 17, for requesting a workload global region call monitor service:

1. Enter an SM command as described in Chapter 21, “Displaying a List of Data Collection Monitors (SM Command)” on page 379.
2. Use an S line command to select any of the services shown in the display list of monitor services that start with a $ character. An S line command for a global region call monitor service displays the request data entry panel shown in Figure 17.

```
BMC SOFTWARE  ---------- START WM GLOBAL MONITOR REQUEST ----- PERFORMANCE MGMT
COMMAND ===>                                                   TGT ===> IMSA

                      $CTOT - ALL REGION CALLS

 PARM     ==>                              (Workload Monitor Identifier)

 INTERVAL ==> 00:01:00 START ==>           STOP ==>                 QIS ==> YES

 WVAL     ==>          WMSG  ==>           WLIM ==> 10  WIF ==> 1   WIN ==> 1

 TITLE    ==>                              (Title)

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

 PLOTMAX  ==>                              (Maximum PLOT X-Axis Value)

 RANGES   ==>                              (1-4 Range Distr. Upper Limits)

 LOG      ==>                              (NO,ATSTOP,ATPD,ATINTVL,ATWARN)

 Specify Workload Selections:
   CALLTYPE ==>                            (ALL, MSG, DB2, DLI)
```

Figure 17. Start Workload Global Region Call Monitor Request

These services use the same options as the workload monitor services except for the workload selection criteria. The CALLTYPE option allows workload selection by type of calls for the region call monitor services as described in Table 10 on page 397.

Table 10. SET Keyword to Define Workload Selection for Global Region Call Monitors

Keyword	Operand	Description
CALLTYPE| CTYP	ALL DLI	Specifies the type of calls to be collected by $CBMP, $CTOT, and $CDBT. You can specify the following: ALL All calls DLI DL/I calls

Displaying Monitor Data

A display of the data collected by monitors can be requested by:

- Selecting a scrollable list of active monitors and their current values:
  - Access the Active Timer Request list application directly from the Primary Option Menu (Primary Menu Option 2) to view all active monitors.
  - Use the D line command from the Data Collection Monitors service list application (SM command) to access the Active Timer list for only the selected service.
  - Selecting an active monitor summary display (DMON)
  - Use the DM application transfer command.
  - Invoke the DMON service from the SERV field of any display with a SET request.
  - Selecting an active monitor warning display (DWARN)
  - Use the DW application transfer command.
  - Invoke the DWARN service from the SERV field of any display with a SET request.
  - Selecting a graphic plot of the historical data collected by one monitor
  - Use the S line command in the Active Timer list (Primary Menu Option 2) to select a plot of the data collected by that active monitor.
  - Move the cursor to one of the monitor requests in a DMON or DWARN display and press ENTER to view a plot of data collected by that monitor as described in "Active Monitor Summary Display (DMON)" on page 375 and "Active Monitor Warning Display (DWARN)" on page 377.
  - Invoke the PLOT service from the SERV field of any display with a SET request.
- Setting up monitor graphic displays for timed, cyclic refresh

  Select Option C, CYCLE SETUP, from the Primary Option Menu to set up a continuous timed cycle of refreshable monitor plot (PLOT, with a service name parameter) or graphic summary displays (DMON or DWARN). For more information about this option, see the *Using MAINVIEW* manual.

Logging Monitor Data

An image of a monitor plot or graphic summary display (DMON or DWARN) can be recorded in the BBI-SS PAS Image log automatically, to your TS Image log, or to a BBISPRNT data set at your request by:

- Logging an image to the BBI-SS Image log
  - Specify the LOG option when starting the monitor or modifying it.
  - Write an EXEC that defines a SET log request for a monitor plot or graphic summary display (DMON or DWARN) (MAINVIEW AutoOPERATOR must be installed).

Use the IMFEXEC IMFC command followed by the service name, an optional parameter, and an identifier for the target system as in the following examples:

```
IMFEXEC IMFC SET REQ=PIENQ WMAX=80,LOG=ATWARN TARGET=TEST1
```

```
IMFEXEC IMFC DMON PIENQ I=00:05:00 TARGET=TEST1
```

  - Define a SET log request for a graphic summary display (DMON or DWARN) 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 “Grouping Requests” on page 46).

    BBSAMP member ILOGJCL can be used to create a hardcopy of your Image log data sets.

- Logging a display image record to the TS Image log

  Enter a Y in the LOG field of the plot or graphic summary display (DMON or DWARN) to record the image in your TS Image log.

- Logging a screen image to your BBISPRNT data set

  Press the PF4/16 key to record a plot or graphic summary display image in your BBISPRNT data set.

  BBSAMP member SLOGJCL can be used to create a hardcopy of your BBISPRNT data set.

Stopping a Monitor

A monitor service or Image log request can be stopped by:

- Stopping the monitor request with a Z line command

  Use the Z line command from the Active Timer list application as described in Chapter 19, “Displaying a List of Active Timer Requests (Primary Menu Option 2)” on page 357.

- Setting a stop time for automatic completion of data collection

  Specify the STOP value (as a timestamp or interval count) on the Start or Modify panel for the monitor. The collected data remains available for viewing until the monitor is purged.

- Purging a request from the Active Timer list with a P line command

  Use the P line command from the Active Timer list application as described in Chapter 19, “Displaying a List of Active Timer Requests (Primary Menu Option 2)” on page 357.

- Purging a service request with a SET request

  Issue a PRG request with SET from the SERV field of any display, a BBPARM member (see “Grouping Requests” on page 46), or a MAINVIEW AutoOPERATOR EXEC (MAINVIEW AutoOPERATOR must be installed); for example:

  ```
  SERV ==> SET
  PARM ==> PRG=reqid|ALL
  ```

- Stopping a service with a SET request

  Enter a STOP time in the data entry panel for the monitor request or use a SET request in the SERV field of any display as follows:

  ```
  SERV ==> SET
  PARM ==>
  REQ=DBTOT,START=00:11:00,STOP=00:12:00,LOG=ATSTOP,I=00:01:00
  ```

  The request starts at 11 minutes after midnight and stops 12 minutes after midnight; the plot display is logged to the SS Image log when the request stops. STOP or STOPCNT (see Table 20 on page 559) can be used with a SET request.

Qualifying Monitor Requests

Requests for multiple resources with similar names can be made by using a + character as a name qualifier. 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.

If you receive a message that contains the following in the BBI-SS PAS journal:

```
IM4704E ... INVALID PARM - R/C 04
```

the qualified resource could not be found.

Resource Monitors

A qualifier can be used when making Resource Monitor service requests with the following resource parameters:

Resource Parameter	Resource Monitor Service
Region names	PIENQ

For example, if you enter the following in the data entry panel for the PIENQ service:

```
PARM ==> ABC+
```

the PI enqueues held by a group of regions with names starting with ABC are sampled.

Entering the following data collection request in the SERV field and a qualified resource name in the PARM field of the Service Display panel:

```
SET
REQ=PIENQ A++D
```

monitors PI enqueues held by regions starting with an A character, followed by any two characters, and ending with a D.

Workload Monitors

Qualifiers can be used with Workload Monitor service requests. For example, if you enter the following in the data entry panel for the @ELAP service:

```
TRAN ==> PAY+
```

only transactions with names that start with PAY are sampled.

Entering the following data collection request in the SERV field and a qualified resource name in the PARM field of the Service Display panel:

```
SET
REQ=@ELAP A+++++C
```

monitors IMS elapsed time of all transaction codes starting with an A character, followed by any five characters, and ending with a C.

Chapter 23. Resource Monitor Services (Quick Reference)

This section provides an alphabetical list of all the Resource Monitor services and their parameters, with page references to a more detailed description about their use.
See Chapter 21, “Displaying a List of Data Collection Monitors (SM Command)” on page 379 for a complete description of the Data Collection Monitors list application.

Table 11. Resource Monitor Service Select Codes (Page 1 of 3)

Service Select Code	Parameter	See
CSAFR		“CSAFR - CSA Fragmentation” on page 429
CSAUT		“CSAUT - CSA Percentage of Utilization” on page 429
D2CON	[subsysid]	“D2CON - IMS Region Connection to DB2 Subsystem” on page 407
D2SON	[subsysid]	“D2SON - DB2 Sign On by Subsystem” on page 407
D2THD	[subsysid]	“D2THD - Active IMS Region Threads to DB2 Subsystem” on page 408
DBHIT	[subpool number]	“DBHIT - Hit Ratio for OSAM Buffer Pool” on page 412
DBIO	[n]	“DBIO - Database I/O Count by Subpool” on page 411
DBSTL	[n]	“DBSTL - Database Buffer Steals by Subpool” on page 413
DBTOT	{jobname}	“DBTOT - Database Calls per Scheduling by Region” on page 408
DBWP		“DBWP - Database Work Area Pool Percentage of Utilization” on page 419
DLIDB	[NOTBMP| jobname]	“DLIDB - DL/I DB Call Time” on page 409
DLIO	[ddname]	“DLIO - DL/I EXCP Count by ddname” on page 430
DMBP		“DMBP - DMB Pool Percentage of Utilization” on page 419
DPAGE	[jobname]	“DPAGE - Demand Paging by Region” on page 430
DSAP		“DSAP - Dynamic SAP Percentage of Utilization” on page 420
ECSAU		“ECSAU - Extended CSA Percent Utilization” on page 431
EPCB		“EPCB - EPCB Pool Percentage of Utilization” on page 420

Table 11. Resource Monitor Service Select Codes (Page 2 of 3)

Service Select Code	Parameter	See
HPACC	[subpool number]	“HPACC - Hiperspace Access by Subpool” on page 413
HPHIT	[subpool number]	“HPHIT - Hiperspace Hit Ratio by Subpool” on page 414
HPSTL	[subpool number]	“HPSTL - Hiperspace Buffer Steals by Subpool” on page 415
LAWT	[type]	“LAWT - Average Latch Wait Time” on page 421
LDLCK		“LDLCK - Number of Deadlocks” on page 433
LHELD	[IMS online region number]	“LHELD - Number of Locks Held” on page 433
LKMAX	[MPP|BMP| IFP|DBT]	“LKMAX - Maximum Locks Held by Region” on page 434
LKREQ	[GLOBAL]	“LKREQ - Number of Lock Requests” on page 434
LMAWT		“LMAWT - Maximum Average Latch Wait Time” on page 422
LSUSP		“LSUSP - Number of Suspensions” on page 435
LWAIT	[MPP|BMP| IFP|DBT]	“LWAIT - Region in IRLM Suspend” on page 435
LWNUM	[GBL| GBL`ssss`| `ssss`]	“LWNUM - Number of Suspended IRLM Requests” on page 436
OBUFW		“OBUFW - OLDS Buffer Waits” on page 422
OCHKW		“OCHKW - OLDS Check Writes” on page 423
PAGE	[jobname]	“PAGE - Paging (Region)” on page 431
PIENQ	[jobname]	“PIENQ - Program Isolation Enqueues by Region” on page 423
PIMAX	[MPP|BMP| IFP|DBT]	“PIMAX - Maximum Program Isolation Enqueues by Region” on page 424
PIPL		“PIPL - Program Isolation Pool Percentage of Utilization” on page 424

Table 11. Resource Monitor Service Select Codes (Page 3 of 3)

Service Select Code	Parameter	See
POOLA	[id|CSA| ECSA]	“POOLA - Pool Allocated Storage” on page 425
POOLN	[id]	“POOLN - Net Expansion Count” on page 426
POOLT	[id]	“POOLT - Total Expansion/Compression Count” on page 427
PSBP		“PSBP - PSB Pool Percentage of Utilization” on page 427
PSBW		“PSBW - PSB Work Area Pool Percentage of Utilization” on page 428
PTBLK	[GLOBAL]	“PTBLK - Number of PTB Locks” on page 436
SBUSE	[region name or blank]	“SBUSE - Sequential Buffering Storage by Region” on page 415
SYSIO	[ddname]	“SYSIO - EXCP Count by ddname” on page 432
VDBIO	[n]	“VDBIO - VSAM Database I/O by Subpool” on page 416
VDBWR	[n]	“VDBWR - VSAM Writes by Subpool” on page 416
VHIT	[subpool number]	“VHIT - VSAM Hit Ratio by Subpool” on page 417
VSEND		“VSEND - Number of VTAM Sends” on page 437
WADIO		“WADIO - WADS I/O” on page 428
WAIT		“WAIT - Region in a Long PI Wait” on page 409
WKAP		“WKAP - General Work Area Pool Percentage of Utilization” on page 428

Chapter 24. IMS Dependent Region Services

These services measure database and message queue access by programs executing in the dependent regions. For example, to activate the WAIT service to track regions in a long program isolation (PI) wait and issue a warning message if any region is waiting longer than 30 seconds, select the WAIT monitor from the monitor list (SM command) and specify:

```
WMSG ==> MTO
WVAL ==> 30
```

D2CON - IMS Region Connection to DB2 Subsystem

Select Code: D2CON

Parameter: One- to four-character DB2 subsystem name. If no parameter is entered, all IMS regions connected to a DB2 subsystem are measured.

Measurement: Number of dependent regions connected to DB2

Data Type: STATUS

Default Title: DB2 CONNECTIONS

Warning: `RM0690W (nn) hh:mm:ss title(parm) = v (>thrshld) *****`

D2SON - DB2 Sign On by Subsystem

Select Code: D2SON

Parameter: One- to four-character DB2 subsystem name. If no parameter is entered, all signed-on regions are counted.

Measurement: Number of dependent regions that have issued at least one SQL call and have signed on to DB2

Data Type: STATUS

Default Title: DB2 SIGNON

Warning: `RM1000W DB2 SIGNED-ON REGIONS(TOTAL) = v (>thrshld) *****`

D2THD - Active IMS Region Threads to DB2 Subsystem

Select Code:	D2THD
Parameter:	One- to four-character DB2 subsystem name. If no parameter is entered, all IMS regions that have active threads to a DB2 subsystem are measured.
Measurement:	Number of dependent regions with active threads to DB2
Data Type:	STATUS
Default Title:	DB2 ACTIVE THREADS
Warning:	`RM0700W (nn) hh:mm:ss title(parm) = v (>thrshld) *****`

DBTOT - Database Calls per Scheduling by Region

Select Code:	DBTOT
Parameter:	Region (job) name. (This parameter is required.)
Measurement:	Total DL/I database calls (Fast Path calls not included) performed in specified region since last scheduling (measured at time of sample) is compared to the warning threshold
Data Type:	Warning Only (threshold must be specified)
Default Title:	DB CALLS/SCHED BY RGN
Warning:	`RM0270W (nn) hh:mm:ss title(regname) = v PSB=psbname (>thrshld) *****`

DLIDB - DL/I DB Call Time

Select Code: DLIDB

Parameter: NOTBMP or region (job) name

If no parameter is entered, all regions are monitored.

Enter NOTBMP to exclude BMPs or JBPs from consideration by the monitor.

Enter a job name to include only that job name for consideration by the monitor.

Measurement: Number of seconds that the database DL/I call has lasted.

Data Type: STATUS

Default Title: DL/I DB CALL TIME

Warning:

```
RM1020W (nn) hh:mm:ss title(parm) = value (>thrshld)
*****
RM1021W (nn) hh:mm:ss title(parm) NO LONGER > value
*****
```

WAIT - Region in a Long PI Wait

Select Code: WAIT

Parameter: None

Measurement: A warning is written when any region is detected in a long PI wait (exceeding the threshold value, defined in seconds)

Data Type: Warning Only (threshold must be specified)

Default Title: REGION IN A LONG PI WAIT

Warning:

```
RM0600W (nn) hh:mm:ss title(TOTAL) = v RGN=regname
(>thrshld) *****
```

Note: This service can show only one region exception at a time. When the warning condition in one region is cleared, the service continues to check other regions until another exception condition is found and displayed.

Chapter 26. IMS Internals Services

These services measure IMS internal activity for program isolation, pools, logging, latching, and pool allocation. For example, to activate the PSBP service to track the usage of the PSB pool and log a plot of the collected data to the BBI-SS PAS Image log at the end of ten 30-second intervals or every five minutes and issue a warning message if the percentage of the pool usage exceeds 70, select the PSBP monitor from the monitor list (SM command) and specify:

```
INTERVAL ==> 00:00:30
WVAL     ==> 70
LOG      ==> ATPD
```

DBWP - Database Work Area Pool Percentage of Utilization

Select Code: DBWP

Parameter: None

Measurement: DB work area pool percent utilization

`= bytes allocated * 100 / total pool size in bytes`

Data Type: PERCENT

Default Title: DB WORK POOL % UTIL

Warning: `RM0380W (nn) hh:mm:ss title(TOTAL) = v (>thrshld) *****`

DMBP - DMB Pool Percentage of Utilization

Select Code: DMBP

Parameter: None

Measurement: DMB pool percent utilization

`= bytes allocated * 100 / total pool size in bytes`

Data Type: PERCENT

Default Title: DMB POOL % UTILIZATION

Warning: `RM0400W (nn) hh:mm:ss title(TOTAL) = v (>thrshld) *****`

DSAP - Dynamic SAP Percentage of Utilization

Select Code: DSAP

Parameter: None

Measurement: Dynamic Save Area pool percent utilization

```
= number of SAPs assigned * 100 / number of total
dynamic SAPs
```

Data Type: PERCENT

Default Title: DYN SAP % UTILIZATION

Warning: `RM0330W (nn) hh:mm:ss title(TOTAL) = v (>thrshld) *****`

EPCB - EPCB Pool Percentage of Utilization

Select Code: EPCB

Measurement: EPCB (Extended PCB) pool percent utilization

```
= size of EPCB * 100 / total size of EPCB
```

If Fast Path is not installed in IMS, the percent returned is zero.

Data Type: PERCENT

Default Title: EPCB POOL % UTILIZATION

Warning: `RM0430W (nn) hh:mm:ss title(TOTAL) = v (>thrshld) *****`

LAWT - Average Latch Wait Time

Select Code: LAWT

Parameter: Type

where type can be any of the following latch types for the Common Latch Manager or blank:

ACTL (STATISTICS)
APSB (ALLOC PSB)
BLKM (SMB HASH)
CBTS (CBTS POOL)
CCTL (CCTL for DBCTL latch)
CONV (CONV CHKPT)
DBAU (DBRC AUTH)
DBBP (OSAM BUFP)
DBLK (DEP REGION)
DBLR (BLK LOADER)
DBSL (DB CHKPT)
DCSL (DC CHKPT)
DDRB (DDIR BLK)
DDRP (DDIR POOL)
DISP (DISPATCHER)
DMBB (DMB BLK)
DMBP (DMB POOL)
LOGL (LOG)
PDRB (PDIR BLK)
PDRP (PDIR POOL)
PSBB (PSB BLK)
PSBP (PSB POOL)
SCHD (SCHEDULE)
SMGT (STORAGE MGR)
SUBQ (SCHED SUBQ)
TCTB (TCT BLOCK)
TERM (TERMINAL)
USER (USER)
VLQB (CBTS LQB)
VTCB (CBTS VTCB)
XCNQ (PI ENQ,DEQ)

If no parameter is entered, the average wait time of all latch types is measured.

Measurement: The average WAIT FOR LATCH time for the specified latch type in microseconds within the interval or since the last IMS checkpoint if a checkpoint occurs within the interval.

Data type: AVERAGE

Default Title: AVERAGE LATCH WAIT TIME

Warning:
```
RM0970W (nn) hh:mm:ss title(parm) = v IN x intrvl
(>thrshld) *****
```

LMAWT - Maximum Average Latch Wait Time

Select Code: LMAWT

Parameter: None

Measurement: The latch type with the maximum average wait time is measured

If more than one latch type exceeds the threshold, only the one with the largest average wait time is measured.

Data Type: Warning Only (threshold must be specified)

Measurement unit is microseconds.

Default Title: MAX LATCH WAIT TIME

Warning:

```
RM0980W (nn) hh:mm:ss title(parm) = v LATCH=yyyy
(>thrshld) *****
```

where yyyy is the latch type.

OBUFW - OLDS Buffer Waits

Select Code: OBUFW

Parameter: None

Measurement: The number of times within the interval that the IMS logical logger had to wait for a buffer to be written to the OLDS

Data Type: COUNT

Default Title: OLDS BUFFER WAITS

Warning:

```
RM0910W (nn) hh:mm:ss title(TOTAL) = v IN x intrvl
(>thrshld) *****
```

OCHKW - OLDS Check Writes

Select Code: OCHKW

Parameter: None

Measurement: The number of Check Write requests to the IMS logical logger within the interval

Check Write requests are used mainly for log write ahead for database updates. When IMS encounters a Check Write request, it forces a physical write to the WADS/OLDS if one has not already been done and suspends the requestor.

Data Type: COUNT

Default Title: OLDS CHECK WRITES

Warning:

```
RM0920W (nn) hh:mm:ss title(TOTAL) = v IN x intrvl
(>thrshld) *****
```

PIENQ - Program Isolation Enqueues by Region

Select Code: PIENQ

Parameter: Region (job) name

If no parameter is entered, the total number of PI enqueues held by all dependent regions is measured.

Enter region name to measure number of PI enqueues held by one region.

Enter qualified name to measure number of PI enqueues held by a group of regions. If you receive a message that contains the following in the BBI-SS PAS journal:

```
IM4704E ... INVALID PARM - R/C 04
```

the qualified resource could not be found.

Measurement: Number of outstanding program isolation enqueues at time of sample: total, by region, or region group

Data Type: STATUS

Default Title: PI ENQUEUES BY RGN

Warning:

```
RM0630W (nn) hh:mm:ss title(parm) = v (>thrshld) *****
```

PIMAX - Maximum Program Isolation Enqueues by Region

Select Code: PIMAX

Parameter: BMP or DBT

If no parameter is entered, all regions are monitored.
Enter:

BMP To monitor only batch message processing (BMP) and Java batch message processing (JBP) regions.

DBT To monitor only DBCTL threads (CICS and ODBA).

Measurement: The region with the most PI enqueues exceeding the threshold is returned

If more than one region exceeds the threshold, only the one with the most enqueues is returned.

Data Type: Warning Only (threshold must be specified)

Default Title: MAX PI ENQS BY REGION

Warning:

```
RM0710W (nn) hh:mm:ss title(parm) = v xxxxxxxx yyy
(>thrshld) *****
```

where:

xxxxxxxx Is the name of the region that holds the most enqueues

yyy Is the corresponding region number

Note: This service can show only one region exception at a time. When the warning condition clears in a region, the service continues to check other regions until it finds another exception condition.

PIPL - Program Isolation Pool Percentage of Utilization

Select Code: PIPL

Parameter: None

Measurement: Program isolation pool percent utilization, based on its maximum allowable size

```
= number of bytes allocated * 100     / total number of
bytes that can be assigned
```

Data Type: PERCENT

Default Title: PI POOL % UTILIZATION

Warning:

```
RM0640W (nn) hh:mm:ss title(TOTAL) = v (>thrshld) *****
```

POOLA - Pool Allocated Storage

Select Code: POOLA

Parameter: id|CSA|ECSA

where id can be any of the following non-CBT pool IDs:

CESS
DBWP
DLDP
DLMP
DPSB
EPCB
FPWP
PSBW

CSA Measures the allocated storage in CSA for all pools.

ECSA Measures the allocated storage in ECSA for all pools.

If no parameter is specified, the allocated storage for all pools is measured.

Measurement: The allocated storage in bytes

Data Type: STATUS

Default Title: ALLOCATED POOL STORAGE

Warning: `RM0940W (nn) hh:mm:ss title(parm) = v (>thrshld) *****`

POOLN - Net Expansion Count

Select Code: POOLN

Parameter: id

where id can be any of the following non-CBT fixed pool IDs:

CESS
FPWP

If no parameter is specified, the net expansion for all pools is measured.

Measurement: The difference between total expansions and total compressions of all blocks

Tuning Tip

A high number indicates the :ih1.tuning tip :i2.POOLN primary/secondary allocations are too small. Use the POOLS/DPOOL display services to determine which buffer sizes have the problem.

Data type: STATUS

Default Title: POOL NET EXPANSIONS

Warning: `RM0950W (nn) hh:mm:ss title(parm) = v (>thrshld) *****`

POOLT - Total Expansion/Compression Count

Select Code: POOLT

Parameter: id

where id can be can be any of the following non-CBT fixed pool IDs:

CESS
FPWP

If no parameter is specified, the total number of expansions and compressions of blocks for all pools is measured.

Measurement: Total number of expansions and compressions within the interval. The interval needs to be a large value (for example, 01:00:00 for one hour) for the measurement to be meaningful.

Tuning Tip

If net expansion is small as measured by POOLN and total count is high as measured by POOLT, then the blocks are being allocated (expanded) and deleted (compressed) too frequently. It causes extensive IMS overhead, and the primary allocations need to be increased. Use the POOLS/DPOOL display services to determine which buffer sizes have the problem.

Data type: COUNT

Default Title: TOTAL POOL EXPN/COMP

Warning:

```
RM0960W (nn) hh:mm:ss title(parm) = v IN x intrvl
(>thrshld) *****
```

PSBP - PSB Pool Percentage of Utilization

Select Code: PSBP

Parameter: None

Measurement: PSB pool percent utilization

```
= bytes allocated * 100 / total pool size in bytes
```

Note: With the IMS option `LSO=S`, MVIMS monitors DLISAS PSB pool utilization. If the LSO option is not S, total PSB pool utilization is monitored.

Data Type: PERCENT

Default Title: PSB POOL % UTILIZATION

Warning:

```
RM0390W (nn) hh:mm:ss title(TOTAL) = v (>thrshld) *****
```

PSBW - PSB Work Area Pool Percentage of Utilization

Select Code: PSBW

Parameter: None

Measurement: PSB work area pool percent utilization

```
= bytes allocated * 100 / total pool size in bytes
```

Data Type: PERCENT

Default Title: PSB WORK POOL % UTIL

Warning: `RM0370W (nn) hh:mm:ss title(TOTAL) = v (>thrshld) *****`

WADIO - WADS I/O

Select Code: WADIO

Parameter: None

Measurement: The number of EXCPs to a WADS data set within the interval

If dual WADS logging is in effect, the actual number of EXCPs is twice the amount reported.

Data Type: COUNT

Default Title: WADS I/O

Warning: `RM0930W (nn) hh:mm:ss title(TOTAL) = v IN x intrvl (>thrshld) *****`

WKAP - General Work Area Pool Percentage of Utilization

Select Code: WKAP

Parameter: None

Measurement: General work area pool percent utilization

```
= bytes allocated * 100 / total pool size in bytes
```

Data Type: PERCENT

Default Title: WKAP % UTILIZATION

Warning: `RM0360W (nn) hh:mm:ss title(TOTAL) = v (>thrshld) *****`

Chapter 25. IMS Database Services

These services measure the DL/I buffer pool activity. For example, to activate the DBSTL service to track the number of buffer steal writes in the OSAM database subpool 2 between 10:30 am and 11:40 am, issue a warning message if the count exceeds 100 in a 10 minute interval, and log a plot of the collected data to the &iss. Image log at 11:40 when processing of the request stops, select the DBSTL monitor from the monitor list (SM command) and specify:

```
PARM  ==> 2
WVAL  ==> 100
LOG   ==> ATWARN,ATSTOP
START ==> 10:30:00
```

DBIO - Database I/O Count by Subpool

Select Code: DBIO

Parameter: Subpool number

If no parameter is entered, database I/O for the total OSAM pool is measured.

Enter a subpool number to measure database I/O for one subpool.

Measurement: Database I/O in the OSAM pool: total or by subpool

```
= OSAM reads
+ OSAM writes (STEAL)
+ OSAM writes (PURGE)
```

Data Type: COUNT

Default Title: DB I/O COUNT BY SUBPOOL

Warning: `RM0290W (nn) hh:mm:ss title(parm) = v IN x intrvl (>thrshld) *****`

DBHIT - Hit Ratio for OSAM Buffer Pool

Select Code: DBHIT

Parameter: Subpool number

If no parameter is entered, the hit ratio for the entire OSAM buffer pool is measured.

Enter a subpool number to measure hit ratio for one subpool.

Measurement: Hit ratio for the OSAM buffer pool within the interval: total or by subpool

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.

It is calculated as follows:

```
HIT RATIO = 100 X (A / (A + B))
```

where:

A Number of requests satisfied from the pool

B OSAM reads with I/O

Tuning Tip

Index pools should have a hit ratio of 80.0 or higher. Data pools should be 60.0 or higher.

Data Type: AVERAGE

Default Title: OSAM HIT RATIO BY SP

Warning: `RM0720W (nn) hh:mm:ss title(parm) = v  (>thrshld) *****`

DBSTL - Database Buffer Steals by Subpool

Select Code: DBSTL

Parameter: Subpool number

If no parameter is entered, database buffer steal writes for the total OSAM pool are measured.

Enter a subpool number to measure database buffer steal writes for one subpool.

Measurement: Database buffer steal writes in the OSAM pool: total or by subpool

Tuning Tip

Buffer steal writes should be avoided. A high number indicates your buffer pools may be too small.

Data Type: COUNT

Default Title: DB BFR STEALS BY SUBPOOL

Warning:

```
RM0300W (nn) hh:mm:ss title(parm) = v IN x intrvl
(>thrshld) *****
```

HPACC - Hiperspace Access by Subpool

Select Code: HPACC

Parameter: Subpool number

If no parameter is entered, all VSAM buffer pools are measured.

Enter a subpool number to measure one subpool.

Measurement: The sum of the successful Hiperspace reads and writes in the interval for the VSAM buffer pool: total or by subpool

Data Type: COUNT

Default Title: H/S ACCESS BY SUBPOOL

Warning:

```
RM0750W (nn) hh:mm:ss title(parm) = v IN x intrvl
(>thrshld) *****
```

HPHIT - Hiperspace Hit Ratio by Subpool

Select Code: HPHIT

Parameter: Subpool number

If no parameter is entered, the hit ratio for all VSAM subpools that have associated Hiperspace buffers is calculated.

Enter a subpool number to measure the hit ratio for one subpool.

Measurement: Hiperspace hit ratio within the interval: total or by subpool

The Hiperspace hit ratio indicates how much Hiperspace buffering contributes to the VSAM hit ratio. It is calculated as follows:

```
100 x (A / (B + C))
```

where:

A Number of successful Hiperspace reads for the subpool

B Number of requests satisfied from the VSAM subpool

Note: This number includes the successful Hiperspace reads.

C Number of VSAM reads with I/O

When no parameter is specified, subpools without associated Hiperspace buffers are not included in this calculation. A value of zero is returned if Hiperspace buffering is not supported by IMS.

Data Type: AVERAGE

Default Title: H/S HIT RATIO BY SUBPOOL

Warning: `RM0760W (nn) hh:mm:ss title(parm) = v  (>thrshld) *****`

HPSTL - Hiperspace Buffer Steals by Subpool

Select Code: HPSTL

Parameter: Subpool number

If no parameter is entered, the number of unsuccessful reads from Hiperspace (buffer steals) for all VSAM subpools is calculated.

Enter a subpool number to measure one subpool.

Measurement: Number of unsuccessful Hiperspace reads: total or by subpool

Each unsuccessful read represents an occasion when data must be obtained from external storage because the Hiperspace pages containing the buffer were stolen. If IMS determines in advance that the desired buffer is not in Hiperspace, it does not even attempt the Hiperspace read. In this case, the number of reads to external storage are greater than the number of unsuccessful Hiperspace reads.

A value of zero is returned if IMS does not support Hiperspace buffering..

Tuning Tip

If this number is large, it indicates a shortage of expanded storage that should be investigated.

Data Type: COUNT

Default Title: H/S BUFFER STEALS BY SP

Warning: `RM0810W (nn) hh:mm:ss title(parm) = v IN x intrvl (>thrshld) *****`

SBUSE - Sequential Buffering Storage by Region

Select Code: SBUSE

Parameter: Region name or blank

If no region job or started task name is entered, the sequential buffering storage usage for all regions is calculated.

Enter a region name or qualified name to measure the sequential buffering usage for a region or a group of regions.

Measurement: Kilobytes of virtual storage that IMS currently is using for sequential buffering

Data Type: STATUS

Default Title: SB STORAGE BY REGION

Warning: `RM0730W (nn) hh:mm:ss title(parm) = v  (>thrshld) *****`

VDBIO - VSAM Database I/O by Subpool

Select Code: VDBIO

Parameter: Subpool number

If no parameter is entered, database I/O for the total VSAM pool is measured.

Enter a subpool number to measure database I/O for one subpool.

Measurement: Database I/O in the VSAM pool: total or by subpool

```
= reads
+ writes (user-initiated)
+ writes (VSAM-initiated)
```

Data Type: COUNT

Default Title: VSAM DB I/O BY SUBPOOL

Warning: `RM0310W (nn) hh:mm:ss title(parm) = v IN x intrvl (>thrshld) *****`

VDBWR - VSAM Writes by Subpool

Select Code: VDBWR

Parameter: Subpool number

If no parameter is entered, VSAM-initiated writes for the total VSAM pool are measured.

Enter a subpool number to measure VSAM-initiated writes for one subpool.

Measurement: VSAM-initiated writes in the VSAM database pool: total or by subpool

Tuning Tip

VSAM initiated writes should be avoided. A high number indicates your buffer pools may be too small.

Data Type: COUNT

Default Title: VSAM WRITES BY SUBPOOL

Warning: `RM0320W (nn) hh:mm:ss title(parm) = v IN x intrvl (>thrshld) *****`

VHIT - VSAM Hit Ratio by Subpool

Select Code: VHIT

Parameter: Subpool number

If no parameter is entered, the hit ratio for the entire VSAM buffer pool is measured.

Enter a subpool number to measure the hit ratio for one subpool.

Measurement: Hit ratio for the VSAM buffer pool within the interval: total or by subpool

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 use external storage.

It is calculated as follows:

```
HIT RATIO = 100 x (A / (A  +  B))
```

where:

A Number of read requests satisfied from the pool

Note: This number includes successful Hiperspace reads.

B Number of reads with I/O

Tuning Tip

Index pools should have a hit ratio of 80.0 or higher. Data pools should be 60.0 or higher.

Data Type: AVERAGE

Default Title: VSAM HIT RATIO BY SP

Warning: `RM0740W (nn) hh:mm:ss title(parm) = v  (>thrshld) *****`

Chapter 27. OS/390 Services

These services measure the OS/390 resources used by IMS interaction with OS/390.
For example, to activate the PAGE service to track the total system paging rates for the IMS control region for 10 sampling intervals and log a plot of the collected data to the BBI-SS PAS Image log when processing of the request completes, select the PAGE monitor from the monitor list (SM command) and specify:

```
PARM ==> IMSCTLRG
LOG  ==> ATSTOP
STOP ==> 10
```

CSAFR - CSA Fragmentation

Select Code: CSAFR

Parameter: None

Measurement: Warning is issued when a storage block of threshold bytes could not be allocated in CSA subpool 241 or unallocated storage at time of sample CSA subpool 241

The threshold should be set equal to the increment specified for PI pool expansion.

Data Type: Warning Only (threshold must be specified)

Default Title: CSA FRAGMENTATION

Warning: `RM0480W (nn) hh:mm:ss title(TOTAL) = v (<thrshld) *****`

CSAUT - CSA Percentage of Utilization

Select Code: CSAUT

Parameter: None

Measurement: CSA percent utilization at time of sample (virtual)

`= bytes of CSA allocated * 100 / total size of CSA in bytes`

Data Type: PERCENT

Default Title: CSA % UTILIZATION

Warning: `RM0460W (nn) hh:mm:ss title(TOTAL) = v (>thrshld) *****`

DLIO - DL/I EXCP Count by ddname

Select Code: DLIO

Parameter: ddname

If no parameter is specified, total EXCPs for all data sets allocated to the IMS DLISAS region are measured.

Enter a ddname to measure EXCPs for one data set allocated to IMS.

Enter qualified name to measure EXCPs for a group of data sets.

Measurement: Number of successful EXCPs for DL/I data sets allocated to the DLISAS region (`LSO=S`): total or by ddname

If any other LSO option is in effect, this service measures data sets in the control region, the same as SYSIO.

If SMF is inactive, the count will be zero for non-VSAM and non-OSAM data sets.

Data Type: COUNT

Default Title: DL/I EXCP COUNT BY DDNAME

Warning: `RM0510W (nn) hh:mm:ss title(parm) = v IN x intrvl (>thrshld) *****`

DPAGE - Demand Paging by Region

Select Code: DPAGE

Parameter: Region (job) name

If no parameter is entered, total demand paging for the system is measured.

Enter region name (IMS regions only) to measure demand paging for one region.

Measurement: Total page-ins in the specified interval: total or by region (includes reclaims)

Data Type: COUNT

Default Title: DEMAND PAGING BY REGION

Warning: `RM0450W (nn) hh:mm:ss title(parm) = v IN x intrvl (>thrshld) *****`

ECSAU - Extended CSA Percent Utilization

Select Code: ECSAU

Parameter: None

Measurement: Extended CSA percent utilization at the time of sample

This is computed as:

```
100 x (A - B) / A
```

where:

`A` Total ECSA

`B` Space described by FBQES in ECSA

Note: Using this formula, a 4K block of ECSA is recognized as 100% utilized, even if only a portion is actually allocated.

Data Type: PERCENT

Default Title: ECSA % UTILIZATION

Warning: `RM0800W (nn) hh:mm:ss title(TOTAL) = v (>thrshld) *****`

PAGE - Paging (Region)

Select Code: PAGE

Parameter: Region (job) name

If no parameter is entered, total paging for the system is measured.

Enter region name (IMS regions only) to measure paging for one region.

Measurement: Total private area, VIO, and swap page-ins and page-outs in the specified interval: total or by region (does not include reclaims)

Data Type: COUNT

Default Title: PAGING (REGION)

Warning: `RM0440W (nn) hh:mm:ss title(parm) = v IN x intrvl (>thrshld) *****`

SYSIO - EXCP Count by ddname

Select Code:	SYSIO
Parameter:	ddname If no parameter is specified, total EXCPs for all data sets allocated to the IMS control region are measured. Enter a ddname to measure EXCPs for one data set allocated to IMS. Enter a qualified data set name to measure EXCPs for a group of data sets.
Measurement:	Number of successful EXCPs: total or by ddname If SMF is inactive, the count will be zero for non-VSAM and non-OSAM data sets.
Data Type:	COUNT
Default Title:	EXCP COUNT BY DDNAME
Warning:	`RM0530W (nn) hh:mm:ss title(parm) = v IN x intrvl (>thrshld) *****`

Chapter 28. IRLM Services

These services measure critical IRLM activity when IMS IRLM is used. For example, to activate the LHELD service every minute to monitor for the number of locks held by IRLM for a target IMS and issue a warning message when it holds one or more, select the LHELD monitor from the monitor list (SM command) and specify:

```
INTERVAL ==> 00:01:00
WVAL     ==> NZ
```

LDLCK - Number of Deadlocks

Select Code: LDLCK

Parameter: None

Measurement: Number of deadlocks that occurred within each user-specified interval.

Data Type: COUNT

Default Title: IRLM DEADLOCKS

Warning: `RM0820W (nn) hh:mm:ss title(parm) = v IN x intrvl (>thrshld) *****`

LHELD - Number of Locks Held

Select Code: LHELD

Parameter: IMS online region number

If no parameter is entered, all the locks being held by the target IMS are counted.

Enter IMS online region number to measure the locks being held by that region.

Measurement: Number of locks currently being held by an IMS online dependent region or by the target IMS as a whole

Data Type: STATUS

Default Title: IRLM LOCKS HELD

Warning: `RM0890W (nn) hh:mm:ss title(parm) = v (>thrshld) *****`

LKMAX - Maximum Locks Held by Region

Select Code: LKMAX

Parameter: BMP or DBT

If no parameter is entered, all regions are monitored.
Enter:

BMP To monitor only batch message processing (BMP) and Java batch message processing (JBP) regions.

DBT To monitor only DBCTL threads (CICS and ODBA).

Measurement: Region with the most outstanding IRLM locks over the threshold is returned

If more than one region is over the threshold, the one with the most locks is returned.

Data Type: Warning Only (threshold must be specified)

Default Title: MAX LOCKS HELD BY REGION

Warning:

```
RM0870W (nn) hh:mm:ss title(parm) = v xxxxxxxx yyy
(>thrshld) *****
```

where:

`xxxxxxxx` Is the region name
`yyy` Is the region number

Note: This service shows only one online dependent region exception at a time. When the warning condition in the region clears, it continues to check other online dependent regions until another exception is found.

LKREQ - Number of Lock Requests

Select Code: LKREQ

Parameter: GLOBAL

If no parameter is entered, the subset related to the target IMS is measured.

Enter GLOBAL to measure the entire IRLM system.

Measurement: Number of lock requests

Data Type: COUNT

Default Title: IRLM LOCK REQUESTS

Warning:

```
RM0840W (nn) hh:mm:ss title(parm) = v IN x intrvl
(>thrshld) *****
```

LSUSP - Number of Suspensions

Select Code: LSUSP

Parameter: None

Measurement: Number of IRLM suspensions that occurred within each user-specified interval

Data Type: COUNT

Default Title: IRLM SUSPENSIONS

Warning:
```
RM0900W (nn) hh:mm:ss title(parm) = v IN x intrvl
(>thrshld) *****
```

LWAIT - Region in IRLM Suspend

Select Code: LWAIT

Parameter: BMP or DBT

If no parameter is entered, all regions are monitored.
Enter:

BMP To monitor only batch message processing (BMP) and Java batch message processing (JBP) regions.

DBT To monitor only DBCTL threads (CICS and ODBA), valid only for IRLM 2.1 and later.

Measurement: A warning is written when a monitored region is in IRLM suspend state longer than the threshold value specified in seconds

Data Type: Warning Only (threshold must be specified)

Default Title: REGION IN IRLM SUSPEND

Warning:
```
RM0880W (nn) hh:mm:ss title(parm) = v xxxxxxxx yyy
(>thrshld) *****
```

where:

`xxxxxxxx` Is the region name
`yyy` Is the region number

Note: This service shows only one online dependent region exception at a time. When the warning condition in the region clears, it continues to check other online dependent regions until another exception is found.

LWNUM - Number of Suspended IRLM Requests

Select Code: LWNUM (IRLM 2.1 and later)

Parameter: GLOBAL, GBL, GBL`ssss`, or `ssss`

If no parameter is entered, all suspended requests from the target IMS are measured. Enter:

GLOBAL or GBL
: All suspended requests are counted (not limited to the target IMS).

GBL`ssss`
: All requests suspended longer than `ssss` seconds are counted.

`ssss`
: All requests from the target IMS suspended longer than `ssss` seconds are counted.

Measurement: Number of IRLM requests suspended at the end of each interval that have lasted longer than a user-specified number of seconds

Data Type: STATUS

Default Title: # REGIONS IN IRLM SUSPND

Warning: `RM1010W (nn) hh:mm:ss title(parm) = v (>thrshld) *****`

PTBLK - Number of PTB Locks

Note: This service applies to IRLM 1.5.

Select Code: PTBLK

Parameter: GLOBAL

If no parameter is entered, the subset related to the target IMS is measured.

Enter GLOBAL to measure the entire IRLM system.

Measurement: Number of lock requests that resulted in PTB process

The monitor is not valid if the count is not meaningful. This count is only meaningful for an IRLM started with parameter `SCOPE=GLOBAL`.

Data Type: COUNT

Default Title: IRLM PTB LOCKS

Warning: `RM0850W (nn) hh:mm:ss title(parm) = v IN x intrvl (>thrshld) *****`

VSEND - Number of VTAM Sends

Note: This service applies to IRLM 1.5.

Select Code: VSEND

Parameter: None

Measurement: Number of VTAM sends issued by the IRLM system

Use this monitor only if you specify SCOPE=GLOBAL in your IRLM procedure. If SCOPE=LOCAL is specified, VTAM is not used by IRLM. VSEND is only for monitoring VTAM sends.

Data Type: COUNT

Default Title: IRLM VTAM SENDS

Warning:

```
RM0860W (nn) hh:mm:ss title(parm) = v IN x intrvl
(>thrshld) *****
```

Chapter 29. Workload Monitor Services (Quick Reference)

This section provides an alphabetical list of all the Workload Monitor services and their parameters with page references to a more detailed description about their use. See Chapter 21, “Displaying a List of Data Collection Monitors (SM Command)” on page 379 for a complete description of the Data Collection Monitors list application.

Table 12. Workload Monitor Service Select Codes

Service Select Code	**Parameter**	**See**
$CBMP	[id],[keywords]	“$CBMP - BMP and JBP Region Calls” on page 447
$CTOT	[id],[keywords]	“$CTOT - All Region Calls” on page 449
$CDBT	[id],[keywords]	“$CDBT - DBCTL Region DLI Calls” on page 448
#CIC	[id],[keywords]	“#CIC - Control Interval Contentions” on page 443
#OBAW	[id],[keywords]	“#OBAW - OBA Latch Waits” on page 444
#PROC	[id],[keywords]	“#PROC - Number of Transactions Processed” on page 453
@ELAP	[id],[keywords]	“@ELAP - Average Elapsed Time” on page 451
@OBA	[id],[keywords]	“@OBA - Overflow Buffer Usage” on page 445

Chapter 30. Workload Monitor Support for DBCTL and ODBA Threads

This chapter summarizes service support for DBCTL threads, which includes both CICS and ODBA threads.

Collecting DBCTL Thread Data

To collect DBCTL thread data, CICS=YES or CICS=ONLINE must be specified in BBPARM member IMFECP00. Then, when you request a monitor service (SM primary command), you can include or exclude the DBCTL thread data with the PGMTYPE workload selection keyword as follows:

- PGMTYPE=DBT collects just DBCTL thread data.
- PGMTYPE=NOTDBT excludes DBCTL thread data collection from a Workload Monitor request.

DBCTL thread data support is summarized below.

Service Support

The following Workload Monitor services provide DBCTL thread data:

#PROC
@ELAP
@OBA
#OBAW
#CIC
$CTOT
$CDBT

If you use @ELAP or $CDBT, you should consider the following:

@ELAP You may want to exclude the CICS transactions from @ELAP monitoring by specifying PGMTYPE=NOTDBT.

The elapsed time for conversational CICS transactions may be quite high because it includes user think time at the terminal. The Event Collector measures elapsed time from transaction start to the next SYNC point. With a conversational CICS transaction, SYNC point may not occur until transaction termination.

If a CICS transaction issues more than one commit or allocates more than one PSB per execution, the elapsed time reflects only the time between SYNC points, not the elapsed time of the CICS transaction.

If you want to monitor conversational and nonconversational CICS transactions separately, you must use the PSB and/or TRAN workload selection criteria keyword when you request a monitor service.

$CDBT The $CDBT monitor shows the number of DLI calls by DBCTL threads and complements the $CTOT and $CBMP monitors. You can specify a selection criteria of CALLTYPE=ALL or DLI with the monitor request. Specifying CALLTYPE=MSG or DB2 results in zero counts.

Chapter 31. Fast Path Activity Monitors

These services measure the use of IMS Fast Path resources, which include CI contention, waits for OBA, and overflow buffer usage. They can also be used for DBCTL threads.

#CIC - Control Interval Contentions

Select Code: #CIC

Parameter: User-defined identifier for the request or blank.

Measurement: The number of Fast Path database control interval contentions for the selected workload and sampled interval. If workload selection is not requested, the control interval contentions for the total workload measured.

Data Type: COUNT

Selections: Valid workload selection keyword parameters:

```
PROG        ==> name
PSB         ==> name
REGION      ==> jobname
RGNID       ==> nnn
TRAN        ==> trncode
TRANTYPE    ==> FP
```

All keyword operands, described in Table 9 on page 392, are ORed together. Multiple workload selection keyword parameters are ANDed.

Note: TRANTYPE is set internally to FP to ensure correct averaging by excluding transactions that do not access Fast Path databases.

Default Title: CI CONTENTIONS

Warning: `WM0070W (nn) hh:mm:ss title(parm) = v IN x intrvl (>thrshld) *****`

Example

```
WVAL  ==> 3
WMSG ==> MTO
WLIM  ==> 10
LOG     ==> ATWARN
```

#OBAW - OBA Latch Waits

Select Code: #OBAW

Parameter: User-defined identifier for the request or blank.

Measurement: The number of transaction OBA latch waits for the selected workload and sampled interval. If workload selection is not requested, the total OBA latch waits by Fast Path transactions is measured.

Data Type: COUNT

Selections: Valid workload selection keyword parameters:

```
PROG        ==> name
PSB         ==> name
REGION      ==> jobname
RGNID       ==> nnn
TRAN        ==> trncode
TRANTYPE    ==> FP
```

All keyword operands, described in Table 9 on page 392, are ORed together. Multiple workload selection keyword parameters are ANDed.

Note: TRANTYPE is set internally to FP to ensure correct averaging by excluding transactions that do not access Fast Path databases.

Default Title: OVERFLOW BUFFER WAITS

Warning: WM0060W(nn) hh:mm:ss title(parm) = v IN x intrvl (>thrshld) *****

Example

```
REGION ==> PROD+
```

@OBA - Overflow Buffer Usage

Select Code: @OBA

Parameter: User-defined identifier for the request or blank.

Measurement: The average overflow buffer usage by Fast Path transactions for the selected workload and sampled interval. If workload selection is not requested, the overflow buffer usage by Fast Path transactions for the total workload is measured.

Data Type: AVERAGE

Selections: Valid workload selection keyword parameters:

```
PROG        ==> name
PSB         ==> name
REGION      ==> jobname
RGNID       ==> nnn
TRAN        ==> trncode
TRANTYPE    ==> FP
```

All keyword operands, described in Table 9 on page 392, are ORed together. Multiple workload selection keyword parameters are ANDed.

Note: TRANTYPE is set internally to FP to ensure correct averaging by excluding transactions that do not access Fast Path databases.

Default Title: AVG OVFLW ALLOCATION

Warning: WM0050W (nn) hh:mm:ss title(parm) = v (>thrshld) *****

Example

```
PARM ==> WHSE
PSB    ==> WH+
```

Chapter 32. Global Region Call Monitors

The global region call monitors measure all region calls (DBCTL, BMP, and JBP) as they occur during IMS application program processing. Call types by region can be selected with the use of the CALLTYPE keyword specified with the service request.

$CBMP - BMP and JBP Region Calls

Select Code: $CBMP

Parameter: User-defined identifier for the request or blank.

Measurement: A count of the calls issued by BMP and JBP regions in the sampled interval. The count is a total of all calls or by call type as specified with the request.

Data Type: COUNT

Selections: Valid call type selection keyword parameters:

```
CALLTYPE ==> ALL|DB2|DLI
```

where ALL is for all database calls; DB2 is only DB2 calls; and DLI is only DL/I calls. If CALLTYPE is not specified, the default is ALL. (MSG is not an applicable operand for MVDBC.)

Multiple operands are ORed together.

Default Title: TOTAL BMP CALLS

Warning:

```
WM0120W (nn) hh:mm:ss title(parm) = v IN x intrvl
(>thrshld) *****
```

Example

```
PARM     ==> DLICALLS
TITLE    ==> BMP DL/I CALLS
CALLTYPE ==> DLI
```

$CDBT - DBCTL Region DLI Calls

Select Code: $CDBT

Parameter: User-defined identifier for the request or blank.

Measurement: A count of the DL/I calls issued by DBCTL threads in the sampled interval. The count is a total of all calls or by call type as specified with the request.

Data Type: COUNT

Selections: Valid call type selection keyword parameters:

```
CALLTYPE  ==> ALL|DLI
```

Note: IMS processes only DL/I calls for this region type; therefore, specifying `CALLTYPE ==> MSG` or `CALLTYPE ==> DB2` results in zero counts.

Default Title: TOTAL DBT (CICS) CALLS

Warning:

```
WM0140W (nn) hh:mm:ss title(parm) = v IN x intrvl
(>thrshld) *****
```

Example

```
PARM      ==> DLIDBT1
WVAL      ==> 100
CALLTYPE  ==> DLI
```

$CTOT - All Region Calls

Select Code: $CTOT

Parameter: User-defined identifier for the request or blank.

Measurement: A count of the calls issued by all region types in the sampled interval. The count is a total of all calls or by call type as specified with the request.

Data Type: COUNT

Selections: Valid call type selection keyword parameters:

```
CALLTYPE ==> ALL|DB2|DLI
```

where ALL is for all database calls; DB2 is only DB2 calls; and DLI is only DL/I calls. The default is ALL. (MSG is not an applicable operand for MVDBC.)

Multiple operands are ORed together.

Default Title: TOTAL PROGRAM CALLS

Warning:

```
WM0110W (nn) hh:mm:ss title(parm) = v IN x intrvl
(>thrshld) *****
```

Example

```
PARM       ==> DB2CALLS
CALLTYPE   ==> DB2
```

Chapter 33. Elapsed Timing Monitors

These services measure the transaction time for DBCTL threads.

@ELAP - Average Elapsed Time

Select Code: @ELAP

Parameter: User-defined identifier for the request or blank.

Measurement: Average DBCTL thread elapsed execution time for the selected workload and sampled interval. If workload selection is not requested, the average elapsed execution time for the total workload is measured.

Data Type: AVERAGE

Selections: Valid workload selection keyword parameters:

```
TRANTYPE    ==> ALL|DLI|DB2|FP
TRAN        ==> trncode
CLASS       ==> nn
PROG        ==> name
PSB         ==> name
REGION      ==> jobname
RGNID       ==> nnn
TERM        ==> name
USERID      ==> userid
PGMTYPE     ==> MPP|MDP|IFP|FPU|TPI|BMP|DBT|NOTDBT
```

The BMP program type includes the JBP program type, and DBT and NOTDBT include both CICS and ODBA threads.

All keyword operands, described in Table 9 on page 392, are ORed together. Multiple workload selection keyword parameters are ANDed.

Notes: Program types MPP/JMP, MDP, IFP, and TPI are not valid for DBCTL.

You may want to exclude CICS transactions threads by specifying `PGMTYPE=NOTDBT`. The elapsed time for conversational monitors may be quite high because it includes user think time at the terminal. Elapsed time is measured from transaction start to SYNC point. SYNC point for a conversational CICS transaction may not occur until the transaction terminates. To monitor conversational and non-conversational CICS transactions separately, use the PSB and TRAN workload selection keyword parameters.

If a CICS transaction issues more than one commit or allocates more than one PSB per execution, the elapsed time reflects only the time between SYNC points, not the elapsed time of the CICS transaction.

Default Title: AVG ELAPSED TIME

Warning: `WM0020W (nn) hh:mm:ss title(parm) = v (>thrshld) *****`

Example

```
PARM     ==> CTRAN
WMAX     ==> 1.50
TITLE    ==> CTRAN 1 ELAPSED TIME
TRAN     ==> CTRAN1
```

Chapter 34. Transaction Monitor

This monitor measures the number of transactions processed by IMS.

#PROC - Number of Transactions Processed

Select Code: #PROC

Parameter: User-defined identifier for the request or blank.

Measurement: A count of the DBCTL transactions processed for the selected workload and sampled interval. If workload selection is not requested, all the transactions are counted.

Data Type: COUNT

Selections: Valid workload selection keyword parameters:

```
PROG        ==> name
PSB         ==> name
REGION      ==> jobname
RGNID       ==> nnn
TRAN        ==> trncode
TRANTYPE    ==> ALL|FP|DLI
```

All keyword operands, described in Table 9 on page 392, are ORed together. Multiple workload selection keyword parameters are ANDed.

Default Title: TRANS PROCESSED

Warning:

```
WM0040W (nn) hh:mm:ss title(parm) = v IN x intrvl
(>thrshld) *****
```

Example

```
TITLE    ==> CICSRGN DBCTL TRANS
REGION   ==> CICSRGN
```

Part 5. Traces

The trace services are used to activate and display a summary workload trace or detail transaction processing event trace.

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Chapter 35. Tracing Transactions

Workload Analyzer provides unique application tracing that allows you to selectively trace a transaction and view how well your application is performing with integrated trace displays. Application tracing consists of data collection and display services that provide:

Summary trace
: Response time of the transaction, the application CPU time, the IMS CPU time, the number of database calls (DL/I and DB2), and the number of I/Os.

Detail trace
: Each type of database call, its return code and elapsed time (in the order processed), the name of the database accessed, and 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.

  Detail trace can be used to debug complex application performance problems associated with the execution of a specific transaction. This data can be saved to data sets for later reference or use on another system.

When you trace a transaction, you can:

- Qualify a trace by workload selection or by exception filters to limit the trace; for example, by database name or high elapsed time.
- Set automatic start and stop times for the trace when you think the most activity will occur.
- Use integrated trace display services where you can see a list of transaction trace entries and expand to summarized trace data or detailed trace events for a selected transaction.

Chapter 36. Requesting Workload Trace Data Collection (MTRAC)

An IMS workload trace must be activated by using the MTRAC service. The data collected by MTRAC is displayed by trace display services as described in Chapter 38, "Requesting a Workload Trace Data Display (LTRAC, STRAC, and DTRAC)" on page 495.

When a trace is requested, the data entry panel for the MTRAC service is displayed. Options on this panel let you specify:

- Type of trace

  Two levels of trace are available:

  Summary Trace — Provides timestamps and other important workload statistics about the activity generated by one transaction occurrence.

  The abbreviated summary trace (TYPE=A) provides the same information as a summary trace except when the abbreviated trace is logged to a data set. The logged trace will contain only LTRAC entries (no STRAC data), which reduces DASD requirements. You can use the current traces option to view STRAC data while the trace data resides in the buffers.

  Detail Trace — Provides more detailed chronological event data about the activity that occurred for one transaction. The amount of data collected is limited to a specified buffer size, as described in "Trace Requirements" on page 472.

  Some transactions may require multiple logical terminal pages to display all of the traced information. Because of the output volume a detail trace might produce, it should be used only when analyzing performance problems in specific applications. For example, a valuable use of detail trace is during new application testing to analyze call flow, I/O, and performance.

  The level of trace is specified by the TYPE keyword with the MTRAC request.

- Trace logging to Trace Log Data Sets

  Trace logging allows you to record both summary and detail trace data to external VSAM data sets. It is requested with a yes (Y) option for LOGTRAC (log trace) with the MTRAC trace request. When you ask for trace logging, a Trace Log Data Set Options data entry panel is displayed. These trace logging options let you specify:

  – Trace log data set allocation and disposition, archiving, and switching
  – Whether existing data in a log data set can be overwritten

- Trace data collection by selection criteria and exception filters

  Selection criteria — You can limit a trace to a specific part (or parts) of the IMS workload by:

  – Program type
  – Transaction type
  – Transaction name
  – PSB name
  – Region job name

- User ID
- Program name
- Region ID
- Terminal ID
- Database name
- DB2 plan name
- Abend code

Exceptions

You can limit a trace to exception conditions by setting thresholds for time, such as transaction elapsed time or input queue time, or counts, such as number of databases used or number of DC calls. A minimum or maximum threshold can be defined. Only those trace records that meet the defined threshold condition are collected.

Note: For MTRAC to collect DBCTL thread data, CICS=YES or CICS=ONLINE must be specified in BBPARM member IMFECP00.

Starting MTRAC

MTRAC data collection can be activated by:

- Selecting the TRACES option from the Primary Option Menu

  Enter a START TRACE (ST) command in the CURRENT TRACES application selected with the TRACES option. When ST is requested, the initial data entry panel displays a default request for a summary trace (S for the TYPE parameter), as shown in Figure 18 on page 461. Changing TYPE to D requests a detail trace.

  Note: As described in *Implementing Security for MAINVIEW Products*, you must be authorized to request a trace.

  You also can access the MTRAC initial data entry panel by selecting the MTRAC service from the list of monitors displayed with the SM primary command.

  - Pressing ENTER activates a request.
  - Pressing END redisplays the list application where you requested MTRAC.

  Multiple trace requests with different selection criteria can be run concurrently. Each MTRAC request can be given an optional name for identification by specifying a 1- to 8-character identifier in the PARM field. One MTRAC request can be activated without an identifier; the request identifier defaults to blanks.

  For example, this MTRAC data collection request for the transaction PART is identified as MYTRAC1:

  ```
  PARM    ==> MYTRAC1
  TYPE    ==> DETAIL
  TRAN    ==> PART
  ```

  Note: A detail trace for a BMP or JBP must be requested before the region is started.

- Defining MTRAC requests in a member of your BBI-SS PAS BBPARM data set that can be started automatically when the system starts or at your request (see “Request Initiation” on page 555)

- Starting MTRAC from a MAINVIEW AutoOPERATOR EXEC

  Write an EXEC that starts MTRAC (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=MTRAC TRAN=PAY+ TARGET=IMSVSx
  ```

  For more information, see the *MAINVIEW AutoOPERATOR Advanced Automation Guide for CLIST EXECS*.

- Starting MTRAC from a service display

  Define a SET request for MTRAC in the SERV field as described in Chapter 46, “The SET Timer Request” on page 555.

Using the Workload Trace Data Entry Panel

The Workload Analyzer Trace (MTRAC) monitor is a monitoring service that activates either a summary IMS workload trace or a detail transaction processing event trace. There are two ways to display the request data entry panel shown in Figure 18 on page 461:

- ST command for START TRACES
- S line command for MTRAC from the monitors service list (SM for START MONITORS)

You can use the request data entry panel to access additional data entry panels to override default settings and request:

- Trace logging options to record traces to external VSAM data sets
- Selection criteria to limit the amount of data saved by a specific part of the IMS workload
- Exception filters to limit the amount of data saved by exceptions These options are described in this section.

When a trace is requested, the following data entry panel is shown:

```
BMC SOFTWARE  ------------ START IMS TRACE REQUEST ---------- PERFORMANCE MGMT
COMMAND ===>                                                     TGT ===> IMSA
                                                             TIME --  12:34
PARM     ==>         (Trace identifier)       START ==>       (&hhmmss.)
TYPE     ==> S       (S-Summary,D-Detail)     STOP  ==>       (&hhmmss./mins)
STORAGE  ==> 20K     (Display buffer size)    WRAP  ==> Y     (Y/N wrap buffer)
LOGTRAC  ==> Y       (Y/N log trace)          RST   ==> HOT   (HOT,COLD,PUR,QIS)
TITLE    ==> IMS APPLICATION TRACE            QIS   ==>       (YES,NO)

 Specify additional trace options:     (*=processed)
   Selection criteria         ==> N   (Y/N)
   Exception filters          ==> N   (Y/N)
   Trace log data set options ==> N   (Y/N)

                                                Press ENTER to process; END to cancel
```

Figure 18. Start Workload Trace Request

The options in this panel are SET keywords for an MTRAC request. These keywords are described in Table 13 in alphabetical order.

Table 13. SET Keywords to Activate a Trace (Page 1 of 3)

Keyword	Operand	Description
LOGTRAC	N|Y	N is the default. Y writes all trace records for this request to a unique trace log data set (TLDS) for this trace. If Y is specified with no additional summary or detail trace logging options (see Chapter 37, "Logging a Trace" on page 477), a single data set is allocated dynamically using the defaults specified in IMFBEX00 for this MVIMS. **Note:** The BBI-SS PAS started task must be authorized (see *Implementing Security for MAINVIEW Products*) to allocate trace log data sets dynamically.
PARM	id	Specifies which set of trace data is to be displayed with the application trace services. The id is a unique 1- to 8-character identifier. If you want to run multiple trace requests, specify an ID in the PARM field to make the trace unique. Blank can also be used as an identifier for one trace.
QIS		Defines the action to be taken for the service when IMS is not active.
QIS	YES	Specifies that the service is to be quiesced. This is the default.
QIS	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.
RST		Defines the restart option to be used restart service when a service is quiesced because of an inactive IMS subsystem or `RRR` is specified for BLK (see "Multiple Requests" on page 556). Default is HOT.
RST	HOT	Restarts the trace automatically without loss of previous data.
RST	COLD	Restarts the trace automatically; all previously collected data is deleted.
RST	PUR	Purges the trace automatically when the target IMS starts.
RST	QIS	Keeps the trace in a quiesced state until it is purged by an authorized user.

Table 13. SET Keywords to Activate a Trace (Page 2 of 3)

Keyword	Operand	Description
START	hh:mm:ss	Requests trace 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 trace 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 command from the Current Traces (Primary Menu Option 3) application. If the time entered is the same as the START time, 24 hours are added to the STOP time.
STORAGE|ST	`nnnnnn`	Specifies the amount of BBI-SS PAS private storage to be used by the MTRAC service. MTRAC saves captured data in main storage. Values from 1 to 999999 can be specified, either by byte or by kilobyte; for example, both 40000 and 40K are valid entries. The 40000 byte specification will be rounded to the next multiple of 1024 (1K), in this case 40960 (40K). The MTRAC data entry panel for this option is primed from the default specified in BBPARM member IMFBEX00. If no value is specified, the value from BBPARM BBIISP00 is used. **Note:** For a detail trace, this value must be at least four times TRSIZE specified in BBPARM member BBIISP00 (see “Trace Requirements” on page 472). If STORAGE is less than four times TRSIZE, the STORAGE value is adjusted upward.
TITLE|T	'c...c'	Defines the service display title (1 to 24 characters). A user-defined title can replace the default service title. If the title is specified with SET as a single request or in a BBPARM member as a series of requests, it must be enclosed in single quotation marks. **Note:** The MOD keyword cannot be used to change this option. The request must be purged and a new request must be made.

Table 13. SET Keywords to Activate a Trace (Page 3 of 3)

Keyword	Operand	Description
TYPE	S|SUMMARY D|DETAIL A|ABBREVIATED	Trace event data is in either summarized (SUMMARY, the default) or detailed (DETAIL) format. DETAIL collects information on every DLI, DB2, or MQSeries call. The abbreviated summary trace (TYPE=A) provides the same information as a summary trace except when the abbreviated trace is logged to a dataset. The logged trace will contain only LTRAC entries (no STRAC data). You can use the current traces option to view STRAC data while the trace data resides in the buffers. **Note:** You must be authorized to start a summary or detail trace.

WRAP	YES|
	NO
		Determines trace data wrap in BBI-SS PAS buffer. Default is YES; new data overlays oldest data. NO stops the trace when the buffer is full. A SET request with `MOD=MTRAC`, `WRAP=YES` resumes the trace. This can be specified in a BBPARM member or as:
		
		`SERV ==> SET`
		`PARM ==> MOD=MTRAC, WRAP=YES`

Filtering a Trace

You can request additional data entry panels to specify:

- Trace log data set options
- Selection criteria
- Trace exceptions by specifying Y for one or more of these additional trace options.

When you select Y for an option, additional data entry panels are displayed. Once you are finished with a panel, press ENTER to process those request options. Each panel you have used is displayed before the Start IMS Trace Request panel is returned.

When all panels are processed, the Start IMS Trace Request panel is redisplayed with an * character next to each processed option. The request is not activated until all the options display either N or *. This gives you the opportunity to review and change your options before sending the request.

For example:

- To eliminate previously specified options, change the * to a Y and clear the options you do not want from the associated data entry panel.
- If you change an * to a Y or an N to a Y, the data entry panel for that option is primed with the values previously specified. You can leave them as shown or change them.

Note: This allows you to change any option you have requested. However, once a trace is activated, you can change only some, not all, of the options as described in “Modify Trace Options Request (M Line Command)” on page 501. Any others must be changed by stopping the trace and reactivating it.

Filtering a Trace by Selection Criteria

Selection criteria limit or filter trace data collection to a specific part of the IMS workload. By specifying a certain resource to be traced, such as an IMS region, the sampling is limited automatically to those events occurring only with that resource. To limit data collection by selection criteria, specify Y in the Selection Criteria field of the Start IMS Trace Request data entry panel. This displays the Selection Criteria data entry panel shown in Figure 19.

```
BMC SOFTWARE  ---------- IMS TRACE SELECTION CRITERIA -------- PERFORMANCE MGMT
COMMAND ===>                                                      TGT ===> IMSA

 Specify selection criteria:
   PGMTYPE  ==>                  (MPP, MDP, IFP, FPU, TPI, BMP, DBT, NOTDBT)
   TRANTYPE ==>                  (ALL, DLI, DB2, FP)
   TRAN     ==>
   CLASS    ==>
   PSB      ==>
   REGION   ==>
   USERID   ==>
   PROG     ==>
   RGNID    ==>
   TERM     ==>                  (name, SYNCLOCK, MSCCLOCK)
   DATABASE ==>
   DB2PLAN  ==>
   ABEND    ==>
```

Figure 19. Selection Criteria Data Entry Panel (Start IMS Trace Request Options)

A trace can be requested by IMS workload components by using the workload selection keywords shown in Table 14 on page 466. If none of the selection keywords are specified with an MTRAC request, all transactions that complete processing are traced.

Following is an example of using parameters to selectively trace transactions. The conditions are ANDed.

```
PARM   ==> TRACE1
TRAN   ==> PART
PSB    ==> DFS+++
```

This request traces all transactions with a transaction code of PART and a PSB whose name is six bytes long and begins with the letters DFS.

Syntax

- A list of operands can be specified in each of the selection criteria fields. Each entry in the list must be separated by a comma or blank. For example:

  `TRAN ==> TRAN1,TRAN2,TRAN3`

  traces all transactions that have a transaction code of TRAN1 or TRAN2 or TRAN3.

- The + qualifier character can be used generically or positionally. As a generic 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 trace to sample only regions whose names begin with CICS.

  Entering:

  ```
  TRAN ==> A++N+
  ```

  traces all events that have an identifiable transaction code with an A character in the first position, any two characters before N, and any characters following N.

- Trace records are created when there is a match with the selection criteria keywords. Multiple keywords are connected with an AND operation and the operands within a keyword are connected with an OR operation. For example:

  ```
  PROG    ==>  SAMPPGM,TESTPGM
  PGMTYPE ==>  3,4
  ```

  collects only records that use programs SAMPPGM or TESTPGM and are running in classes 3 or 4.

The options in the IMS Trace Selection Criteria data entry panel are SET keywords for an MTRAC request. These keywords are described in Table 14 in alphabetical order.

Table 14. SET Keywords to Define Trace Selection Criteria (Page 1 of 3)

Keyword	Operand	Description
ABEND	+| Sxxx| Uxxxx	Qualifies a trace request by abend code, where xxx is an alphanumeric code and: + Indicates all abends S Indicates a system abend; for example, S0C7 You must specify four characters. U Indicates a user abend; for example, U3303 You must specify five characters. The plus qualifier (+) can be used.
CLASS	class	Qualifies a trace 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 an MTRAC request for DBCTL threads.
DATABASE	database name	Qualifies a trace request by the specified database.
DB2PLAN	DB2 plan name	Qualifies a trace request by the specified plan.

Table 14. SET Keywords to Define Trace Selection Criteria (Page 2 of 3)

Keyword	Operand	Description
PGMTYPE| PTYP	BMP DBT|NOTDBT FPU	Qualifies a trace request by program type. Multiple program types can be specified. The types are: BMP Batch message processing program or Java batch message processing program (JBP) DBT DBCTL threads (CICS and ODBA) FPU Fast Path utility Default is all types. DBT selects only programs that use a DBCTL thread. NOTDBT selects programs that do not use a DBCTL thread. **Note:** Program types MPP, MDP, IFP, and TPI are not valid for DBCTL.
PROG	program name	Qualifies a trace 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 a trace 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	job name	Qualifies a trace 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`
RGNID	region number	Qualifies a trace 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`
TERM	lterm	For DBCTL threads, qualifies a trace request by the 4-character ID of the CICS terminal.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+` **Note:** The MSCCLOCK and SYNCLOCK operands are not applicable to DBCTL.

Table 14. SET Keywords to Define Trace Selection Criteria (Page 3 of 3)

Keyword	Operand	Description
TRAN	trancode	Qualifies a trace 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 a trace 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
USERID	userid	Qualifies a trace request by the name of the CICS sign-on user ID. Valid entries are 1- to 8-character alphanumeric CICS sign-on user IDs, which can be used with the plus qualifier (+). Multiple user IDs can be specified; for example: `USERID ==> USER1 USER2 USER6`

Filtering a Trace by Exceptions

You can use exception keywords to specify thresholds that determine which trace records are to be saved. These keywords can be used to:

- Detect occurrences of specific exception conditions.
- Limit the amount of trace storage either for online viewing or logging to VSAM data sets by tracing only the most interesting transactions for analysis. To limit data collection by exceptions, specify Y in the Exception Filters field of the Start IMS Trace Request data entry panel. This displays the Exception Filters data entry panel shown in Figure 20.

```
BMC SOFTWARE  ----------- IMS TRACE EXCEPTION FILTERS -------- PERFORMANCE MGMT
COMMAND ===>                                                     TGT ===> IMSA

TIME:                       DLI CALLS:                SQL CALLS:
 Elapsed    ==>              Total    ==>              Total      ==>
 Input Q    ==>
 Response   ==>              DB calls ==>              Sel/Fch    ==>
 Tot CPU    ==>              Get type ==>              Open       ==>
 Dep CPU    ==>              Upd type ==>              Insert     ==>
 DB2 CPU    ==>              REPL     ==>              Delete     ==>
                             ISRT     ==>              Update     ==>
 MISC COUNTS:                DLET     ==>              DDL        ==>
 DBs used   ==>                                        Dynamic    ==>
 Read/write ==>              DC calls ==>              Others     ==>
 Serial I/O ==>              Msg GN   ==>
                             Msg ISRT ==>              FP:
                             Msg PRG  ==>               CI contend ==>
                                                        FPwait Bfr ==>
                                                        OBA used   ==>
Transactions that meet one or more of the above thresholds are accepted  for the
trace.  If no filters are specified, all trace records that meet  the selection
criteria are accepted.
```

Figure 20. IMS Trace Exception Filters Data Entry Panel

A trace can be requested by exceptions by using the keywords shown in Table 15 on page 470. If none of the selection keywords are specified with an MTRAC request, all transactions that complete processing are traced.

Syntax

- Exception filter keyword values are user-defined.
- A < prefix can be used with a numeric value to define a less-than condition.

  If you do not specify a less-than condition, a comparison is made to an equal-to or greater-than condition.

  Note: If you want to trace transactions with a 0 exception, you must specify <1 for the exception filter. For example, to check transactions that have made 0 GU calls, specify <1 for the Get Type exception filter. A 0 value specified for any of these options disables that option; the specified exception is not traced.

- Specified keywords are ORed; a trace record is saved if any one of the comparison conditions is valid.

For example:

```
Response  ==> 5.5
```

collects only records with a response time equal to or greater than 5.5 seconds.

```
DB calls  ==> <5
```

collects only records that have fewer than 5 file database calls.

Note: The options in the IMS Trace Exception Filters data entry panel are described in Table 15 on page 470 in alphabetical order and are followed by a corresponding SET keyword. These keywords can be used for a SET request for a service or for multiple SET requests in a BBPARM member, as described in Chapter 46, "The SET Timer Request" on page 555.

Time can be specified either in hours, minutes, and seconds as `hh:mm:ss` or in milliseconds as `n.nnn` (8-digit maximum); for example, 3.456 or 3,456 milliseconds or 0.001 or 1 millisecond. A numeric (`n`) can be specified from 1 to 999999 or 99999K; for example, 100K (multiple of 1024) I/Os.

Table 15. Exception Filter Keyword Descriptions (Page 1 of 2)

Option / Keyword	Operand	Description
CI Contend / FPCICON	`n`	Number of Control Interval contentions
DB2 CPU / DB2CPU	`hh:mm:ss|n.nnn`	DB2 CPU time
DB calls / DLICALL	`n`	Number of database calls
DBs used / DBUSED	`n`	Number of databases used
DC calls / DLIDC	`n`	Number of DC (message) calls (message GET UNIQUE, message GET NEXT, for example)
DDL / SQLDDL	`n`	Total number of DDL and SQL calls
Delete / SQLDEL	`n`	Total number of DELETE SQL calls
Dep CPU / DEPCPU	`hh:mm:ss|n.nnn`	Dependent region CPU time
DLET / DLIDLET	`n`	Number of DELETE DL/I calls
Dynamic / SQLDYN	`n`	Total number of dynamic SQL calls
Elapsed / ELAPSED	`hh:mm:ss|n.nnn`	Transaction elapsed time
FPwait Bfr / FPWTBFR	`n`	Number of Fast Path buffer waits
Get type / DLIGTYP	`n`	Number of GET DL/I calls (GET UNIQUE, GET HOLD UNIQUE, GET NEXT, GET HOLD NEXT, for example)
Input Q / INPUTQ	`hh:mm:ss|n.nnn`	Time on the input queue

Table 15. Exception Filter Keyword Descriptions (Page 2 of 2)

Option / Keyword	Operand	Description
Insert / SQLINS	n	Total number of INSERT SQL calls
ISRT / DLIISRT	n	Number of INSERT DL/I calls
Msg GN / DLIMSGN	n	Number of message queue GET NEXT calls
Msg ISRT / DLIMSIN	n	Number of message queue INSERT calls
Msg PRG / DLIMSPR	n	Number of message queue PURGE calls
OBA used / FPOBA	n	Number of overflow buffers used
Open / SQLOPN	n	Total number of OPEN SQL calls
Others / SQLOTH	n	Total number of other SQL calls
Read/write / RDWRT	n	Number of READs and WRITEs
REPL / DLIREPL	n	Number of REPLACE DL/I calls
Response / RESPONS	hh:mm:ss| n.nnn	Response time (elapsed + input queue time)
Sel/Fch / SQLSEL	n	Total number of SELECT and FETCH SQL calls
Serial I/O / SERIO	n	Number of serialized I/Os
Tot CPU / TOTCPU	hh:mm:ss| n.nnn	Total CPU time
Total / DLITOT	n	Total number of DL/I calls
Total / SQLTOT	n	Total number of SQL calls
Upd type / DLIUTYP	n	Number of update DL/I calls (REPLACE, INSERT, DELETE)
Update / SQLUPD	n	Total number of UPDATE SQL calls

Stopping MTRAC

Note: A stopped trace is marked complete and stops collecting trace data, but the data remains available for viewing with the DTRAC service until the MTRAC request is purged. A purge stops both data collection and deletes any accumulated data.

An MTRAC 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 Chapter 19, “Displaying a List of Active Timer Requests (Primary Menu Option 2)” on page 357.

- Setting a stop time for automatic completion of data collection

  Specify the STOP value (as a timestamp) on the start or modify MTRAC request panel or with a SET request for MTRAC from the service display panel. The collected data remains available for viewing until the request is purged. For example, the following SET request:

  ```
  SET
  REQ=MTRAC,MYTRAC1,START=11:00:00,STOP=11:10:00
  ```

  stops MTRAC data collection at the end of 10 minutes. The data remains available for viewing.

- 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 Chapter 19, “Displaying a List of Active Timer Requests (Primary Menu Option 2)” on page 357.

- Purging a service request with a SET request

  Issue a PRG request with SET from the service display panel, BBPARM, or a MAINVIEW AutoOPERATOR EXEC (MAINVIEW AutoOPERATOR must be installed); for example:

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

The SET parameters are described in Chapter 46, “The SET Timer Request” on page 555.

Trace Requirements

A detail trace stores trace data for active transactions in ECSA buffers. The number and size of the detail trace buffers can be specified in either IMFBEX00 or the BBIISP00 member of the BBPARM data set. IMFBEX00 has priority over BBIISP00. The defaults for BBIISP00 are:

```
TRBUFF=10
TRSIZE=4
```

TRBUFF defines the number of detail trace buffers. TRSIZE defines the size, in K, of each trace buffer. For example, if you specify TRSIZE=50000, each trace buffer will be 48K.

When an active transactions completes, the contents of its buffer are moved to the trace areas in the BBI-SS PAS and can then be displayed by using the DTRAC service.

A pool of buffers is GETMAINed in ECSA when a detail trace is activated and then dynamically allocated to the dependent regions as needed. The buffers are returned to the pool when the trace areas in the BBI-SS PAS are updated. If, during transaction initialization, one of the buffers cannot be obtained, only a summary record is generated for the transaction.
The buffer pool is FREEMAINed either when the last detail trace stops (and the program running in each region which has a detail trace buffer allocated terminates) or when the target system terminates. The buffers in ECSA are obtained only if a detail trace is activated.

Note: To calculate an appropriate TRSIZE, estimate about 16K per 100 DL/I or SQL calls. The recommended value for TRBUFF is the maximum number of IMS dependent regions running concurrently plus 2. If there are not enough detail trace buffers, only a summary trace record is created.

MTRAC stores trace data in the private storage area of the BBI-SS PAS address space in extended private storage. This should be considered when setting up storage requirements for the BBI-SS PAS (see the *MAINVIEW Common Customization Guide* for a description of the storage requirements). When the available allocated area is full, the newest data wraps around and overlays the oldest data unless `Wrap=NO` is specified with the MTRAC request.

The size of the trace data storage area in the BBI-SS PAS can be specified with the STORAGE parameter in the MTRAC request data entry panel; for example:

```
STORAGE ==> 100K
```

requests a GETMAIN storage of 100K. The default can be specified in either the IMFBEX00 or BBIISP00 member of the BBI-SS PAS BBPARM data set. IMFBEX00 has priority over BBIISP00.

A summary trace entry requires a minimum of 376 bytes of storage per transaction. The largest amount of storage that can be used is 2776 bytes:

```
376 + (48 * 50) = 2776
```

This is 376 minimum bytes plus 48 bytes (maximum of 50) for each database trailer appended to the summary record (see the DBTS parameter in “Specifying Event Collector Options” in the Customization Guide.

A detail trace generally requires a much larger storage area than a summary trace; 52 bytes are required per detail line. So a detail trace of a transaction with 20 detail lines requires about `20 * 52 + summary trace` bytes of storage. Specifying additional storage prevents frequent wrapping.

Qualifying a Workload MTRAC Request

To limit the IMS workload components traced but not the resources, a generic operand of + can be specified for an MTRAC keyword to select all resources of that type. For example, `REGION=+` traces all regions but excludes input and output events. `TRAN=+` traces 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 trace to sample only those regions whose names begin with CICS.

Entering:

```
TRAN ==> A++N+
```

traces 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 MTRAC service requests for:

Resource Selection	Resource
PROG keyword	Program names
PSB keyword	PSBs
REGION keyword	Region jobnames
TERM keyword	LTERM names
TRAN keyword	Transaction names
USERID keyword	User IDs
DATABASE keyword	Database

Controlling Active Traces with CURRENT TRACES (Primary Menu Option 3)

You can control active trace requests by selecting the Current Traces application (Primary Menu Option 3) from the Primary Option Menu as described in Chapter 39, “Displaying a List of Current Traces (Primary Menu Option 3)” on page 497. From a list of current traces displayed by this application, you can use line commands to:

- Display collected trace data
- Show trace options
- Modify a trace request
- Switch trace log data sets
- Purge a trace request
- Replicate a trace request
- Quiesce trace logging

You can also enter primary commands to start a trace (ST) or display the History Traces (HT) application which is used to display trace log data set requests described in Chapter 37, “Logging a Trace” on page 477. For information about how to use the Current Traces application, see Chapter 39, “Displaying a List of Current Traces (Primary Menu Option 3)” on page 497.

Displaying an Online Trace with CURRENT TRACES (Primary Menu Option 3)

You can use the S line command from the Current Traces application to select an online trace for display. The LTRAC display for the selected trace is shown. You can use the LTRAC display to select an entry to see summarized trace data for a transaction instance (STRAC display). From here, you can select the DTRAC display to see detail trace data for that transaction instance. For information about how to use these displays, see Chapter 38, “Requesting a Workload Trace Data Display (LTRAC, STRAC, and DTRAC)” on page 495

Chapter 37. Logging a Trace

When you request a trace with the MTRAC service, you can also ask for the trace data to be recorded to external VSAM data sets called trace log data sets (TLDS) for later viewing. These external VSAM data sets can store both summary and detail traces. Trace log data sets can be dynamically allocated by user-selected trace log data set options with the MTRAC request or they can be pre-allocated using sample batch jobs. They are managed from the HISTORY TRACES application.

The logging of trace data requires a pre-allocated trace directory that must be identified to BBI. Setup of the directory can be done automatically during AutoCustomization or manually. The online trace directory keeps track of all trace log data sets and is maintained through the HISTORY TRACES application selected from the Primary Option Menu. The HISTORY TRACES application also can be used to display any trace logged to the trace log data set(s).

The MTRAC trace log data set options are used to assign a set of logs with each MTRAC request. These options also allow:

- Log switching
- Data set archiving when a data set is full or it switches to another data set or a trace completes normally
- Data overwrite of a data set that has not been reset yet

Log switching to the next available data set can be requested to occur:

- When a log data set is full
- At a specific time of day
- Immediately with a line command from the CURRENT TRACES application

Logging switches to the oldest trace data set if a data set is not available and the MTRAC request specifies overwrite.

If archiving is requested for a trace data set, an archive started task is run. This started task:

- Makes a copy of the data to tape or another data set
- Executes a step that allows the data set to be reused

If your site prefers to use batch jobs to pre-allocate and maintain the trace directory and the trace log data sets manually instead of dynamically, there are sample jobs available in the BBSAMP library, as described in “Maintaining Trace Data Sets Using Sample Batch Jobs” on page 484. Pre-allocated trace log data sets must have a low-level qualifier of Vnn, where nn can be 01 through 99. The first data set must have a low-level qualifier of 01.

Using Trace Logs

Trace logging provides:

- Log data sets for each trace request

  Each trace request can be assigned its own log data sets. This allows dynamic application traces to be managed separately from system-wide, continuous workload surveillance or system exception traces.

- Flexible space management

  Each trace can be logged to single or multiple data sets either pre-allocated manually or dynamically allocated and managed by the online trace services.

- User-selected logging options

  A trace can be logged simply by using option defaults, or all the options can be user-defined for complete control.

- Viewing of active trace data online

  The trace displays (LTRAC, STRAC, DTRAC) can be used to see the current data from an active trace online or from one being logged to a data set.

- Viewing of historical trace data at any time

  The History Traces application (Primary Menu Option 4) displays the data sets tracked in the online trace directory. It allows online viewing of the data recorded in these data sets with a simple line command whether the trace was written the same day, last night, a year ago, or even on another system. This means:

  – Data from completed traces saved in the trace logs can be viewed later; there is no lost data because of system interruptions.

  – Older data from an active trace with multiple log data sets can be accessed.

  – Traces can be kept as transaction profiles for later comparisons if application or system changes affect system performance.

- Tracing of very large applications

  Long-running applications can be traced without loss of data because of online trace storage buffer limitations.

Defining a Trace Directory

Before any trace can be started with trace logging, a trace directory must be:

- Allocated and initialized

  This can be done during AutoCustomization or manually using BBSAMP member JXT001. The instructions for using JXT001 are in the *MAINVIEW for DB2 Customization Guide* and are commented in JXT001.

- Identified to BBI

  It is identified to BBI by the TRDIR parameter in BBPARM member BBIISP00.

One trace directory per BBI-SS PAS (identified to that BBI-SS PAS in BBPARM member BBIISP00 as described above) is dynamically allocated when the BBI-SS PAS starts. It is a 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. Entries can be added to or deleted from the directory by using the History Traces application (see Chapter 40, “Displaying History Traces (Primary Menu Option 4)” on page 505).

Requesting Trace Logging with MTRAC Options

You can request trace logging by:

- Entering the ST application transfer command in any display to access the MTRAC request data entry panels.

or

- Selecting MTRAC from the list of monitors displayed with the SM application transfer command.

then

- Entering Y for the LOGTRAC option in the MTRAC data entry panel.

The Trace Log Data Set Options data entry panel, shown in Figure 21 on page 480, is displayed. The options are described in Table 16 on page 480 in alphabetical order. When you are finished specifying the options you want, press the ENTER key to process them. If you have requested any other MTRAC options, each panel you have used is displayed before the Start IMS Trace Request panel is returned. This gives you the opportunity to change any options you previously specified before the trace is activated.

These options will allocate the trace log data sets dynamically, overwrite existing data, archive a log data set when it is full, and switch to the next data set if they are requested. If you want to use batch jobs to manually define, archive, and restore trace log data sets, see “Maintaining Trace Data Sets Using Sample Batch Jobs” on page 484.

```
BMC SOFTWARE  ------------- TRACE LOG DATA SET OPTIONS ------ PERFORMANCE MGMT
  COMMAND ===>        TGT -- IMSA

 Number of logs   ===> 1
 First log DSN    ===>
                    Low level qualifier of DSN must be V01
                    Blank for default: CIR7.IMSA.BLANK.mmmdd.Thhmm.V01
                    Names without quotes will be prefixed with CIR7


   Overwrite logs   ===> Y    (Y/N) (Action when all logs used)
   Archive PROC     ===>            (Blank for none/PROCLIB member name)
   Log switch time  ===>            (HH:MM that a log switch is requested)

   Disposition      ===> NEW  (OLD/NEW)  If NEW, specify options below:

    Volumes         ===> (V00001,V00002,V00003)
    Primary CYLS    ===> 5                SMS Storage Class    ===> SMSSTOR
    Data DSN suffix ===> D                SMS Data Class       ===> SMSDATA
                                          SMS Management Class ===> SMSMGMT
```

Figure 21. Trace Log Data Set Options Data Entry Panel

The following table describes each option shown in Figure 21. The display is primed with defaults from BBPARM member IMFBEX00. A corresponding keyword is shown with each option in the table. These keywords can be used with a SET request, described in Chapter 46, “The SET Timer Request” on page 555, or they may be used in BBPARM IMFBEX00 to define the data entry panel default.

Table 16. Trace Log Data Set Options (Page 1 of 4)

Option/ Keyword	Operand	Description
Note: Options are in alphabetical order and are followed by the corresponding keyword. The keyword can be used for a SET request or may define a log option default for the data entry panel in BBPARM member IMFBEX00.		
Archive PROC TRARCSTC	`name`	Name of the entry in PROCLIB to archive a log data set when: • It is full • Logging switches to the next data set • Trace completes normally To set up a started task for trace log data set archiving, you can use the sample job in BBSAMP member IMFTARC as described in “Archiving a Trace Log Data Set” on page 485. To restore an archived trace for online viewing, use the sample job described in “Restoring an Archived Trace Log Data Set” on page 485.
Data DSN Suffix TRSUFFIX	`xxx`	The variable `xxx` is the suffix to be appended to the name of the VSAM cluster to make the name of the data component. The default value is specified with the TRSUFFIX keyword in BBPARM member IMFBEX00. The initial default is D.

Table 16. Trace Log Data Set Options (Page 2 of 4)

Option/ Keyword	Operand	Description
Disposition TRDISP	NEW|OLD	NEW There are no existing trace log data sets. All data sets are allocated when the trace request is processed. If any data set cannot be allocated, the trace request fails and any data set successfully allocated is deleted. OLD There are existing trace log data sets. For example, there may be some data sets that were pre-allocated with BBSAMP member JXT011 as described in "Maintaining Trace Data Sets Using Sample Batch Jobs" on page 484. Any existing data in these data sets is to be overwritten. **Note:** If you are not authorized for dynamic trace log data set allocation (NO is specified for TRALLOC in your BBPARM user authorization member), only OLD is accepted.

Table 16. Trace Log Data Set Options (Page 3 of 4)

Option/ Keyword	Operand	Description

First Log DSN
TRDSN
	`name`.V01	Name of the first log data set to be allocated. The low-level qualifier must be V01. If this keyword is omitted and the data set disposition is specified as NEW, a default name is generated as:
		
		`trprefix.imsid.traceid.mmmdd.Thhmm.V01`
		
		`trprefix` Your user ID or the prefix specified with the TRPREFIX parameter in IMFBEX00.
		
		`imsid` ID of the IMS target.
		
		`traceid` The request identifier specified in the PARM field of the first Start IMS Trace Request panel. If the PARM field is blank, BLANK is the default value for `traceid`.
		
		`mmmdd` Current month and day.
		
		`Thhmm` Current time.
		
		`V01` Required suffix.
		
		If the name is enclosed in single quotes, it is used as specified. If quotes are not used, the TRPREFIX value specified in IMFBEX00 is added in front of the specified name. If TRPREFIX was not specified, the ID of the user requesting the trace is used. For example, you can specify:
		
		`TEST.V01`
		
		to allocate `userid`.TEST.V01, where `userid` is your user ID.
		
		If you are using a SET request for MTRAC, as described in Chapter 46, “The SET Timer Request” on page 555, instead of the MTRAC request data entry panels and you specify TRDSN without LOGTRAC, Y is assumed for LOGTRAC.

Log switch time TRSWTIME	`hh:mm`	The variable `hh:mm` specifies the time an automatic log switch from the current log to the next log will occur. This is valid only if the Number of Logs option is >1. **Note:** A switch to another log data set can be made at that time only if there is one available that is empty or marked for reuse.

Table 16. Trace Log Data Set Options (Page 4 of 4)

Option/ Keyword	Operand	Description
Number of Logs TRNUMDS	n	The variable n is the number of trace log data sets to be used for this trace. The default is 1. Specify more than one for continuous traces. This allows automatic switching when a log data set is full. If you are using a SET request for MTRAC, as described in Chapter 46, "The SET Timer Request" on page 555, instead of the MTRAC request data entry panels and you specify TRNUMDS without LOGTRAC, Y is assumed for LOGTRAC.
Overwrite logs TRREUSE	Y|N	Indicates the action to be taken when a log data set is about to be used for trace data and is not reset: Y Overwrite existing data N Quiesce logging **Note:** If the data set is reset, this option has no effect.
Primary CYLS TRCYL	n	The variable n can be 1 to 999. It is the primary allocation in cylinders for trace log data sets. The initial default value specified in IMFBEX00 with the TRCYL keyword is 3.
SMS Data Class TRSMSDCL	name	Name of the SMS data class to be used to allocate a trace log data set. The default is specified in IMFBEX00 with the TRSMSDCL keyword.
SMS Management Class TRSMSMCL	name	Name of the SMS management class to be used to allocate a trace log data set. The default is specified in IMFBEX00 with the TRSMSMCL keyword.
SMS Storage Class TRSMSSCL	name	Name of the SMS storage class to be used to allocate a trace log data set. The default is specified in IMFBEX00 with the TRSMSSCL keyword.
Volumes TRVOLS	(x,x...)	The variable x is the volume(s) to use to allocate a trace log data set. You can specify up to seven volumes. Parentheses are required to specify multiple volumes. The initial default value specified in IMFBEX00 with the TRVOLS keyword is SYSDA. If the Number of Logs option is 1, the data set is allocated on the first volume. If more than one log is specified for the Number of Logs option, the data sets are allocated alternately on each specified volume (if there is enough space) until all data sets are allocated. **Note:** A volume specification replaces any SMS class specification. However, if your site is SMS-controlled, the volume specified may be overridden by your SMS criteria. SMS-controlled sites do not need to specify volume(s). Non-SMS-controlled sites must specify volume(s) to avoid an IDCAMS define error.

Maintaining Trace Data Sets Using Sample Batch Jobs

You can create trace log data sets dynamically as described in“Requesting Trace Logging with MTRAC Options” on page 479 or manually by using sample jobs from the BBSAMP data set. These sample jobs allow you to:

- Create and maintain the trace directory

  As described in “Defining a Trace Directory” on page 478, trace logging requires a pre-allocated trace directory. The BBSAMP sample members you can use for the trace directory are:

  JXT001 You do not need to use this job if the directory was created by AutoCustomizaton. It defines and initializes the trace directory. The instructions are commented in JXT001 and are also in the *MAINVIEW for DBCTL Customization Guide*.

  JXT003 Synchronizes trace directory information with the actual status of the trace log data sets. The instructions for using this job are commented in JXT003 and are also in the *MAINVIEW for DBCTL Customization Guide*.

- Define a trace log data set

  As described in “Requesting Trace Logging with MTRAC Options” on page 479, you can let the BBI-SS PAS allocate trace log sets for you, if you are authorized for this, or you can use the following sample job to allocate them manually:

  JXT011 Defines a trace log data set. The instructions for using this job are commented in JXT011 and are provided in this section.

- Archive a trace log data set

  To set up a started task for automatic archiving, as described in “Requesting Trace Logging with MTRAC Options” on page 479, use:

  IMFTARC Copies a trace log data set to a sequential data set for archival and marks the trace log data set for reuse. The instructions for using this job are provided in this section.

- Restore an archived trace log data set

  IMFTRLOD Reloads an archived copy of a trace to a new trace log data set so that it can be viewed online. The instructions for using this job are provided in this section.

- Create a trace log data set from the IMS log

  IMFLOGTR Creates a summary trace from the IMS log and records it in a trace log data set. The instructions for using this job are provided in this section.

Defining a Trace Log Data Set

You can define different trace log data sets as often as you need them with a batch job or you can let the BBI-SS PAS allocate them for you dynamically, if you are authorized, by using the MTRAC service. You must define them manually if you are not authorized for BBI-SS PAS dynamic data set allocation. BBSAMP member JXT011 is a sample batch job you can use to define a trace log data set (TLDS) as a linear data set using IDCAMS. This pre-allocates a TLDS that can then be referenced when you request a trace with MTRAC.

This job has three steps:

1. Complete the job statement information.
2. Define the name of the trace log data set.

   The low-level qualifier must be `Vnn`, where `nn` can be 01 through 99. The first data set must have a low-level qualifier of V01.
3. Provide a valid volume value for the define statement.

Archiving a Trace Log Data Set

Use BBSAMP member IMFTARC to set up a started task for automatic archiving of a TLDS. It is executed when a data set is full, when logging switches to another data set, or when the trace completes by specifying it with the Archive PROC option on the initial MTRAC data entry panel. This procedure has two steps:

1. Unload the trace log data set to a GDG (generation data group) data set.
2. `PGM=JXTRES` marks the trace log data set as RESET in the header.

You also can use this member as a model to create a batch job to archive or reset a log data set instead of using a started task. It can be invoked from the History Traces panel with an A line command if it is specified with the Archive PROC option on the initial MTRAC data entry panel. Otherwise, it must be submitted manually.

Restoring an Archived Trace Log Data Set

Use BBSAMP member IMFTRLOD to restore an archived trace log data set. This job has two steps:

1. Define a VSAM linear data set.
2. Load the archived data to the defined linear data set.

You can add the linear data set to the online trace directory to view the contents online by using the NEW primary command in the History Traces application (see “NEW Primary Command” on page 508).

Creating a Trace Log Data Set from the IMS Log or an IRUF File

Use BBSAMP member IMFLOGTR to create a user-selected summary trace from the IMS log. This job has two steps:

1. Define a trace log data set
2. Load user-selected data from the IMS log to the defined trace log data set

Note: You could load user-selected data to the defined trace log data set using an IRUF file created by the MAINVIEW for IMS Offline Log Edit program IMFLEDIT. For more information, see the *MAINVIEW for IMS Offline – Customization and Utilities Guide*.

You can add the trace log data set to the online trace directory to view the contents online using the NEW command in the History Traces application (see page 508).

IMFLOGTR defines a trace log data set as a linear data set using IDCAMS. It provides trace identification parameters and filter parameters and produces a report called the “Processing and Exception Log”. This report contains statistics showing all the parameters specified and the results of IMS log processing by IMFLOGTR.

Job Control Language Statements

- Using a copy of BBSAMP member IMFLOGTR, change:
  - The JOB statement.
  - PFX in the PROC statement to your site's requirements.
  - The IMSLOG symbolic parameter to specify your existing IMS log data set and the TLDS symbolic parameter to specify your new trace log data set.
  - The DEFINE statement to identify your new trace log data set (NAME), the volume (VOLUMES) where it is to reside, and the amount of space (CYL) it needs.
- Review IMFLOGTR PARM options for the EXEC statement:

  ```
  //LOAD   EXEC PGM=IMFLOGTR,REGION=4M,PARM='option'
  ```

  The `option` variable can be:

  READALL
  : Read the entire IMS log even if the trace log data set is full. The default is to stop reading the log when the data set is full.

  ALLCOUNTERS
  : Report the results of IMS log processing and all types and number of log records read. The default is to report only Event Collector transaction records (X'FA'). Other IMS log record counts are not reported.
- Specify the following DD statements for:

  SYSPRINT
  : Defines the print output data set for the “Processing and Exception Log” report.

  SYSUT1
  : Defines the IMS log data set.

SYSUT2
: Defines the output trace log data set.

SYSIN
: Defines the IMFLOGTR parameter statements.

- Specify IMFLOGTR parameter statements:

  The following keywords are used to identify the trace and filter the summary trace data. Exception filters for IMFLOGTR are the same as those used for an MTRAC request.

  Trace Identification Parameters:

  SSID — 1- to 4-character ID of the BBI subsystem for the trace. The default is the first SMF ID found in the IMS log.

  TARGET — 1- to 8-character job name of the target system for the trace. The default is the first IMS job name found in the IMS log.

  UID — 1- to 8-character ID of the user creating the trace. The default is the name of the job creating the trace.

  TITLE — 1- to 24-character trace title. The default is LOAD FROM IMS LOG. If your title contains blank characters, it must be enclosed in single quotation marks.

  PARM — 1- to 8-character identifier assigned to the trace to make this trace unique. The default is BATCHLOD.

  Trace Filter Parameters:

  The following parameters qualify the summary trace records from the IMS log by start and stop times and exceptions:

  Start and Stop Filters

  You can specify:

  – Date and time as `yyyy-mm-dd-hh.mm.ss`

  – Date as `yyyy-mm-dd`

  For example, `START=20yy-12-05`

  START — Date or date and time to start the summary trace load from the IMS log to the trace log data set. The default is to start with the first record found on the IMS log.

  STOP — Date or date and time to stop the summary trace load from the IMS log to the trace log data set. The default is to stop at the last record found on the IMS log.

  RDSTOP — Date or date and time to stop the read of the IMS log. If RDSTOP is specified, reading stops when RDSTOP is encountered; no more records are loaded into the trace log data set.

  To find out what the total number of summary records in the IMS log is, specify RDSTOP to force processing of the log even if the trace log data set is full. You can use this information to help you size your trace log data set.

Exception Filters

These are the same parameters used by MTRAC to filter a trace by exceptions. As described in "Filtering a Trace by Exceptions" on page 469, you can use these parameters to set a threshold by time or by a count. You can specify a threshold with an = (equal-to or greater-than condition) or a < (less-than condition) character as shown in the examples below.

Exceptions by time can be specified as either `hh:mm:ss` or seconds as `nnn.nnn`, for example,

> `INPUTQ=00:15:00`
>
> Only those records with an input queue time equal to or greater than 15 seconds are loaded from the IMS log into your trace log data set.
>
> `RESPONS<.001`
>
> Only those records with a response time that is less than one thousandths of a second are loaded from the IMS log into your trace log data set.

Exceptions by count can be:

> `DBUSED=2`
>
> Only those records that have two or more used databases are loaded from the IMS log into your trace log data set.
>
> `RDWRT<5`
>
> Only those records that have less than five reads and writes are loaded from the IMS log into your trace log data set.
>
> You cannot specify a decimal place with a count filter.

Time Exceptions

Parameters used as filters to qualify the trace by time include:

DB2CPU	DB2 CPU time
DEPCPU	Dependent region CPU time
ELAPSED	Transaction elapsed time
INPUTQ	Time on the input queue
RESPONS	Response time (elapsed + input queue time)
TOTCPU	Total CPU time

Count Exceptions

Parameters used as filters to qualify a trace by amount of activity against a resource include:

DBUSED	Number of databases used
DLICALL	Number of database calls
DLIDC	Number of DC (message) calls (message GET UNIQUE, message GET NEXT, for example)
DLIDLET	Number of DELETE DL/I calls
DLIGTYP	Number of DL/I calls (GET UNIQUE, GET HOLD UNIQUE, GET NEXT, GET HOLD NEXT, for example)

DLIISRT	Number of INSERT DL/I calls
DLIMSGN	Number of message queue GET NEXT calls
DLIMSIN	Number of message queue INSERT calls
DLIMSPR	Number of message queue PURGE calls
DLIREPL	Number of REPLACE DL/I calls
DLITOT	Total number of DL/I calls
DLIUTYP	Number of update DL/I calls (REPLACE, INSERT, DELETE)
FPCICON	Number of Control Interval contentions
FPOBA	Number of overflow buffers used
FPWTBFR	Number of Fast Path buffer waits
RDWRT	Number of READs and WRITEs
SERIO	Number of serialized I/Os
SQLDDL	Total number of DDL and SQL calls
SQLDEL	Total number of DELETE SQL calls
SQLDYN	Total number of dynamic SQL calls
SQLINS	Total number of INSERT SQL calls
SQLOPN	Total number of OPEN SQL calls
SQLOTH	Total number of other SQL calls
SQLSEL	Total number of SELECT and FETCH SQL calls
SQLTOT	Total number of SQL calls
SQLUPD	Total number of UPDATE SQL calls

Messages

Complete descriptions of the messages issued by IMFLOGTR can be seen by selecting the MESSAGES option (Option M in General Services) from the Primary Option Menu. The last character of the message indicates its type as shown below. The highest severity type is listed first.

C Critical, return code of 12

E Exceptional, return code of 8

W Warning, return code of 4

I Informational, return code of 0

Controlling Trace Logging with CURRENT TRACES (Primary Menu Option 3)

You can control trace requests for logging by selecting the Current Traces application (Primary Menu Option 3) from the Primary Option Menu as described in Chapter 39, “Displaying a List of Current Traces (Primary Menu Option 3)” on page 497. This application displays a list of current trace requests. The line commands you can use in this application to control trace logging include:

- Show trace log options
- Modify a trace log request
- Switch trace log data sets
- Quiesce trace logging

The show line command produces additional logging information, which is described in this section. This section also describes considerations for modifying a trace log request. For information about how to use the Current Traces application, see Chapter 39, “Displaying a List of Current Traces (Primary Menu Option 3)” on page 497.

Show a Trace Log Request (W Line Command)

You can use the W line command from the Current Traces application (Primary Menu Option 3) to view the trace log data set options specified for a trace request.

The IMS Trace Request panel is shown for the selected MTRAC request. To see the log options specified, enter a Y for “Trace Log Data Set Options”. This displays the Trace Log Data Set Options and additional trace log fields read from the current trace log data set, as shown in Figure 22.

```
BMC SOFTWARE  ----------- TRACE LOG DAT SET OPTIONS --------- PERFORMANCE MGMT
 COMMAND ===>                                                      TGT -- IMSA

  Number of logs:       3
  Log DSN:              CIR1.IMSA.SUMMARY.MAY21.T1125.V01

  Recording Start:      15DECyy 00:01:00   Percent used: 100   Status: RESET
  Recording Stop:       15DECyy 23:59:59   Data lost:    No

  Overwrite logs:       Y
  Archive PROC:         ARCHJCL1
  Log switch time:      24:00:00

  Disposition:          NEW

  Volumes:              BAB003,BAB303,BAB009
  Primary CYLS:         3                SMS Storage Class:
  Data DSN Suffix:      DATA             SMS Data Class:
                                         SMS Management Class:
```

Figure 22. Show Trace Log Data Set Options

This panel shows the previously defined trace log options (see Figure 21 on page 480) and additional fields read from the current trace log data set. The Log DSN field is either the name of the current log data set if the trace is active or the name of the last data set used if the trace is complete.

The fields read from the current trace log data set include:

Recording Start: Date and time this data set was activated for logging.

Recording Stop: Date and time of the last record written to this data set.

Percent Used: Number of pages used divided by the number of pages allocated, expressed as a percent, for this data set.

Data Lost: YES|NO. Indicates whether any data was lost while writing to this log data set.

Status: The status of the log data set. This can be:

- EMPTY — Data set contains no trace records.
- UPDATE — Data set is being updated.
- USED — Data set contains valid trace data.
- RESET — Data set contains valid trace data and is marked for reuse.
- INCOMP — Data set did not close or archive successfully after an update; for example, in a system failure.

Modify a Trace Log Request (M Line Command)

As described in Chapter 39, "Displaying a List of Current Traces (Primary Menu Option 3)" on page 497, you can change MTRAC request options, including those for logging a trace, by selecting a trace request with the M line command. This displays a data entry panel(s) with the options that were defined to activate the selected trace (see Chapter 36, "Requesting Workload Trace Data Collection (MTRAC)" on page 459). Only those options with an `===>` can be changed.

Note: You cannot modify the LOGTRAC option after the trace has started. Thus, you cannot start or stop logging in the middle of a trace with a modify line command. To change the log options specified, enter a Y for "Trace Log Data Set Options".

The following table describes trace log options you might consider changing when logging is active. All the trace log options are described in Table 16 on page 480

Table 17. Modifiable Trace Logging Options (Page 1 of 2)

Option	Keyword	Possible Use
The first column lists options in alphabetical order. The second column contains the corresponding keyword. The keyword can be used for a SET request or may define a log option default for the data entry panel in BBPARM member IMFBEX00.		
Archive PROC	TRARCSTC=`name`	To change the name of the archive job, perhaps to archive to a different set of archive data sets.
Log switch time	TRSWTIME=`hh:mm`	Allows you to change the time when a log switch occurs. For instance, you might want to add a data set by increasing the number of them (TRNUMDS) and then force a switch to free up the current data set.

Table 17. Modifiable Trace Logging Options (Page 2 of 2)

Option	Keyword	Possible Use
Number of logs	TRNUMDS=n	To increase or decrease the number of trace log data sets. If you increase the number of data sets (TRNUMDS) and NEW is specified for the data set disposition (TRDISP=NEW), additional data sets are allocated before the modify request is considered successful.
Overwrite logs	TRREUSE=Y|N	Changing from Y to N prevents overlaying data that is not archived. Changing from N to Y assures that a data set is always available for new trace data, but old trace data may be overlaid before it can be archived.
Primary CYLS or SMS Data Class SMS Management Class SMS Storage Class Volumes	TRCYL=n or TRSMSDCL=name TRSMSMCL=name TRSMSSCL=name TRVOLS=(x,x...)	If NEW is specified for the data set disposition (TRDISP=NEW) and you are adding log data sets by increasing their number (TRNUMDS), you may want to change the allocation parameters for these new data sets to allocate them on different volumes or to increase their size.

Note: If the number of logs is increased using the modify command, the additional log data sets must be successfully allocated before the request is considered successful. If they cannot all be allocated, the request fails and any additional data sets that were allocated dynamically are deleted. Logging continues with the original number of log data sets.

Switch Log Data Sets (I Line Command)

You can request that trace logging be switched immediately to the next available data set by selecting that trace request with the I line command. An archive request for the trace log data set just deactivated is started if the selected MTRAC request specified the archive option.

If the switch command is issued and only one log data set is defined, logging either reuses the same data set or quiesces. Logging resumes with the same data set if the Overwrite Log option for the MTRAC request was Y (yes). Logging quiesces if the Overwrite Log option for the MTRAC request was N (no).

Note: You must be authorized to issue the I (SWITCH) line command for traces other than your own. This is done with the PMACC parameter in a user authorization member of the BBPARM data set as described in *Implementing Security for MAINVIEW Products*.

Quiesce Trace Logging (Q Line Command)

Once quiesced, logging cannot be restarted for this request. The trace continues to run, but no data is written to the log. To restart logging, the request must be purged with the P line command. Another request for this trace with the logging options specified must be activated.

Note: You must be authorized to issue the Q (QUIESCE LOGGING) line command for traces other than your own. This is done with the PMACC parameter in a user authorization member of the BBPARM data set as described in *Implementing Security for MAINVIEW Products*.

Displaying a Logged Trace with HISTORY TRACES (Primary Menu Option 4)

As described in Chapter 40, “Displaying History Traces (Primary Menu Option 4)” on page 505, you can display a logged trace from a trace log data set by using the S line command to select a trace log data set from the History Traces list application. This presents the LTRAC display, described in Chapter 43, “LTRAC - List of Trace Entries” on page 523. When the trace data is from a trace log data set, the following message appears in line 4 of the display:

```
ENTRIES IN DATASET
```

The EXPAND line shows HISTORY. You can use this field to toggle between the data from the selected trace log data set and the current trace data in online storage buffers. Move the cursor to the HISTORY field and press ENTER to see current trace data. Press ENTER to see the selected historical trace data. The target for displayed history trace data is shown in the HIST TGT field of the LTRAC field.

You can use the LTRAC display to select an entry to see summarized trace data for a transaction instance (STRAC display). From here, you can then select the DTRAC display to see detail trace data for that transaction instance. For information about how to use these displays, see Chapter 38, “Requesting a Workload Trace Data Display (LTRAC, STRAC, and DTRAC)” on page 495.

Chapter 38. Requesting a Workload Trace Data Display (LTRAC, STRAC, and DTRAC)

Data collected by an MTRAC request, whether it is still in online trace storage buffers or saved in trace log data sets (see Chapter 37, “Logging a Trace” on page 477), can be displayed by:

LTRAC Displays a list of transaction instances selected for a trace request. Each instance corresponds to a completed transaction.

STRAC Displays summarized trace data about the activity generated by one transaction instance.

DTRAC Displays a detail trace of events that occurred for one transaction in chronological order 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.

Data collection must first be activated with an MTRAC request before any trace display service can be requested. If an identifier is specified with the MTRAC request, that same identifier must be used with the trace display service to view that trace request. Only one MTRAC request can be active without an identifier; the request identifier defaults to blanks.

The easiest way to display a trace is to use an S line command to select an active trace request or a logged trace data set from a service application list. This displays the LTRAC service for that selection. An active request can be selected from the Current Traces application (Primary Menu Option 3), as described in Chapter 39, “Displaying a List of Current Traces (Primary Menu Option 3)” on page 497. A logged trace data set can be selected from the History Traces application, (Primary Menu Option 4), as described in Chapter 40, “Displaying History Traces (Primary Menu Option 4)” on page 505. The Active Timer Requests list application also can be used to select an active trace request.

When you display the LTRAC service for a selected MTRAC request or a logged data set, you can use the trace displays to build trace information as follows:

1. Select Primary Menu Option 3 if you want to see a list of active traces; select Primary Menu Option 4 if you want to see a list of trace log data sets.
2. Use the S (SELECT) line command.

   The LTRAC service showing a list of transaction instances is displayed for that selection.
3. Use the LTRAC S line command to select a transaction instance.

   The STRAC service showing summarized activity for that selected transaction instance is displayed.
4. Use the STRAC EXPAND line to select the DTRAC service for that transaction instance.

   The DTRAC service displays a detailed trace of events in chronological order for that transaction instance 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.

The type of trace shown depends upon the type requested with MTRAC (SUMMARY or DETAIL).

Any of the trace display services for an active MTRAC request also can be requested from a list of analyzer display services (Primary Menu Option 1) or from the SERV field of a display. You must specify the identifier of the MTRAC request when you request the trace display service. For example, for the following MTRAC request identified as MTRAC1:

```
PARM      ==> MYTRAC1
TYPE      ==> DETAIL
TRAN      ==> PART
```

DTRAC is requested for this active trace with the same MYTRAC1 identifier from the list of analyzer display services or SERV field of a display as follows:

```
SERV      ==> DTRAC
PARM     ==> MYTRAC1
```

Chapter 39. Displaying a List of Current Traces (Primary Menu Option 3)

The trace services (MTRAC to request a trace and LTRAC, STRAC, and DTRAC to display the collected trace data) are provided by the Workload Analyzer component of MVIMS. To view a list of traces activated with an MTRAC request:

- Select Primary Menu Option 3, CURRENT TRACES, from the Primary Option Menu.
- Enter a CT command to transfer to this application from another application. A scrollable list of all the active traces that you are authorized to view is displayed as shown below.

```
BMC SOFTWARE  ------------------ CURRENT TRACES -------------  PERFORMANCE MGMT
COMMAND ===>                                                       TGT ===> IMSA
                                 INPUT    INTVL ==> 3      TIME --  14:31:36
 COMMANDS: ST (START APPLICATION TRACE), HT (HISTORY TRACES), TYPE
 LC CMDS:  S (SELECT), W (SHOW),      M (MODIFY), I (SWITCH), Z (STOP)
           P (PURGE),  R (REPLICATE), H (HELP),   Q (QUIESCE LOGGING)       <<<
 LC  PARM     TITLE                      USER ID  TARGET TYPE AREA  STAT  LOG
     PAYROLL  PAYROLL TRANSACTIONS       CIR11    IMSA    DET IWKLD ACTV  ACT
     APSB01   TRACE OF APSP01            PWW1     IMSA    DET IWKLD ACTV  QIS
     JSC      WORKLOAD TRACE             JSC4     IMSA    SUM IWKLD ACTV
  ****************************** END OF REQUESTS ****************************
```

Figure 23. Current Traces Application

Trace requests are shown in the list as they are processed. This application allows service selection by line command and shows all the active requests, parameters specified for each request, the user logon identification, the target IMS of the request, the service security classification, the area of IMS being monitored, the service status, and the logging status for this request.

Selecting an active trace request invokes the LTRAC service for that trace. Other line commands can be used to view current trace request options, access data entry panels to replicate or change current options to make another unique trace request, or confirm a purge of the selected request.

The fields for the Current Traces application are:

Field Name	Description
INTVL	Screen refresh field. You can specify a refresh interval for this application. Entering GO in the COMMAND field or pressing PF6/18 starts the refresh cycle.
LC	A line command input field. One-character line commands can be entered in this field to view, modify, or replicate the options for a selected request; purge a request; or display HELP information about the service (see “Line Commands” on page 500).
PARM	This field shows the parameters defined for the active requests.
TITLE	The service title.

USER ID — The logon identification of the user who made the request.

TARGET — The IMS subsystem defined as the target of the requested service either by default or user-specified.

SEC — The security code for user access to the service.

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

Field Data	Description
DB	Database activity and buffer pool utilization
IMVS	IMS and OS/390 interactions
INTNL	IMS internal functions
IWDB2	IMS workload DB2 activity
IWFP	IMS workload Fast Path activity
IWGBL	IMS workload global IMS region calls
IWKLD	IMS workload
IWTRN	IMS workload transactions
LOCK	IRLM functions
MFS	Terminal I/O
QUEUE	IMS queuing
REGN	Application program activity in the dependent regions
SCHED	Scheduling of application programs in the dependent region

STAT — The service request status, which could be:

Field Data	Description
ACTV	The request is active.
COMP	The request executed and completed normally.
HELD	The request is being held and is pending release.
INIT	The request is being invoked for the first time (a start time was specified, but it has not been reached).
INV	The request terminated because of an invalid parameter or measurement. The BBI-SS PAS Journal log contains a descriptive message of the error.
LOCK	A LOCK command was issued for the service or the service abended.
QIS	The service is quiesced, because the target IMS is not active.

	RST	The target IMS restarted. The request is waiting until the current interval expires before performing restart processing as specified by the RST keyword in the original request.
LOG	The trace logging status for this request. The possible values are:	
	blank	Logging was not requested for this trace.
	ACT	Logging is active.
	QIS	Logging is quiesced.
	SUSP	Logging is suspended because the trace is quiesced. Logging resumes when the trace restarts.

Application Transfer Commands

The following related application transfer commands can be entered in the COMMAND field of the Current Traces list application showing all active trace requests:

HT (HISTORY TRACES)
ST (START TRACES)

HT (HISTORY TRACES)

HT displays the History Traces application (see Chapter 40, “Displaying History Traces (Primary Menu Option 4)” on page 505), which is used to manage trace log data sets where traces are recorded. Use this command to access and control the current and historical trace logs.

ST (START TRACES)

ST displays the MTRAC data entry panel to start a trace request. Specify the keyword parameters, selection criteria, and exception filters in successive panels to activate data collection for a summary or detail trace as described in Chapter 36, “Requesting Workload Trace Data Collection (MTRAC)” on page 459.

TYPE Primary Command

Entering TYPE in the COMMAND line lists the traces of the specified type only. The possible types that can be specified are shown in the TYPE column of the History Traces application. For example, to list only detail traces), enter:

```
COMMAND ===> TYPE DET
```

Enter TYPE to return to the list of all traces.

Line Commands

Entering one of the following one-character line commands in the LC field for a request executes the line command function. Multiple selections can be entered at one time by selecting a series of services and pressing the ENTER key. Each display in a series is processed by pressing the END key. Each data entry timer request panel in a series that is to be modified or purged is submitted by pressing the ENTER key and then the END key to process the next request.

Line Command	Description
S	SELECT. Displays a list of scrollable trace entries. Selecting an active workload trace (MTRAC) request displays the collected IMS trace entries (LTRAC) for the selected trace request.
W	SHOW. Shows a display panel of the trace request options defined for the selected request for viewing only (see "Show Trace Options Request (W Line Command)" on page 502).
M	MODIFY. Shows a data entry panel of the trace options defined for the selected request so the options can be changed (see "Modify Trace Options Request (M Line Command)" on page 501).
I	SWITCH. Switches logging of traces from the current VSAM data set to the next available one (see "Switch Log Data Set Request (I Line Command)" on page 503).
Z	STOP. Stops the request and retains collected data. The STOP time equals the current time. **Note:** You must be authorized to issue the Z (STOP) line command for traces other than your own. This is done with the PMACC parameter in a user authorization member of the BBPARM data set as described in *Implementing Security for MAINVIEW Products*.
P	PURGE. Displays a PURGE panel to verify a purge of the selected request (see "Purge a Trace Request (P Line Command)" on page 501).
R	REPLICATE. Shows data entry panels for the trace options defined for the selected request so that the options can be repeated or changed to make a new request for that service (see "Replicate a Trace Request (R Line Command)" on page 502). The request must be unique (defined by the service select code plus a parameter).
H	HELP. Displays HELP information about the service for the selected request.
Q	QUIESCE LOGGING. Quiesces logging of traces to an external VSAM data set (see "Quiesce Trace Logging Request (Q Line Command)" on page 502).

List of Trace Transactions Display (S Line Command)

The S (SELECT) line command for a trace displays the LTRAC service. LTRAC shows a scrollable list of transaction instances for the selected trace. From here, all other trace displays can be accessed with EXPAND as described in Chapter 43, “LTRAC - List of Trace Entries” on page 523.

Modify Trace Options Request (M Line Command)

Selecting a trace request with the M line command displays a data entry panel(s) with the options that were defined to activate the selected trace (see Chapter 36, “Requesting Workload Trace Data Collection (MTRAC)” on page 459). Only those options with an `===>` can be changed.

Note: If trace logging to external VSAM data sets was specified with the LOGTRAC option (Y for yes to start trace logging; N for NO to stop it), it cannot be changed with the modify command while a trace is active.

For more information about trace logging and the options you can change after logging is active, see “Modify a Trace Log Request (M Line Command)” on page 491.

Purge a Trace Request (P Line Command)

Selecting an active trace request with the P line command displays a purge confirmation panel like the one shown on page 366. Pressing the ENTER key confirms a purge of the selected service request. 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 Current Traces list application.

To stop a request and retain a trace, use the modify command and enter a stop time.
That allows information to remain after collection stops. If a request is purged, all data is lost.

Note: You must be authorized to issue the P (PURGE) line command for traces other than your own. This is done with the PMACC parameter in a user authorization member of the BBPARM data set as described in *Implementing Security for MAINVIEW Products*.

Quiesce Trace Logging Request (Q Line Command)

If the Current Traces application shows ACT for the LOG field of a request, the trace is being logged to external VSAM data sets (see Chapter 37, “Logging a Trace” on page 477). Selecting that trace request with a Q line command immediately quiesces logging of the trace.

Once quiesced, logging cannot be restarted for this request. The trace continues to run, but no data is written to the log. To restart logging, the request must be purged with the P line command. Another request for this trace with the logging options specified must be activated.

Note: You must be authorized to issue the Q (QUIESCE LOGGING) line command for traces other than your own. This is done with the PMACC parameter in a user authorization member of the BBPARM data set as described in *Implementing Security for MAINVIEW Products*.

Replicate a Trace Request (R Line Command)

The R line command displays the MTRAC Start IMS Trace Request data entry panel and each of the additional MTRAC options panels, described in Chapter 36, “Requesting Workload Trace Data Collection (MTRAC)” on page 459, for the selected trace request. Each of the panels shows the options specified when the original trace request was activated. All values prefixed with an ===> can be modified.

Note: If the request specified a STOP time, it appears as nnnn, where nnnn is the number of intervals remaining until the trace stops.

The R line command is used to replicate a request to define another one. Each request must be unique with an ID in the PARM field that identifies the request. The display is preset with the service select code.

Pressing the ENTER key submits the request. 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 Current Traces list application.

Show Trace Options Request (W Line Command)

Selecting a trace request with the W line command shows the MTRAC Start IMS Trace Request panel and each of the additional MTRAC options panels, if requested, used to submit the selected trace (see Chapter 36, “Requesting Workload Trace Data Collection (MTRAC)” on page 459). If trace log options were specified with the trace request, additional fields are shown with the previously defined trace log options. These fields are obtained from the current trace log data set (see “Show a Trace Log Request (W Line Command)” on page 490).

Each option is suffixed by a colon (:), which means the option value cannot be changed. An ===> for the “additional trace options” fields allows you to enter a Y if you want to review any additional trace options you have defined previously. Press the END key to return to the Current Traces list application.

Switch Log Data Set Request (I Line Command)

If a trace is being logged to external VSAM data sets (see Chapter 37, “Logging a Trace” on page 477), the Current Traces application shows ACT for the LOG field of the trace request.

You can request that trace logging be switched immediately to the next available data set by selecting that trace request with the I line command. An archive request for the trace log data set just deactivated is started if the selected MTRAC request specified the archive option.

If the switch command is issued and only one log data set is defined, logging either reuses the same data set or quiesces. Logging resumes with the same data set if the Overwrite Log option for the MTRAC request was Y (yes). Logging quiesces if the Overwrite Log option for the MTRAC request was N (no).

Note: You must be authorized to issue the I (SWITCH) line command for traces other than your own. This is done with the PMACC parameter in a user authorization member of the BBPARM data set as described in *Implementing Security for MAINVIEW Products*.

Chapter 40. Displaying History Traces (Primary Menu Option 4)

This application is provided by the Workload Analyzer component of MVIMS. It is used to display historical traces recorded to trace log data sets and to manage these data sets. The recording of traces to trace log data sets can be defined with an MTRAC service request to activate a trace. To use this History Traces application, you should understand how to request trace logging and how it works as described in Chapter 36, “Requesting Workload Trace Data Collection (MTRAC)” on page 459 and Chapter 37, “Logging a Trace” on page 477.

History Traces can be accessed by:

- Selecting Primary Menu Option 4 from the Primary Option Menu
- Entering an HT command to transfer to this application from another one.

```
BMC SOFTWARE  ---------------- HISTORY TRACES  --------------  PERFORMANCE MGMT
 COMMAND ===>         TGT ===> IMSA
                                             TIME--  09:36:34  SCROLL ===> CSR
 COMMANDS: SORT, LOCATE, NEW, STOP, START, TYPE
 LC CMDS:  S (SELECT), W (SHOW), P (PRINT)   D (DELETE),  E (RESET)
           V (VERIFY), N (NEW),  A (ARCHIVE), F (FREE)

  DIRECTORY:    CIR4.LL1X.TRACEDIR
  ENTRIES USED: 1,209     FREE:   201
                                                            SCROLL  RIGHT >>>
 LC  DATE------TIME TRACEID  TITLE                    USERID   TARGET   STAT ACT
     yy/12/15 22:00 TEST001  TEST DETAIL TRACE        CIR4     IMSA     INV
     yy/12/15 21:00 DETAIL   WORKLOAD DETAIL TRACE    CIR2     IMSA     USD  RD
     yy/12/15 00:00 BLNK     TRACE OF SPECIAL TRANS   BABUSERS IMSA     UPD  WRT
     *************************** END OF DATA *********************************
```

Figure 24. History Traces Application (Before Scrolling Right)

```
BMC SOFTWARE  ----------------- HISTORY TRACES --------------  PERFORMANCE MGMT
 COMMAND ===>         TGT ===> IMSA
                                             TIME--  09:36:34  SCROLL ===> CSR

 COMMANDS: SORT, LOCATE, NEW, STOP, START, TYPE
 LC CMDS:  S (SELECT), W (SHOW), P (PRINT),   D (DELETE),  E (RESET)
           V (VERIFY), N (NEW),  A (ARCHIVE), F (FREE)

  DIRECTORY:    CIR4.LL1X.TRACEDIR
  ENTRIES USED: 1,209     FREE:   201
                                                              SCROLL LEFT <<<
 LC  DATE------TIME  TYPE  DSN                                       VOLSER
     yy/12/15 22:00  DET   CIR4.IMSA.LEOTST01.NOV28.T2200.V01         MIGRAT
     yy/12/15 21:00  DET   CIR21234.IMSA.DETAIL1X.TEST1234.V02        BAB001
     yy/12/15 00:00  SUM   CIR2.IMSPROD.DB2E.TRANS.NOV01.T0000.V01    BAB303
     *************************** END OF DATA *********************************
```

Figure 25. History Traces Application (After Scrolling Right)

The History Traces application displays the trace directory which tracks all trace logs. You can use this application with simple line and primary commands to:

- Maintain the trace directory
- See an online display of historical trace data records whether the trace was recorded the same day, last night, a year ago, or on another system
- Review trace options
- Do online administration of the trace log data sets (purge, free, verify, reset, archive)
- Move trace log data sets from one system to another

This application displays the trace directory showing one row for each log data set tracked in the directory. The initial display is in descending order of date and time but can be sorted by any column. For example, if you want to see all the data sets for one trace together, you can sort the list by TRACEID.

This display contains the following:

Field Name	**Description**
DIRECTORY	Data set name of the directory.
ENTRIES USED	Number of entries in the directory that are used.
FREE	Number of entries in the directory that are not used. This field is highlighted if fewer than 10 entries remain. **Note:** You can use the batch maintenance jobs described in Chapter 37, “Logging a Trace” on page 477 to clean up or expand the directory.

The fields for the list of trace log data sets are described below in alphabetical order.

ACT	Status of log data set activity:	
	blank	Data set is not currently in use.
	ALL	Data set is allocated to a currently active trace.
	R/W	One or more users are reading the data set and an active trace is also writing to it.
	REA	One or more users are reading the data set, but nothing is being written to it.
	WRI	An active trace is writing to the data set.
DATE----TIME	Date and time that logging was activated on this data set.	
DSN	Name of the trace log data set.	

STAT	Status of the trace log data set contents:	
	EMP	Data set contains no trace records.
	INC	Data set did not close or archive successfully after an update; for example, in a system failure.
	INV	Data set is an invalid trace log data set. The exact reason is contained in a message written to the BBI-SS PAS journal.
	NOC	Data set is not cataloged.
	RES	Data set contains valid trace data and is flagged for reuse.
	UPD	Data set is being updated.
	USD	Data set contains valid trace data and closed successfully.
TARGET	Target that was specified when the trace was requested.	
TITLE	Title specified when the trace was requested.	
TRACEID	Trace identifier specified when the trace was requested.	
TYPE	Type of trace, either SUM (summary) or DET (detail), specified when the trace was requested.	
USERID	ID of the user who requested the trace.	
VOLSER	Volume serial name of the first volume used for this data set.	

SORT Primary Command

When the list of trace log data sets is displayed initially, the list is sorted in descending order by date and time. Any of the columns in the display can be sorted with the SORT command. The sort, except for date and time, is in ascending order. SORT is entered in the COMMAND field of the display with the first two characters of the column name as:

```
SORT cc
```

where cc can be any of the following two characters, which are described below in alphabetical order.

AC Sorts the list by activity status of the log data set.

DA Sorts the list by the date and time logging was activated on this data set.

Note: DATE-TIME is treated as one field so you cannot sort by time without also sorting by date.

DS Sorts the list by data set name of the trace log.

ST Sorts the list by status of the trace log data set contents.

TG Sorts the list by name of the target system.

TI Sorts the list by trace title.

TR Sorts the list by trace identifier.

TY Sorts the list by type of trace (detail or summary).

US Sorts the list by user ID.

VO Sorts the list by volume serial name.

LOCATE Primary Command

Entering LOCATE in the COMMAND line moves an entry to the top of the log data set list by the currently sorted column. It is similar to the ISPF LOCATE member command.

NEW Primary Command

Entering NEW in the COMMAND line presents a data entry panel, shown in Figure 26 on page 509, to manually add trace log data sets to the directory; for example, to move them from one system to another. Enter the data set name only. The application automatically verifies each name entered.

Figure 26 shows a sample data entry panel that specifies a data set to be added to the directory. Pressing ENTER processes the request and shows the results in the RESPONSE field, which can be:

CANNOT ALLOCATE
: Trace log data set cannot be allocated.

CANNOT READ
: A non-VSAM linear data set was specified that is not a valid data format for a trace log data set.

DOES NOT EXIST
: Data set name is not cataloged.

NOT TLDS
: Request to add a trace log data set (TLDS) to the directory could not be processed, because the work area could not be obtained or the data set does not contain trace data.

TLDE ALREADY EXISTS
: Trace log data set already exists in the directory.

TLDS ADDED
: Trace log data set added to the directory.

```
BMC SOFTWARE  ---------- CREATE TRACE DSN ENTRIES -----------  PERFORMANCE MGMT
COMMAND ===>        TGT ===> IMSA
                                                                TIME --  09:36:34

  DIRECTORY: CIR4.LL1X.TRACEDIR

  SPECIFY TRACE DATASET NAME(S), ONE NAME PER ROW.
  THE HEADER RECORD IN EACH DATA SET WILL BE READ TO CREATE THE DIRECTORY ENTRY.

         LOG DATA SET NAME                              RESPONSE
        ---------------------------------------------   -----------------------
    1.  CIR4.LL1X.IMSA.TEST001.MAY21.T2200.V02          TLDS ADDED
    2.
    3.
    4.
    5.
    6.
    7.
    8.
    9.
    10.

 Press ENTER to add datasets
```

Figure 26. New Primary Command Data Entry Panel

STOP Primary Command

Entering STOP in the COMMAND line closes and deallocates the trace directory. Active trace logging continues. All commands except START are disabled and a new trace logging request cannot be initiated. A trace directory is required for trace logging to occur.

Note: PMACC authorization defined in a BBPARM user authorization member (see *Implementing Security for MAINVIEW Products*) is required to use this command.

START Primary Command

Entering START in the COMMAND line reallocates the directory and opens it with a disposition of old. If this is successful, all commands are re-enabled and new trace logging requests can be initiated. If START is not successful, all other application commands remain disabled and trace logging cannot be initiated.

Note: PMACC authorization defined in a BBPARM user authorization member (see *Implementing Security for MAINVIEW Products*) is required to use this command.

TYPE Primary Command

Entering TYPE in the COMMAND line lists the traces of the specified type only. The possible types that can be specified are shown in the TYPE column of the History Traces application. For example, to list only detail traces, enter:

```
COMMAND ===> TYPE DET
```

Enter TYPE to return to the list of all traces.

Line Commands

Entering one of the following one-character line commands in the LC field for a log data set executes the line command function. Multiple selections can be entered at one time by selecting a series of services and pressing the ENTER key. Each display in a series is processed by pressing the END key. Each data entry request panel in a series is submitted by pressing the ENTER key and then the END key to process the next request.

Note: If your user ID does not match the user ID of the trace, you must be authorized to use the following line commands:

- Delete
- Free
- Reset
- Archive

Authorization is defined with the PMACC parameter in a BBPARM user authorization member as described in *Implementing Security for MAINVIEW Products*.

Line Command	Description
S	SELECT. Loads the selected log data set and displays the LTRAC screen. From there, you can access all other trace displays, as described in Chapter 43, “LTRAC - List of Trace Entries” on page 523.
W	SHOW. Displays the selected log data set information. The directory entry is updated if necessary.
P	PRINT. Prints DB2 trace reports from the selected log data set if you have MAINVIEW for DB2 installed.
D	DELETE. Deletes the entry from the trace directory. If the data set is cataloged, a confirmation screen similar to the sample in Figure 27 on page 511 is displayed. If the entry is for a data set that is not cataloged, no confirmation is required.

```
BMC SOFTWARE  -------- TRACE DIRECTORY PURGE CONFIRMATION ---- PERFORMANCE MGMT
COMMAND ===>                                                      TGT ===> IMSA
                                                               TIME --  09:36:34

 LOG DATA SET NAME:   CIR4.LL1X.TEST1.V02
 TARGET:              IMSA
 USERID:              CIR4
 TRACEID:             BIGELAP
 VOLUME:              ARCHIV
 START DATE-TIME:     yy/12/15 22:00
 STATUS:              INV

 Do you wish to also delete the log data set? ===> Y  (Y/N)

 Press ENTER to confirm; END to cancel
```

Figure 27. Trace Directory DELETE Entry Confirmation Panel

E RESET. Marks the log data set for reuse.

V VERIFY. Matches the directory against the log data set and updates the directory with information from the log data set. If the data set is not cataloged, the status is changed to NOCAT. If there is any error in reading this information, the status is changed to INV (invalid).

N NEW. Acts like the NEW primary command, except the data entry screen is primed with the name of the selected log data set.

A ARCHIVE. Initiates the archive started task (STC) for the selected log data set if the archive option was specified with the MTRAC trace request. If archiving was not specified for this log data set, the request is ignored.

F FREE. Closes and deallocates the selected log data set if a trace is not being written to it. This command also can be used when another user is viewing the same trace log.

Chapter 41. Printing History Traces (Primary Menu Option 4)

This chapter describes how to print history trace data using either the offline or the online printing facility.

Primary Input - Trace Log Data Sets (TLDSs)

The primary input source is data that MVIMS collects and stores in trace log data sets. The normal input is the VSAM trace log data set (a TLDS not archived to tape) created by a trace request with history logging active at the time of the trace. All trace log data sets (TLDSs) are tracked in a trace directory and can be accessed through the History Traces application.

You can specify one or more TLDSs in a series of DD statements with the ddnames in the form TRACINxx. Only TLDS data sets can be specified in this manner.

If you do not know the exact names of the trace data sets, you can use the TRACEID keyword to specify which trace is to be printed. In this case, you must also use the TRACEDIR DD statement to specify the directory data set. It is recommended but not required that you further qualify which trace data sets are to be selected by using the TARGET, DATE, and TIME keywords.

Alternative Input - Archived TLDSs

An archived TLDS is produced by the archive utility IMFTARC. To print directly from this sequential data set without reloading it to a VSAM linear data set, specify the DSN on the ARCIN DD statement.

Output Formats

The output format is the same as that of the online displays; it is 90 characters wide with the first position reserved for the attribute character.

Printing from an Online Application

MVIMS allows you to print trace log data sets online from the History Traces application if you are executing your TS from ISPF. You can do this by using the P (PRINT) line command.

Before printing from the online application, you must first copy the skeleton JCL located in the WATBPRNT member of the BBPROF data set that is distributed as part of the MVIMS-distributed library.

Copy WATBPRNT to an individual user data set (BBPROF) or to a site data set (SBBPROF). The BBPROF or SBBPROF data set must be defined in the CLIST (MAINVIEW CLIST) used to start the terminal session. For more information about BBPROF, see the *MAINVIEW Common Customization Guide*.

To print from the online application:

1. Select Option 4 from the MVIMS Main Menu.
2. In the History Traces panel, enter the P line command next to the data set you wish to print. (For a full description of how to use line commands in the History Traces application, see "Line Commands" on page 510 in Chapter 40, "Displaying History Traces (Primary Menu Option 4)" on page 505.)
3. Enter the required information in the next panel that appears. This panel gives you options that allow you to tailor the print job output to your needs.
4. Press the End key.

The printed trace data has the same format and content as the online displays.

Printing Using a Batch Utility Job

MVIMS provides you with the option of printing history trace data offline. You can do this by using a batch utility job, WATBTRAC. Before submitting the WATBTRAC batch print job, you must tailor the JCL described in the next section.

JCL

In order to print trace log data sets offline, you must modify and then submit the JCL described in this section. The skeleton JCL to print trace data sets is shown in Figure 28. This JCL is a single-step procedure located in member WATBTRAC of the BBSAMP data set.

```
//         JOB (ACCT),'NAME'
//WATBPRNT PROC TLDS=NULLFILE,           INPUT TRACE DATA SET
//             TDIR=NULLFILE,            INPUT TRACE DIRECTORY
//             ARC=NULLFILE,             INPUT ARCHIVED TRACE DATA SET
//             PFX='HILVL.RUN.LIB'       DSN PREFIX OF BBLINK
//PRINT   EXEC PGM=WATBPRNT,REGION=4M,PARM='GMWK=128K'
//*                                      INCREASE GMWK FOR LARGE TRACES
//STEPLIB   DD DISP=SHR,DSN=&PFX..BBLINK
//SYSPRINT  DD SYSOUT=*                  INPUT LIST AND DIAGNOSTICS
//SYSUDUMP  DD SYSOUT=*                  ABEND DUMPS
//STD1      DD SYSOUT=*                  DEFAULT REPORT OUTPUT
//*
//*    ONLY ONE OF THE FOLLOWING INPUT DD'S MAY BE SPECIFIED
//*
//TRACIN01  DD DISP=SHR,DSN=&TLDS        TLDS INPUT
//*TRACEDIR  DD DISP=SHR,DSN=&TDIR       TLDS INPUT THRU TRACE DIR
//*ARCIN     DD DISP=SHR,DSN=&ARC        ARCHIVED TLDS INPUT
//        PEND
//*
//*       SPECIFY INPUT FILE HERE AS TLDS=
//*
//PRINT   EXEC WATBPRNT,TLDS='SYS5.IMSP.THRDHIST.JUL01.T0001.V01'
//REPORT1   DD SYSOUT=*                  USER-DEFINED OUTPUT DD
//SYSIN     DD *                         CONTROL CARD INPUT
    REPORT  REPORTID=WATBPRNT,
            DDNAME=REPORT1,
            LTRAC=YES,
            STRAC=YES,
            DTRAC=YES
```

Figure 28. JCL to Print a Trace (WATBTRAC)

The individual JCL control statements, shown in Figure 28, specify how to read the input data set for each of the requested traces and how to format the output. The statements are described below.

PRINT

Specifies the name of the program as:

PGM=WATBPRNT

and the region required to run the program.

This program supports a GMWK option in the PARM field. For example:

```
PGM=WATBPRNT,PARM='GMWK=128K'
```

This option is used to increase the size of the summary work area needed to process trace data sets that contain a very large number of transactions. This option increases the summary work area for all services (LTRAC, STRAC, and so on).

The syntax rules for GMWK are similar to those for the OS/390 JCL REGION parameter. The size specified should be greater than 128K. Storage acquired with this option is below the 16M line and is limited by the largest private area available in the OS/390 system. When the GMWK option is used, the job's REGION size may need to be adjusted accordingly.

A general guideline for the size of GMWK is:

```
GMWK = 1700 + (72 * number of unique transactions
summarized)
```

STEPLIB DD — Defines the program library containing the WATBPRNT load module.

SYSPRINT DD — Defines the data set for printing all input statements and program messages.

Note: The SYSPRINT DD statement must exist. If it is not found, a WTO is issued and the run is terminated.

SYSUDUMP DD — Defines the dump data set for problem determination.

STD1 — Defines the ddname for the default report.

TRACINxx DD — Defines one or more trace log data sets (TLDSs) as input for trace data formatting. If TRACINNxx is defined, TRACEDIR and ARCIN are ignored. This DD must refer to a VSAM trace data set (a TLDS not archived to tape), written by the online trace.

Multiple TLDS data sets can be processed by specifying each in a DD statement with a ddname of TRACINxx, where xx is any valid set of characters. Each of the TLDSs is processed in the order it exists in the job stream.

TRACEDIR DD — Designates a trace directory data set.

If no TRACINxx DD statement is found, the TRACEDIR DD statement is processed.

If you specify TRACEDIR DD, you must use the TRACEID keyword. All trace data sets defined with this trace ID are eligible for printing.

ARCIN DD — Defines an archived TLDS. TRACIN and TRACEDIR must be dummied or you must specify NULLFILE.

REPTDD1 — Defines the ddname for the trace print output.

SYSIN DD — Defines the input data set containing the control card specifying the amount of detail to print.

Request Keywords

This section identifies keywords that can be used to request a trace print.

Table 18. Identification Keywords (Page 1 of 4)

Keyword/Operand	Description
AB|ABEND	Selects only those transactions with a non-zero system or user completion code.

DATE=[`ddmmmyyyy`| `ddmmmyyyy-ddmmmyyyy`]	The date value is used to select a date range or starting date from the input. The input can be a single date in `ddmmmyyyy` format, which defines a starting day, or a range in the form `ddmmmyyyy-ddmmmyyyy` to define starting and ending dates to process.
	
	The asterisk is used to specify current date. To select all entries from yesterday, specify:
	
	`DATE=*_1`
	
	Note: The underscore is used instead of a dash, since the dash is already used to define a range of dates. Using *-1 would result in interpreting the date as a range from current date to day 1 (which is invalid as a date).
	
	To process only one day, specify:
	
	`15DEC20yy-15DEC20yy`
	
	The default is to select all records.

DB2C|DB2CNT<`nnnnnn`|>`nnnnnn`| =`nnnnnn`	The variable `nnnnnn` represents number of DB2 database calls. The parameter selects a subset of the trace entries in the online trace storage buffer or trace log data set by DB2 database call counts.
DB2T|DB2TIME<`nnnnnn`|>`nnnnnn`| =`nnnnnn`	The variable `nnnnnn` represents CPU time in milliseconds. The parameter selects a subset of the trace entries in the online trace storage buffer or trace log data set by DB2 elapsed time.
D|DAY=`nn|nn-nn`	The variable `nn` represents a day or range of days as a relative number from the date of the first trace entry (first date is 1, up to a maximum of 99) in the trace buffer or trace log data set. The parameter selects a subset of the entries by a day or range of days. If there is only one day's data, the END TIME timestamp is `hh:mm:ss.th`. If the trace buffer or trace log data set contains more than one day's data, END TIME changes to `dd-hh:mm:ss`, where `dd` is the day number relative to the date of the first record in the trace buffer or trace log data set. If DAY is not specified, but TIME is, the default is the day of the most current record in the buffer or trace log data set.

Table 18. Identification Keywords (Page 2 of 4)

Keyword/Operand	Description
DLIC|DLICNT<nnnnnn|>nnnnnn|=nnnnnn	The variable nnnnnn represents number of DL/I database calls. The parameter selects a subset of the trace entries in the online trace storage buffer or trace log data set by DL/I database call counts.
DLIT|DLITIME<nnnnnn|>nnnnnn|=nnnnnn	The variable nnnnnn represents DL/I CPU time in milliseconds. The parameter selects a subset of the trace entries in the online trace storage buffer or trace log data set by DL/I elapsed time.
DTRAC=[YES|NO]	The DTRAC keyword requests printing a one-line entry for each detail trace event. For ease of associating the detail data with a transaction, it is recommended that either LTRAC or STRAC also be requested, but this is not required. The possible values are YES and NO. The default is DTRAC=NO.
EL|ELAPSED<nnn|>nnn|=nnn	The variable nnn represents elapsed time in milliseconds. The parameter selects a subset of the trace entries in the online trace storage buffer or trace log data set by elapsed time.
IOC|IOCNT<nnnnnn|>nnnnnn|=nnnnnn	The variable nnnnnn represents number of total I/Os (READs and WRITEs). The parameter selects a subset of the trace entries in the online trace storage buffer or trace log data set by total I/O count.
LTRAC=[YES|NO]	The LTRAC keyword is used to request the LTRAC one-line entry for each transaction. If used in conjunction with STRAC or DTRAC, each transaction starts with the LTRAC line followed by the other displays as requested. The possible values are YES and NO. The default is LTRAC=YES.
MSW	Selects only those transactions that are a result of a message switch.
PR|PROGRAM=xxxxxxxx	The variable xxxxxxxx represents a program name. The parameter selects a subset of the trace entries in the online trace storage buffer or trace log data set by program name. Multiple trace entries can be selected by using an * or + qualifier; for example, `PR=SM++0+00`.
REPORTID={name}	Each trace print must have a unique identification provided by REPORTID. This is the only required keyword. REPORTID is also used as the ddname of the output data set. The value can be 1–8 characters, with any special characters allowed.
RE|RESPONSE<nnnnnn|>nnnnnn|=nnnnnn	The variable nnnnnn represents response time in milliseconds. The parameter selects a subset of the trace entries in the online trace storage buffer or trace log data set by response time.

Table 18. Identification Keywords (Page 3 of 4)

Keyword/Operand	Description
STRAC=[YES|NO]	The STRAC keyword is used to request the STRAC transaction summary display. STRAC=NO suppresses the STRAC displays. STRAC=YES requests only the first section of the STRAC display. These requests can be combined with any of the DTRAC requests. The default is STRAC=NO.
T|TIME=`hhmm|hhmm-hhmm`	The variable `hhmm` represents a start time or time period. The parameter selects a subset of the trace entries in the online trace buffer or trace log data set by a start time or time period. When the start time is higher than the end time, for example, `TIME=2000-0300`, 24 hours are added.
TITLE1=[c.....c]	The title value is printed centered on the first line of each page of the report. The value can be up to 60 characters. If this keyword is not included, the title is left blank on the report.
TITLE2=[c.....c]	The secondary title is printed centered on the second line of each page of the report. The value can be up to 60 characters. If this keyword is not included, the secondary title is taken from the title specified when the trace was created.
TRACEID=[id|BLANK]	Defines the ID of the trace that is to be matched in a search through the trace directory. All TLDS data sets that meet this requirement, plus any TARGET, TIME, and DATE requirements, are dynamically allocated and processed. To define a trace ID of blank, specify: `TRACEID=BLANK` **Note:** The DD statement TRACEDIR must be present before this keyword is processed. If the DD statement is not present, this keyword is ignored.
TY|TYPE=`xxx`	The variable `xxx` represents a region type, which can be: BMP Batch message processing region and Java batch processing region (JBP). DBT DBCTL threads (CICS and ODBA). NDP Non-message-driven Fast Path region. The parameter selects a subset of the trace entries in the online trace storage buffer or trace log data set by specified region type. Multiple trace entries can be selected by using an * or + qualifier; for example, `TY=M*`.

Table 18. Identification Keywords (Page 4 of 4)

Keyword/Operand	Description
US|USER=xxxxxxxx	The variable `xxxxxxxx` represents a user or LTERM ID. The parameter selects a subset of the trace entries in the online trace storage buffer or trace log data set by user or LTERM. Multiple trace entries can be selected by using an * or + qualifier; for example, `US=CICS*`.

Chapter 42. Workload Analyzer Trace Services (Quick Reference)

The following table shows the service select code and parameters for the Workload Analyzer trace services. It also lists the page where you can find a complete description of each service.

Table 19. Workload Trace Service Select Codes

Service Select Code	Parameter	See
MTRAC	[traceid] [keywords]	Chapter 36, “Requesting Workload Trace Data Collection (MTRAC)” on page 459
LTRAC	[,traceid ,AB ,D ,DB2C<nnn|>nnnn|=nnn ,DB2T<nnn|>nnnn|=nnn ,DLIC<nnn|>nnnn|=nnn ,DLIT<nnn|>nnnn|=nnn ,EL<nnn|>nnnn|=nnn ,IOC<nnn|>nnnn|=nnn ,MSW ,PR=xxxxxxxx ,RE<nnn|>nnnn|=nnn ,T=hhmm|hhmm-hhmm ,TR=xxxxxxxx ,TY=xxx ,US=xxxxxxxx]	Chapter 43, “LTRAC - List of Trace Entries” on page 523
STRAC	[traceid|,SEQ=n]	Chapter 44, “STRAC - Summary Trace Data Display” on page 529
DTRAC	[traceid|,LEVEL=1|2|3|4 ,SEQ=n]	Chapter 45, “DTRAC - Detail Trace Data Display” on page 541

Chapter 43. LTRAC - List of Trace Entries

```
BMC SOFTWARE  ------------ IMS TRACE ENTRIES-------------------PERFORMANCE MGMT
SERV ==> LTRAC        INPUT    11:44:25  INTVL=> 3  LOG=> N     TGT==> IMSxxx
PARM ==>                                          ROW 1 OF 506    SCROLL=> CSR
EXPAND:  MON(WKLD), HISTORY, LINESEL(STRAC)  ENTRIES IN DATASET 45 - 550
                                                                HIST TGT==> IMSxxx
 31DEC94
 END TIME    PROGRAM  TRANCODE  TYP RESPONSE  ELAPSED      DLI      DB2 USR/LTRM
-----------  -------- --------  --- -------- -------- -------- -------- --------
09:20:23.12  PIWAIT   TDRIVER   BMP      50s      50s       20        0 CIR11
09:20:22.32  PHDAMINQ THDAMINQ  MPP  3,230ms  3,230ms      200       90 PWW1
09:20:12.04  PHDAMINQ THDAMINQ  MPP  3,450ms  3,450ms      100       10 PWW1
09:09:13.90  PHIDMINQ THIDMINQ  MPP    <10ms    <10ms        7       10 PWW1
```

Description: This service provides a scrollable list of all the active trace entries in one of the following:

- The online trace storage buffer for an active MTRAC request selected from the Current Traces application (Primary Menu Option 3)
- A trace log data set selected from the History Traces application (Primary Option Menu 4) Each trace entry represents a transaction instance.

LTRAC can be used to see all occurrences of a transaction with the timestamp of when each completed. You can review this list for application performance and select any one of these occurrences to view further detail with the STRAC display.

Color: If you have a color monitor:

Turquoise	Indicates normal values.
Red	Highlights any transactions that have abended.
White	Indicates column headings.
Yellow	Indicates error messages.

Select Code: LTRAC

Parameter: All of the LTRAC parameters act as filters that restrict the information shown according to the criteria specified by the parameter(s). The LTRAC parameters can be used as follows:

- The filtering parameters limit the data shown by the specified parameter.

  For example, if you enter:

  `TY=DBT`

  only the rows for DBCTL CICS and ODBA threads are displayed.

- 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 data 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 except for `traceid,` which is a positional parameter and must always be in the first position. The descriptions begin with parameters that start with a special character. Parameters containing a numeric character are first in their alphabetical group.

`traceid`

The variable `traceid` is a unique ID used with the MTRAC request. A blank can be an identifier. This parameter is positional and must be in the first position. This field is primed automatically with the MTRAC identifier if the request is selected from the Current Traces or Active Timer requests application.

AB|ABEND

Selects only those transactions with a non-zero system or user completion code.

D|DAY=`nn|nn-nn`

The variable `nn` represents a day or range of days as a relative number from the date of the first trace entry (first date is 1, up to a maximum of 99) in the trace buffer or trace log data set. The parameter selects a subset of the entries by a day or range of days.

If there is only one day's data, the END TIME timestamp is `hh:mm:ss.th`. If the trace buffer or trace log data set contains more than one day's data, then END TIME changes to `dd-hh:mm:ss`, where `dd` is the day number relative to the date of the first record in the trace buffer or trace log data set.

If DAY is not specified, but TIME is, the default is the day of the most current record in the buffer or trace log data set.

DB2C|DB2CNT<nnnnnn|>nnnnnn|=nnnnnn

The variable nnnnnn represents number of DB2 database calls. The parameter selects a subset of the trace entries in the online trace storage buffer or trace log data set by DB2 database call counts.

DB2T|DB2TIME<nnnnnn|>nnnnnn| =nnnnnn

The variable nnnnnn represents DB2 CPU time in milliseconds. The parameter selects a subset of the trace entries in the online trace storage buffer or trace log data set by DB2 elapsed time.

DLIC|DLICNT<nnnnnn|>nnnnnn| =nnnnnn

The variable nnnnnn represents number of DL/I database calls. The parameter selects a subset of the trace entries in the online trace storage buffer or trace log data set by DL/I database call counts.

DLIT|DLITIME<nnnnnn|>nnnnnn| =nnnnnn

The variable nnnnnn represents DL/I CPU time in milliseconds. The parameter selects a subset of the trace entries in the online trace storage buffer or trace log data set by DL/I elapsed time.

EL|ELAPSED<nnn|>nnn|=nnn

The variable nnn represents elapsed time in milliseconds. The parameter selects a subset of the trace entries in the online trace storage buffer or trace log data set by elapsed time.

IOC|IOCNT<nnnnnn|>nnnnnn| =nnnnnn

The variable nnnnnn represents number of total I/Os (READs and WRITEs). The parameter selects a subset of the trace entries in the online trace storage buffer or trace log data set by total I/O count.

MSW

Selects only those transactions that are a result of a message switch.

PR|PROGRAM=xxxxxxxx

The variable xxxxxxxx represents a program name. The parameter selects a subset of the trace entries in the online trace storage buffer or trace log data set by program name. Multiple trace entries can be selected by using an * or + qualifier; for example, `PR=SM++0+00`.

RE|RESPONSE<nnnnnn|>nnnnnn| =nnnnnn

The variable nnnnnn represents response time in milliseconds. The parameter selects a subset of the trace entries in the online trace storage buffer or trace log data set by response time.

T|TIME=hhmm|hhmm-hhmm

The variable hhmm represents a start time or time period. The parameter selects a subset of the trace entries in the online trace buffer or trace log data set by a start time or time period.

When the start time is higher than the end time, for example, TIME=2000-0300, 24 hours are added.

TR|TRANCODE=xxxxxxxx

The variable xxxxxxxx represents a transaction code. The parameter selects a subset of the trace entries in the online trace storage buffer or trace log data set by transaction name. Multiple trace entries can be selected by using an * or + qualifier; for example, TR=+MYZ200XX.

TY|TYPE=xxx

The variable xxx represents a region type which can be:

BMP Batch message processing and Java batch message processing regions.

DBT DBCTL threads (CICS and ODBA).

NDP Non-message-driven Fast Path regions.

The parameter selects a subset of the trace entries in the online trace storage buffer or trace log data set by specified region type. Multiple trace entries can be selected by using an * or + qualifier; for example, TY=M*.

US|USER=xxxxxxxx

The variable xxxxxxxx represents a user or LTERM ID. The parameter selects a subset of the trace entries in the online trace storage buffer or trace log data set by user or LTERM. Multiple trace entries can be selected by using an * or + qualifier; for example, US=CICS*.

Expand: The LTRAC display can be EXPANDed by using the following fields as indicated:

MON(WKLD)
Active Timer Requests display of all active monitors in the IMS workload (WKLD) area. One of the following fields, HISTORY or CURRENT, appears in the EXPAND line only if the trace request being displayed by LTRAC specified trace logging.

HISTORY
This field is shown in the EXPAND line of an LTRAC display when the trace request selected from Current Traces (Primary Menu Option 3) specified logging. You can use it to toggle from viewing data from the online storage buffers to viewing entries in the trace log data set for that trace request. It provides access to data no longer in the online trace storage buffer. If the entries are from the online trace storage buffer, line 4 of the display shows ENTRIES IN BUFFER.

CURRENT

This field is shown in the EXPAND line of an LTRAC display showing trace entries from a trace log data set. You can use it to toggle from viewing a trace log data set to viewing any entries remaining in the online trace storage buffer (trace is still active or completed but not purged). If the entries are from a trace log data set, line 4 of the display shows `ENTRIES IN DATASET`. This field applies only to trace requests specifying trace logging.

LINESEL(STRAC)

You can position the cursor anywhere on a row for a specific transaction occurrence to see a summarized display of trace statistics (STRAC) about that selected occurrence.

Sorting: The display list cannot be sorted.

Scrolling: The display is scrollable up or down. Use PF7 to scroll up to new trace entries as they arrive.

Field Descriptions: Each of the fields is shown and described below in alphabetical order.

DB2 Total number of DB2 calls issued by this transaction.

DLI Total number of DL/I calls issued by this transaction.

ELAPSED Elapsed time for this transaction. Time is in milliseconds (ms) unless the value is too high to fit in the field, then it is shown as `hh:mm:ss`.

Note: Time shorter than 10 milliseconds is not available from IMS timestamps and is shown as `<10ms`

END TIME Date and time the transaction stopped and the response was queued (synchronization point). The date above the END TIME field is the date of the oldest record that can be displayed. This is either the oldest record in the online trace storage buffer or the oldest record in the current trace log data set.

If the trace record is from the same day as the oldest record, the format of this field is `hh:mm:ss.th`. If the trace record is from a more recent day, the format is `dd-hh:mm:ss`, where `dd` is the day relative to the oldest record.

ENTRIES IN `ENTRIES IN xxxxxxx n1 - n2` identifies the trace record sequence number in either the online trace storage buffer or the trace log data set, where:

`xxxxxxx` Is BUFFER or DATASET.

`n1` Is the trace record sequence number of the first trace entry.

`n2` Is the trace record sequence number of the last trace entry.

HIST TGT — If the data is being displayed from a trace log data set and the target of the trace in the selected data set is different from the current target shown in the TGT field, this field shows the historical target of the trace. TGT shows the current target controlled by the BBI-SS PAS.

PROGRAM — Program name used by this transaction.

RESPONSE — Same as ELAPSED time.

ROW — `ROW n1 OF n2` identifies the number of entries in either the trace log data set or the online trace storage buffer depending upon the trace selected, where:

- `n1` — Is the entry number of the trace at the top of the display.
- `n2` — Is the total number of trace entries.

TRANCODE — CICS transaction

TYP — Type of region processing the transaction:

BMP	Batch message processing region
JBP	Java batch message processing region
DBT	DBCTL CICS thread
FPU	Fast Path utility region
NDP	Non-message-driven Fast Path region
ODB	DBCTL ODBA thread

USR/LTRM — ID of the user who submitted this transaction or LTERM where the transaction was submitted.

Chapter 44. STRAC - Summary Trace Data Display

```
BMC SOFTWARE--------------IMS SUMMARY TRACE--------------------PERFORMANCE MGMT
SERV ==> STRAC           INPUT    11:44:25  INTVL=> 3  LOG=> N  TGT==> IMSxxx
PARM ==> ,SEQ=2                                  LINE 1 OF 100 SCROLL=> CSR
EXPAND:  MON(WKLD), DTRAC, HISTORY               GOTO( DC DLI FP DB2 CPU MSC)
                                              PF10/11 FOR PREV/NEXT TRACE ENTRY
TRANCODE..... THDAMINQ       REGION ID ...         3    HIST TGT......   IMSxxx
PROGRAM...... PHDAMINQ       REGION NAME.. MPPRGN01     USER..........     PWW1
================================================================================
PSBNAME...... PHDAMINQ       TYPE.........        MPP   LTERM.........  LBS4022
CLASS........                ROUTCODE.....              NODENAME......   BS4022
APPC.........       NO       OTMA.........         NO   ABENDCODE....      S0C7
ARRIVAL 15DECyy  09:20:21.01 RESPONSE TIME    3,230ms
START.. 15DECyy  09:20:21.11 ELAPSED TIME.    3,230ms
END ... 15DECyy  09:20:24.34 MSG SWITCH...         NO

----------------------------DL/I CALL ACTIVITY------------  ---I/O----- -------
DBNAME   ORG       GU    GN  REPL  ISRT  DLET OTHER  TOTAL   READ WRITE
-------- ------ ----- ----- ----- ----- ----- -----  -----  ----- -----
DB1H     PHIDAM   280    40   100   100   100    11    631      0     0
 DB1H1X  (DD)                                                   20     0
 DB1H1A  (DD)                                                   40     0
 DB1H2X  (DD)                                                   21     0
 DB1H2A  (DD)                                                   21     0
ALLDBS              0     0     0     0     0     0      0      0    20
**TOTAL           280    40   100   100   100    11    631    102    20

----------------------------FAST-PATH ACTIVITY--------------------------------
NBA..........       10      CI CONTENTION        0      SYNC RETCODE..        0
OBA..........        2      WAIT FOR BFRS        0      BALG Q-COUNT          0
BUFFER USED..        0      WAIT-OBA BFR LATCH  NO

----------------------------DB2 ACTIVITY--------------------------------------
DB2NAME...... DB2D          CONTROL.......       0      INSERTS.......        0
PLANNAME..... PHDAMINQ      DYNAMIC.......       0      DELETES.......        0
SEL/FCH......        5      DDL...........       0      UPDATES.......        0
OPENS........        0      OTHER.........       0      SQL TOTAL.....        5

----------------------------CPU TIMES-----------------------------------------
                   DLI TIME   BUFFER HANDLER TIME   OPEN CLOSE TIME    TOTAL
DEPENDENT REGION     200us               0                 0           200us
CONTROL REGION       400us               0                 0           400us
DLISAS               300us               0                 0           300us
DEPENDENT REGION CPU TIME.........................................    100ms
DEPENDENT REGION DB2 CPU TIME.....................................     50ms
TOTAL CPU TIME....................................................    151ms

**************************** END OF DATA ************************************
```

Description: This service summarizes DL/I call activity, Fast Path activity, DB2 activity, and CPU times for a selected transaction instance. You can use it, for example, to see how many times this transaction instance accessed a database, the types of calls it made and how many, and the transaction elapsed time. An unusually high elapsed transaction time may indicate poor DASD response time.

Note: In the CPU timing area of the display, to see the amount of dependent, control, and DLISAS region CPU time used by the:

- DL/I analyzer to process a transaction and open and close databases
- Buffer handler module to process a transaction

you must set the Event Collector options in BBPARM member IMFECP00 and the IMS LSO option as described for these fields on pages 537 and 538. For information about these options, see the *MAINVIEW for DBCTL Customization Guide*.

You can request STRAC by cursor selection from the LTRAC display or from the analyzer service list (Primary Menu Option 1).

Color: If you have a color monitor:

Turquoise	Indicates normal values.
Red	Highlights any transactions that have abended.
White	Indicates column headings.
Yellow	Indicates error messages.

Select Code: STRAC

Parameter: The STRAC parameters can be used as follows:

- Multiple parameters must be separated by commas.
- A blank indicates the end of a parameter string.
- Any filter parameter used for LTRAC (see the parameter descriptions in Chapter 43, “LTRAC - List of Trace Entries” on page 523) also can be used for STRAC.

`traceid`

The variable `traceid` is a unique ID used with the MTRAC request. A blank can be an identifier. This parameter is positional and must be in the first position. This field is primed automatically with the MTRAC request identifier if the request is selected from the Current Traces or Active Timer requests application.

SEQ=n

The variable n is a unique internal sequence number assigned to each trace entry in the online trace storage buffer or trace log data set. The number is assigned sequentially throughout the trace. If logging is requested for the trace, the number is assigned across multiple log data sets. If this keyword is not entered, the first trace entry is displayed. If you request STRAC by EXPANDing from LTRAC, this field is primed automatically. You can change the value to scroll anywhere through the trace data.

Expand: The STRAC display can be EXPANDed to the following displays by cursor selection:

MON(WKLD)
: Active Timer Requests display of all active monitors in the IMS workload (WKLD) area.

DTRAC
: Detail trace entry display (DTRAC service).

HISTORY
: This field is shown in the EXPAND line of an STRAC display if the selected trace request specified logging. You can use it to toggle from viewing data from the online storage buffers to viewing entries in the trace log data set. It provides access to data no longer in the online trace storage buffer.

CURRENT
: This field is shown in the EXPAND line of an STRAC display showing trace entries from a trace log data set. You can use it to toggle from viewing a trace log data set to viewing any entries remaining in the online trace storage buffer (trace is still active or completed but not purged). This field applies only to trace requests specifying trace logging.

GOTO: You can go to a specific area of the display by moving it to the top. 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:

DC	DC ACTIVITY (This field does not apply to an IMS DBCTL system.)
DLI	DL/I CALL ACTIVITY
FP	FAST-PATH ACTIVITY
DB2	DB2 ACTIVITY
CPU	CPU TIMES
MSC	MSC ACTIVITY (This field does not apply to an IMS DBCTL system.)

Sorting: This display cannot be sorted.

Scrolling: You can scroll the display by:

- Using PF keys to scroll up or down.
- Using PF10 and PF11 to scroll through trace entries, meeting specified filter parameter criteria, in the online trace storage buffer or trace log data set. PF10 scrolls to the previous trace entry. PF11 scrolls to the next trace entry. The current entry is displayed in the SEQ field.
- 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

TRANCODE..... THDAMINQ       REGION ID ...         3    HIST TGT......   IMSxxx
PROGRAM...... PHDAMINQ       REGION NAME.. MPPRGN01     USER..........     PWW1
================================================================================
PSBNAME...... PHDAMINQ       TYPE.........        MPP   LTERM.........  LBS4022
CLASS........                ROUTCODE.....              NODENAME......   BS4022
APPC.........       NO       OTMA.........         NO   ABENDCODE....      S0C7
ARRIVAL 15DECyy  09:20:21.01 RESPONSE TIME    3,230ms
START.. 15DECyy  09:20:21.11 ELAPSED TIME.    3,230ms
END ... 15DECyy  09:20:24.34 MSG SWITCH...         NO
```

This area shows general information about the application program activity in the region for the selected transaction instance. Data above the `====` line cannot be scrolled.

The descriptions are arranged in alphabetical order.

ABENDCODE
: System abend code (Sxxx) or user abend code (Uxxxx) if the transaction terminated abnormally.

APPC
: NO. This field does not apply to DBCTL threads, region types DBT and ODB.

ARRIVAL
: Date and time of transaction arrival. For a message switch, the original transaction arrival time is used. This field is blank for Fast Path transactions.

CLASS
: Class used by this transaction. This is always 0 for a DBCTL system.

ELAPSED TIME
: Current time minus the transaction start time. It is in milliseconds (ms) or `hh:mm:ss` if the millisecond value is too large to fit in the field.

  Note: Time shorter than 10 milliseconds is not available from IMS timestamps and is shown as `<10ms`.

END
: Date and time the transaction stopped and the response was queued (synchronization point).

HIST TGT
: If the request specified trace logging, this field shows the historical target from the trace log data set if it is different from the current target.

LTERM
: LTERM name of the terminal where this transaction was submitted.

For DBCTL CICS threads, the LTERM is the 4-byte CICS terminal ID.

For a non-message-driven BMP or JBP, the LTERM is set to *NONE*.

MSG SWITCH
: YES|NO indicates whether or not this transaction is a result of a message switch.

NODENAME
: VTAM node of the originating terminal for this transaction.

OTMA
: YES|NO indicates whether the type of CNT for this LTERM is Open Transaction Manager Access.

PROGRAM
: Name of the application program called by IMS to process this transaction.

PSBNAME
: PSB name of the application program used to process this transaction.

REGION ID
: Region identifier assigned to this region by IMS.

REGION NAME
: Job or STC name of the message region where the transaction executed.

RESPONSE TIME
: Response time in milliseconds (ms) or hh:mm:ss if the millisecond value is too large to fit in the field. For DBCTL threads, this is the same as elapsed time.

ROUTCODE
: Fast path routing code if applicable.

START
: Date and time the transaction started.

TRANCODE
: Name of this transaction. For a nonmessage-driven BMP, the transaction code is blank.

TYPE
: Type of region processing the transaction:

BMP	Batch message processing region
DBT	DBCTL CICS thread
FPU	Fast Path utility region
JBP	Java batch message processing region
NDP	Non-message-driven Fast Path region
ODB	DBCTL ODBA thread

USER
ID of the user who requested this transaction.

Area 2

```
----------------------------DL/I CALL ACTIVITY------------  ---I/O----- -------
DBNAME   ORG       GU    GN  REPL  ISRT  DLET OTHER  TOTAL   READ WRITE
-------- ------ ----- ----- ----- ----- ----- -----  -----  ----- -----
DB1H     PHIDAM   280    40   100   100   100    11    631      0     0
 DB1H1X  (DD)                                                  20     0
 DB1H1A  (DD)                                                  40     0
 DB1H2X  (DD)                                                  21     0
 DB1H2A  (DD)                                                  21     0
ALLDBS              0     0     0     0     0     0      0      0    20
**TOTAL           280    40   100   100   100    11    631    102    20
```

This area shows the amount of DL/I call activity incurred by this transaction instance. The descriptions are arranged in alphabetical order.

DBNAME
Name of the DL/I database accessed by this transaction instance.

DLET
Number of DELETE calls issued by this transaction instance against the database.

GN
Number of GET NEXT calls issued by this transaction instance against the database.

GU
Number of GET UNIQUE calls issued by this transaction instance against the database.

ISRT
Number of INSERT calls issued by this transaction instance against the database.

ORG
IMS database organization type. If DBTNAME=DD is specified in BBPARM member IMFECP00, ddnames are shown as (DD); for example, CUSTHISM (DD). If I/O was done against the database or data set, the type and amount of I/O is shown by the READ or WRITE fields.

DEDB	DEDB
HD-R	HDAM plus root-index
HDAM	HDAM
HID-I	HIDAM index
HID-R	HIDAM plus root-index
HIDAM	HIDAM
HIS-C	HISAM-case-2
HISAM	HISAM
HSAM	HSAM
PHDAM	Partitioned HDAM
PHIDAM	Partitioned HIDAM
PSINDX	Partitioned secondary index
ROOT	Root-index
SHISAM	SHISAM
SSAM	SSAM

OTHER
: Number of other types of DL/I calls issued against this database by this transaction instance.

READ
: Total number of key reads and non-key reads to satisfy DL/I requests for this database. STRAC reports only application-related I/O; DTRAC reports all I/O including I/O done by IMS at database OPEN.

REPL
: Number of REPLACE calls issued by this transaction instance against the database.This row contains totals of the requests for all databases accessed by this transaction instance.

TOTAL
: Total number of DL/I database calls issued by this transaction instance against the database:

```
GU + GN + REPL + ISRT + DLET
```

This value includes calls to DEDBs. For large values, the number is scaled by 1000 and a K is placed after the value.

WRITE
: Total number of key writes and non-key writes to satisfy DL/I requests for this database. STRAC reports only application-related I/O; DTRAC reports all I/O including I/O done by IMS at database OPEN.

Area 3

```
 ----------------------------FAST-PATH ACTIVITY---------------------------------
NBA..........       10      CI CONTENTION.       0      SYNC RETCODE..   0
OBA..........        2      WAIT FOR BFRS.       0      BALG Q-COUNT..   0
BUFFER USED..        0      WAIT-OBA BFR LATCH. NO
```

This area shows the region Fast Path call activity for the selected transaction instance. The descriptions are arranged in alphabetical order.

BALG Q-COUNT
: For a Fast Path message-driven transaction, the number of transactions queued on the same balancing group when this transaction went through synchronization point processing.

BUFFER USED
: Number of Fast Path buffers actually used by this transaction instance.

Tuning Tip

If this total is greater than the NBA value, the extra buffers are taken from the overflow buffer allocation. The use of overflow buffers should be avoided if possible.

CI CONTENTION
: Number of Fast Path control interval contentions for this transaction instance.

NBA
: Number of buffers defined in the region JCL for normal buffer allocation.

OBA
: Number of buffers defined in the region JCL for overflow buffer allocation.

SYNC RETCODE
: The result of synchronization point processing for a transaction that accessed Fast Path databases.

WAIT FOR BFRS
: Number of times this transaction instance had to wait for a Fast Path buffer to become available.

WAIT-OBA BFR LATCH
: Y|N indicates whether this transaction waited for the OBA buffer latch or not.

Tuning Tip

Only one message region at a time can use the overflow buffers. A Y in this field indicates that this region used all of the normal buffers allocated to it (NBA) and had to wait before getting one or more overflow buffers. If this wait is a common occurrence, you should consider increasing the NBA for this region so that overflow buffers are not needed.

Area 4

```
 ----------------------------DB2 ACTIVITY-------------------------------------
DB2NAME...... DB2D           CONTROL.......       0      INSERTS.......       0
PLANNAME..... PHDAMINQ       DYNAMIC.......       0      DELETES.......       0
SEL/FCH......        5       DDL...........       0      UPDATES.......       0
OPENS........        0       OTHER.........       0      SQL TOTAL.....       5
```

This area shows the region DB2 subsystem call activity for the selected transaction instance. 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 this transaction instance.

DB2NAME
: DB2 subsystem ID.

DDL
: Number of SQL Data Definition Language calls issued to DB2 (CREATE, DROP, ALTER, COMMENT, or LABEL, for example) by this transaction instance.

DELETES
: Total number of SQL DELETE calls issued to DB2 by this transaction instance.

DYNAMIC
: Total number of SQL dynamic calls issued to DB2 (PREPARE, DESCRIBE, or EXECUTE, for example) by this transaction instance.

INSERTS
: Total number of SQL INSERT calls issued to DB2 by this transaction instance.

OPENS
: Total number of SQL OPEN cursor calls issued to DB2 by this transaction instance.

OTHER
: Number of other SQL calls issued to DB2 by this transaction instance 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 this transaction instance.

SQL TOTAL
: Total number of SQL calls issued to DB2 by this transaction instance. For large values, the number is scaled by 1000 and a K is placed after the value.

UPDATES
: Total number of SQL UPDATE calls issued to DB2 by this transaction instance.

```
 Area 5

 ---------------------------CPU TIMES----------------------------------------
                   DLI TIME   BUFFER HANDLER TIME   OPEN CLOSE TIME    TOTAL
DEPENDENT REGION     200us               0                 0           200us
CONTROL REGION       400us               0                 0           400us
DLISAS               300us               0                 0           300us
DEPENDENT REGION CPU TIME.........................................    100ms
DEPENDENT REGION DB2 CPU TIME.....................................     50ms
TOTAL CPU TIME....................................................    151ms
```

This area shows how much CPU time is used by the DL/I Analyzer, the buffer handler module, and the application program to process a transaction.

The top portion of this area:

```
                    DLI TIME   BUFFER HANDLER TIME   OPEN CLOSE TIME    TOTAL
DEPENDENT REGION     200us               0                 0            200us
CONTROL REGION       400us               0                 0            400us
DLISAS               300us               0                 0            300us
```

shows the DL/I Analyzer, buffer handler module, and application program usage of CPU time. These fields, in alphabetical order, provide:

CONTROL REGION - BUFFER HANDLER TIME
: Amount of control region CPU time used by the buffer handler module to process this transaction. To obtain this time, the Event Collector BHTO option in BBPARM member IMFECP00 must be set to:

```
BHTO=ON
```

If it is not, 0s are displayed for this field.

CONTROL REGION - DLI TIME
: Amount of control region CPU time used by the DL/I Analyzer to process this transaction. To obtain this time, the Event Collector CPU option in BBPARM member IMFECP00 must be set to:

```
CPU=ALL
```

If it is not, 0s are displayed for this field.

CONTROL REGION - OPEN CLOSE TIME
: Amount of control region CPU time used by the DL/I Analyzer to open and close databases for this transaction. To obtain this time, the Event Collector CPU option in BBPARM member IMFECP00 must be set to:

```
CPU=ALL
```

and the IMS LSO option must be set to:

```
LSO=YES
```

If they are not, 0s are displayed for this field.

DEPENDENT REGION - BUFFER HANDLER TIME
: Amount of dependent region CPU time used by the buffer handler module to process this transaction. To obtain this time, the Event Collector BHTO option in BBPARM member IMFECP00 must be set to:

```
BHTO=ON
```

If it is not, 0s are displayed for this field.

DEPENDENT REGION - DLI TIME

Amount of dependent region CPU time used by the DL/I Analyzer to process this transaction. To obtain this time, the Event Collector CPU option in BBPARM member IMFECP00 must be set to:

```
CPU=ALL
```

or

```
CPU=DEP
```

If it is not, 0s are displayed for this field.

DEPENDENT REGION - OPEN CLOSE TIME

Amount of dependent region CPU time used by the DL/I Analyzer to open and close Fast Path databases for this transaction.

DLISAS REGION - BUFFER HANDLER TIME

Amount of DLISAS region CPU time used by the buffer handler module to process this transaction. To obtain this time, the Event Collector BHTO option in BBPARM member IMFECP00 must be set to:

```
BHTO=ON
```

If it is not, 0s are displayed for this field.

DLISAS REGION - DLI TIME

Amount of DLISAS region CPU time used by the DL/I Analyzer to process the transaction. To obtain this time, the Event Collector CPU option in BBPARM member IMFECP00 must be set to:

```
CPU=ALL
```

If it is not, 0s are displayed for this field.

DLISAS REGION - OPEN CLOSE TIME

Amount of DLISAS region CPU time used by the DL/I Analyzer to open and close databases for this transaction. To obtain this time, the Event Collector CPU option in BBPARM member IMFECP00 must be set to:

```
CPU=ALL
```

If it is not, 0s are displayed for this field.

TOTAL

The sum of the DL/I, buffer handler, and open close CPU time used by the dependent, control, or DL/I SAS regions to process a transaction, where `us` represents microseconds, `ms` represents milliseconds, and `s` represents seconds.

The bottom portion of this area:

```
DEPENDENT REGION CPU TIME.........................................  100ms
DEPENDENT REGION DB2 CPU TIME.....................................   50ms
TOTAL CPU TIME....................................................  151ms
```

shows application program and DB2 call usage of CPU time. These fields, in alphabetical order, provide:

DEPENDENT REGION CPU TIME
: Amount of CPU time used by the application program in the dependent region to process this transaction. It includes DB2 CPU time.

DEPENDENT REGION DB2 CPU TIME
: Amount of CPU time used in the dependent region to process normal and service calls to DB2.

TOTAL CPU TIME
: The sum of all CPU time used.

Chapter 45. DTRAC - Detail Trace Data Display

```
BMC SOFTWARE  -------------    IMS DETAIL TRACE     -----------PERFORMANCE MGMT
SERV ==> DTRAC            INPUT   14:24:03  INTVL=> 3  LOG=> N  TGT==> IMSxxx
PARM ==> TRAN1,SEQ=2,LEVEL=1                          ROW 1 OF 6 SCROLL=> CSR
EXPAND:  CALL, IO, DATA, ALL
                                          (PF10/11 FOR PREV/NEXT TRACE ENTRY)
TRANCODE: THDAMINQ  USR/LTRM: PDRIVER   ARRIVE: 14:19:09.00  START: 14:19:09.05
     EVENT             AT      ELAPSED       CPU     DETAIL
------------------ --------- ----------- ----------- --------------------------
SCHD RGN IMSM71X         0us       208ms     1,758ms IWAITING
GU   DC             36,290us        20us         8us ok
GU   DB  CUSTHDAM   36,318us    80,464us        71us ok
GNP  DB  CUSTHDAM      114ms        69us        47us ok
ISRT DC                114ms        24us        21us QH
GU   DC  I/O PCB       114ms     2,570us         0us
```

```
BMC SOFTWARE  -------------    IMS DETAIL TRACE     -----------PERFORMANCE MGMT
SERV ==> DTRAC            INPUT   14:24:44  INTVL=> 3  LOG=> N  TGT==> IMSxxx
PARM ==> TRAN1,SEQ=2,LEVEL=2                          ROW 1 OF 8 SCROLL=> CSR
EXPAND:  CALL, IO, DATA, ALL                                HIST TGT==>IMSxxx
                                          (PF10/11 FOR PREV/NEXT TRACE ENTRY)
TRANCODE: THDAMINQ  USR/LTRM: PDRIVER   ARRIVE: 14:19:09.00  START: 14:19:09.05
     EVENT             AT      ELAPSED       CPU     DETAIL
------------------ --------- ----------- ----------- --------------------------
SCHD RGN IMSM71X         0us       208ms     1,758ms IWAITING
GU   DC             36,290us        20us         8us ok
GU   DB  CUSTHDAM   36,318us    80,464us        71us ok
  IO DD  CUSTHDAM      102ms     7,669us
  IO DD  CUSTHDAM      110ms     3,696us
GNP  DB  CUSTHDAM      114ms        69us        47us ok
ISRT DC                114ms        24us        21us QH
GU   DC  I/O PCB       114ms     2,570us         0us
```

```
BMC SOFTWARE  -------------    IMS DETAIL TRACE     -----------PERFORMANCE MGMT
SERV ==> DTRAC            INPUT   14:25:12  INTVL=> 3  LOG=> N  TGT==> IMSxxx
PARM ==> TRAN1,SEQ=2,LEVEL=3                          ROW 1 OF 29 SCROLL=> CSR
EXPAND:  CALL, IO, DATA, ALL
                                          (PF10/11 FOR PREV/NEXT TRACE ENTRY)
TRANCODE: THDAMINQ  USR/LTRM: PDRIVER   ARRIVE: 14:19:09.00  START: 14:19:09.05
     EVENT             AT      ELAPSED       CPU     DETAIL
------------------ --------- ----------- ----------- --------------------------
SCHD RGN IMSM71X         0us       208ms     1,758ms IWAITING
GU   DC             36,290us        20us         8us ok
     IOA  m  THDAMINQ ARMCO STEEL
         0900ECCCDCDD4CDDCD4EECCD4444444444444444444444444444444444444444
         0430384149580194360235530000000000000000000000000000000000000000
GU   DB  CUSTHDAM   36,318us    80,464us        71us ok
     SSA CUSTOMER(CUSTID   =ARMCO STEEL               )
         CEEEDDCD4CEEECC4447CDDCD4EECCD444444444444445
         34236459D342394000E194360235530000000000000D
     KFB ARMCO STEEL
         CDDCD4EECCD44444444444444
         194360235530000000000000
     IOA ARMCO STEEL
         CDDCD4EECCD4444444444444444444000000000000000000000000000000000000
         194360235530000000000000000000000000000000000000000000000000000000
GNP  DB  CUSTHDAM      114ms        69us        47us ok
     IOA CIMS      121075    17000
         CCDE444444FFFFFF4444FFFFF4444400000000000000000000000000000000000
         394200000012107500001700000000000000000000000000000000000000000
ISRT DC                114ms        24us        21us QH
GU   DC  I/O PCB       114ms     2,570us         0us
```

```
BMC SOFTWARE  -------------    IMS DETAIL TRACE     -----------PERFORMANCE MGMT
SERV ==> DTRAC            INPUT   14:25:12  INTVL=> 3  LOG=> N  TGT==> IMSxxx
PARM ==> TRAN2,SEQ=2,LEVEL=2                          ROW 1 OF 29 SCROLL=> CSR
EXPAND:  CALL, IO, DATA, ALL
                                          (PF10/11 FOR PREV/NEXT TRACE ENTRY)
TRANCODE: CSQDB2T   USR/LTRM: WTOR      ARRIVE: 13:37:09.90  START: 13:37:21.91
     EVENT             AT      ELAPSED       CPU     DETAIL
------------------ --------- ----------- ----------- --------------------------
SCHD RGN IMSM19X         0us     6,865us         0us IWAITING
GU   DC  WTOR       25,314us        25us         8us ok
CSQ3     SIGN ON    48,334us     2,535us       269us RC: 0
CSQ3     C_THREAD   51,057us        17us        12us RC: 0
CSQ3     MQCONN     51,109us        37us        33us RC: 0
CSQ3     MQPUT1     51,367us     2,645us       712us RC: 0
DB2S     SIGN ON    54,195us       129us        81us RC: 0
DB2S     C_THREAD   54,368us       294ms     1,698us RC: 0
DB2S     OPEN          347ms       578us       338us RC: 0   SQL-307
DB2S     FETCH         348ms       161ms     1,139us RC: 0   SQL-317
DB2S     FETCH         509ms       864us       135us RC: 0   SQL-317
DB2S     FETCH         510ms        73us        70us RC: 0   SQL-317
DB2S     FETCH         510ms       278us        62us RC: 0   SQL-317
DB2S     FETCH         512ms       149us       103us RC: 100 SQL-317
DB2S     CLOSE         512ms        70us        49us RC: 0   SQL-327
CSQ3     MQDISC        542ms       136us       132us RC: 0
CSQ3     P1-COMIT      544ms        95us        91us RC: 0
DB2S     P1-COMIT      544ms       312us       218us RC: 0
CSQ3     T_THREAD      545ms     5,207us       177us RC: 0
DB2S     T_THREAD      550ms       605us       245us RC: 0
```

Description: This service displays a detail trace of events that occurred as a transaction was processed. It shows data for IMS events and calls to IMS by DB2 and MQSeries.

The detail workload trace is used to debug complex IMS performance problems associated with the execution of specific transactions. Unique events in the flow of each traced transaction are presented.

Usage notes: The detail trace data is captured during execution into detail trace buffers allocated when the trace is started. The TRSIZE and TRBUFF parameters in BBPARM member IMFBEX00 control the size and number of the buffers.

The detail trace buffer is acquired for a transaction either during scheduling or when the transaction first starts running. If the trace did not complete initialization or if a buffer is not available when the transaction begins running, no detail trace entries will be recorded for the transaction. When you try to view the detail trace, you will get the following message:

```
WA3141I DETAIL TRACE NOT ACTIVE FOR THIS TRANSACTION
        EXECUTION
```

The number of detail trace entries that will fit into the detail trace buffer depends on

- the size of the buffer allocated
- the size of the entries captured

The size of the entry will vary based on its type. If you specified WRAP=NO when you started the trace (see page 464) and a transaction runs out of space in the buffer, you will get the following message:

```
WA3143I DETAIL TRACE BUFFER FULL
```

Select Code: DTRAC

Parameters: The DTRAC parameters can be used as follows:

- Multiple parameters must be separated by commas.
- A blank indicates the end of a parameter string.

traceid

The traceid is a unique ID used with the MTRAC request. A blank can be an identifier. This parameter is positional and must be in the first position. This field is primed automatically with the MTRAC request identifier if DTRAC is requested from the STRAC display.

LEVEL=1|2|3|4

Level 1 displays call activity for transaction events. Level 2 (the default) includes call activity and, for IMS calls, displays database I/O events that occurred during call processing. Level 3 includes call activity and, for IMS calls, displays segment search argument, key feedback, and I/O area data (SSA, KFB, and IOA). Level 4 displays all the information of Levels 1, 2, and 3.

Levels 1, 2, 3, and 4 correspond with the CALL, IO, DATA, and ALL options on the EXPAND line.

SEQ=n

The SEQ= value is a unique internal sequence number assigned sequentially to each trace entry in the online trace storage buffer or trace log data set. If logging was requested for the trace, the number is assigned across multiple log data sets. If this keyword is not entered, the most recent trace entry is displayed. If you request DTRAC by navigating from STRAC, this field is primed automatically. You can change the value to scroll anywhere through the trace data.

Expand: You can select the following DTRAC display options by tabbing on the EXPAND line:

CALL This expansion option displays only the call activity for transactions.

IO This is the default expansion option. It includes call activity, and for IMS transactions, it displays database I/O events that occurred during call processing for the transactions.

DATA This expansion option includes call activity, and for IMS transactions, it displays segment search argument, key feedback, and I/O area data (SSA, KFB, and IOA).

ALL This expansion option includes call activity, and for IMS transactions, it displays database I/O events and SSA, KFB, and IOA data.

The CALL, IO, DATA, and ALL options on the EXPAND line correspond with Levels 1, 2, 3, and 4 on the PARM line (see the LEVEL= parameter on page 543).

HISTORY is displayed in the EXPAND line if the selected trace request specified logging. You can use it to toggle from viewing data from the current trace storage buffer to viewing entries in the trace log data set. It provides access to data no longer in the current trace storage buffer (see Chapter 37, “Logging a Trace”).

CURRENT is displayed on the EXPAND line when a DTRAC display shows trace entries from a trace log data set. You can use it to toggle from viewing a trace log data set to viewing any entries remaining in the current trace storage buffer (trace is still active or completed but not purged). This field applies only to trace requests specifying trace logging.

Sorting: This display cannot be sorted.

Scrolling: There are two ways to scroll DTRAC displays.

- You can use PF keys to scroll up or down.
- You can use PF10 and PF11 to scroll through trace entries in the current trace storage buffer or trace log data set. PF10 scrolls to the previous trace entry. PF11 scrolls to the next trace entry. The current entry is displayed in the SEQ field.

Field Descriptions: The following fields are displayed by DTRAC:

ARRIVE	Time of transaction arrival in the input queue (not applicable to an IMS DBCTL system)
HIST TGT	If the request specified trace logging, this field shows the historical target from the trace log data set if it is different from the current target shown in the TGT field. The current target is controlled by the BBI-SS PAS.
START	Time transaction started
TRANCODE	Name of this transaction instance
USR/LTRM	ID of the user or the name of the LTERM where the transaction was submitted if there is no user ID

Detail Trace Data Columns

This section describes the information DTRAC displays under its five data columns.

```
     EVENT             AT      ELAPSED       CPU     DETAIL
------------------ --------- ----------- ----------- --------------------------
```

EVENT	This field identifies the event being traced. Formatting for information in this column is described on pages 546 through 551.
AT	This field shows the elapsed time from the end of scheduling of the transaction until the time the event occurred. The time value is displayed in seconds (s), milliseconds (ms), or microseconds (us). Certain DB2 events can occur while a region is in an IWAIT status during scheduling. Those events are traced, but the elapsed time shown is from the start of scheduling. One of the causes of this type of event is when DB2 terminates while a region is signed on to DB2. **Note:** The elapsed time of scheduling events (SCHD) is not considered part of the transaction execution time and is not included in the elapsed time shown in the AT field.
ELAPSED	This field shows the elapsed time of the event in seconds (s), milliseconds (ms), or microseconds (us). **Note:** The elapsed time of a DL/I call includes the elapsed time of any I/Os performed on its behalf. For SCHD entries, elapsed time excludes IWAIT time.
CPU	This field provides the CPU time of an event if the time value is available. The time is displayed in microseconds (us). For scheduling events (SCHD), the CPU field shows the amount of IWAIT (IMS wait) time during scheduling (the amount of time the region waited to schedule a transaction for processing). **Note:** For wait-for-input (SCHD WFI) transactions, the event is at the end of the trace events. Because of the method used to collect this data, the data (trace buffer) is available for display only when the next transaction is scheduled in that region. The trace buffer is transferred to the PAS when the WFI GU to the I/O PCB is satisfied or the region terminates.
DETAIL	For IMS nonscheduling events, this field displays the DL/I status code returned by IMS for the event. For IMS scheduling events (SCHD), IWAITING is displayed in the field. For DB2 events, the detail field displays the return code associated with the event. For SQL DB2 events, the field also displays the DB2 precompiled SQL statement number. For MQSeries events, the field displays the return code associated with the event and the token, if there is one.

Detail Trace Event and Data Display Formats

This section describes the DTRAC event and data display formats for trace information. DTRAC displays detail trace information for:

- IMS calls
- DB2 calls
- CICS calls
- MQSeries calls

IMS Calls – Event Display Formats

This section describes the formatting used in the DTRAC EVENT column for events resulting from IMS calls. The types of IMS calls are:

- data communication calls
- database calls
- scheduling calls

For IMS calls, DTRAC also displays

- database I/O events that occurred during call processing for transactions (page 547)
- segment search argument (SSA) data (page 548)
- key feedback (KFB) data (page 548)
- I/O area (IOA) data (page 548)

Data Communications Calls

Shown below is the format DTRAC uses for IMS data communications calls.

Format:

- Call type (such as GU, GN, ISRT, PURG)
- DC (message queue) or
  EM (expedited message handler)
- Name of the PCB referenced in the call, such as I/O PCB

Examples:

```
ISRT DC I/O PCB
GU   EM I/O PCB
```

Database Calls

Shown below is the format DTRAC uses for IMS database calls.

Format:

- Call type (such as GU, GN, ISRT, DLET, REPL)
- DB (DL/I database),
  DE (Fast Path DEDB), or
  MS (Fast Path MSDB)
- Name of the database (the DBD name) referenced in the calls

Examples:

```
REPL DB CUSTHDAM
GU   DE PAYDEDB
```

Scheduling Calls

Shown below is the format DTRAC uses for IMS scheduling calls.

Format:

- SCHD
- RGN (region) or
  WFI (wait for input)
- Region name of this IMS dependent region

Example:

```
SCHD RGN IIMSM71X
```

IMS Calls – Data Display Formats

Database I/O

DTRAC displays the following IMS database I/O.

Format:

- IO DD
- ddname of the file for which I/O was performed

Note: Fast Path DEDB I/O is not traced.

Example:

```
IO DD CUSTDD
```

Segment Search Arguments (SSA)

DTRAC displays the following IMS SSA data.

Format:

- SSA
- First 45 bytes of the nth SSA, in hexadecimal dump format, specified with the call. All SSAs specified for a call are displayed.

Example:

```
SSA CUSTOMER(CUSTID   =ARMCO STEEL              )
    CEEEDDCD4CEEECC4447CDDCD4EECCD444444444444445
    34236459D342394000E194360235530000000000000D
```

Key Feedback Data

DTRAC displays the following IMS key feedback data.

Format:

- KFB
- First 25 bytes in hexadecimal dump format of the key feedback data specified with the call

Example:

```
KFB ARMCO STEEL
    CDDCD4EECCD44444444444444
    194360235530000000000000
```

I/O Area (IOA)

DTRAC displays the following IMS I/O area data.

Format:

- IOA
- First 65 bytes in hexadecimal dump format of the I/O area specified with the call

Example:

```
IOA ARMCO STEEL
    CDDCD4EECCD4444444444444444444000000000000000000000000000000000
    194360235530000000000000000000000000000000000000000000000000000
```

DB2 Calls

This section describes the formatting used in the DTRAC EVENT column for events resulting from DB2 calls. The types of DB2 calls are:

- IMS attach facility DB2 calls
- SQL DB2 calls

IMS Attach Facility DB2 Calls

Shown below is the format DTRAC uses for service calls issued by the IMS attach facility to a DB2 subsystem.

Format:

- DB2 subsystem identifier
- IMS attach facility call type

Example:

```
DB2S  C_THREAD
```

IMS attach facility call types:

`xx-UNKC`	Unrecognized call type; `xx` is the hex value of the call type.
`ABORT`	Abort call
`C_THREAD`	Create thread
`IDENTIFY`	Identify
`INIT_CAL`	Initiate call
`P1-COMIT`	Phase 1 commit
`P2-COMIT`	Phase 2 commit
`SIGN OFF`	User signoff
`SIGN ON`	User signon
`SQL-xxxx-UNK`	Unrecognized SQL call code; `xxxx` is the hexadecimal code value
`T_IDENT`	Terminate identify
`T_THREAD`	Terminate thread

SQL DB2 Calls

The format DTRAC uses for SQL DB2 calls is shown below.

Format:

- DB2 subsystem identifier
- SQL statement call type

Example:

```
DB2S  SELECT
```

SQL statement call types:

DTRAC calls are shown to the left. When a DTRAC call has been abbreviated from the complete form of a call, the complete form is shown in parentheses to the right of the abbreviation.

```
ALTER DB  (ALTER DATABASE)          DROP PK   (DROP PACKAGESET)
ALTER IX  (ALTER INDEX)             DROP SG   (DROP STORAGEGROUP)
ALTER SG  (ALTER STORAGEGROUP)      DROP SY   (DROP SYNONYM)
ALTER SY  (ALTER SYNONYM)           DROP TB   (DROP TABLE)
ALTER TB  (ALTER TABLE)             DROP TS   (DROP TABLESPACE)
ALTER TS  (ALTER TABLESPACE)        DROP VW   (DROP VIEW)
CLOSE                               EXECI     (EXECUTE IMMEDIATE)
COMMENT   (COMMENT ON)              EXECUTE
CONN TO   (CONNECT TO)              EXPLAIN
CONN RST  (CONNECT RESET)           FETCH
CONNECT                             GRANT
CREAT AL  (CREATE ALIAS)            IMPL CON  (IMPLICIT CONNECT)
CREAT DB  (CREATE DATABASE)         INSERT
CREAT IX  (CREATE INDEX)            LABEL     (LABEL ON)
CREAT SG  (CREATE STORAGEGROUP)     LOCK
CREAT SY  (CREATE SYNONYM)          OPEN
CREAT TB  (CREATE TABLE)            PREPARE
CREAT TS  (CREATE TABLESPACE)       REVOKE
CREAT VW  (CREATE VIEW)             RMT SQL   (REMOTE SQL)
DELETE                              SELECT
DESCRIBE                            SET C SQ  (SET CURRENT SQLID)
DROP AL   (DROP ALIAS)              SET C PK  (SET CURRENT PACKAGESET)
DROP DB   (DROP DATABASE)           SET H VA  (SET HOST VARIABLE)
DROP IX   (DROP INDEX)              UPDATE
```

MQSeries Calls

This section describes the formatting used in the DTRAC EVENT column for events resulting from MQSeries calls.

Format:

- MQSeries subsystem identifier
- MQSeries call type or IMS attach facility call type

Examples:

```
CSQ3 C_THREAD
CSQ3 MQCONN
CSQ3 MQPUT1
```

MQSeries call types:

`MQBACK`	Backs out updates to queue manager resources
`MQCLOSE`	Closes a message queue
`MQCMT`	Commits updates to queue manager resources
`MQCONN`	Sets up contact with a queue manager
`MQDISC`	Terminates contact with a queue manager
`MQGET`	Takes messages from a queue
`MQINQ`	Requests information about a message queue
`MQOPEN`	Opens a message queue
`MQPUT`	Puts messages on a queue
`MQPUT1`	Puts a single message on a queue
`MQSET`	Sets attributes on a queue

IMS attach facility call types:

`xx-UNKC`	Unrecognized call type; `xx` is the hex value of the call type.
`ABORT`	Abort call
`C_THREAD`	Create thread
`IDENTIFY`	Identify
`INIT_CAL`	Initiate call
`P1-COMIT`	Phase 1 commit
`P2-COMIT`	Phase 2 commit
`SIGN OFF`	User signoff
`SIGN ON`	User signon
`T_IDENT`	Terminate identify
`T_THREAD`	Terminate thread

Part 6. Monitor Service Control

This section describes how to control time-driven monitor services using the SET timer request and the BBI Subsystem Information application (Primary Menu Option 5) from the Primary Option Menu.

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Chapter 46. The SET Timer Request

The SET request is used to initiate, modify, or purge timer-driven services for:

- Data collection monitor, workload wait, or workload trace services
- Service output display Image logging. It is activated from the service lists. When a service is selected, a data entry panel is displayed and primed with SET request options for the selected service.

Service Requests

SET is used to request timer-driven:

- Data collection by resource, workload wait, or workload trace monitor services
- Image logging of IMS analyzer or monitor status displays

SET options for a service are primed in a data entry panel when that service is requested. SET for a service also can be requested from the SERV field of a display or as a member of a BBPARM data set to initiate multiple service requests.

Request Initiation

A SET request for a service starts with one of the following keywords:

`REQ=reqid`	Defines a new request or continues a held request where `reqid` is the service select code for a service and an optional parameter identifying the request.
`MOD=reqid`	Modifies an existing request.
`BLK=membername`	Identifies a BBPARM data set member that contains a group of service requests.

Service Request ID (reqid)

A service is uniquely defined in a SET request by its `reqid`. The `reqid` is the service select code (ssc) and, if necessary, a parameter:

```
REQ=ssc,parameter
```

Duplicate requests are not allowed; however, multiple requests for the same service can be active concurrently if the `reqid` for each request has a unique parameter.

The original `reqid` must be specified to modify or purge an active service request.

Syntax

If you specify a SET request from the SERV field of a display panel or in a member of a BBPARM data set as described in the following sections, the request requires a syntax.

Note: If you select a service from a list application, there are no syntax requirements. A data entry panel is displayed that is primed with the appropriate keywords for the selected service.

The syntax for entering keyword options (`REQ=`) in the PARM field of a display panel or a BBPARM data set is free format and keyword-oriented. Any number of blanks, commas, slashes, or parentheses can be interspersed in the text between keywords to improve readability; they are ignored during request processing. The equal sign between keyword and operand is optional, but it is recommended to improve readability.

Single Requests

Single SET request keyword options for a service can be entered in the PARM field of a service display panel. The PARM field is 55 bytes long. As many keyword options as can fit in this space can be entered. If all the options do not fit in the parameter line, the option `HOLD=YES` can be used to hold the request until it can be completed with a second SET request with the same `reqid`.

Multiple Requests

A series of valid request keyword options for SET can be predefined in a member of the BBI-SS PAS BBPARM data set. In the BBPARM data set there are sample block request members to set and purge multiple requests. BLKDBCW is a suggested starter set of monitors. BLKDBCWP is a sample member to purge the requests set by BLKDBCW.

Each request can start anywhere in a line from columns 1 to 79 and can continue onto the next line.

There can be one group for each IMS subsystem. Requests for display logging and starting monitors can be specified; for example, member BLKIMSA in BBPARM could contain:

```
REQ=PI I=00:06:00 LOG=ATINTVL
REQ=FPBST   I=00:01:00
REQ=DWARN   I=00:01:00
REQ=DBHIT,WVAL=80,WLIM=3,LOG=ATINTVL
REQ=DBTOT,WVAL=60,WLIM=3,LOG=ATINTVL
REQ=LHELD,WVAL=90,WMSG=WTO,WIF=2,WIN=5,WLIM=6,LOG=ATINTVL
```

The member can be started by specifying the BLK keyword and BBPARM member name in the parameter field for the SET timer request:

```
SERV ==> SET
PARM ==> BLK=BLKIMSA
```

Note: The BLK keyword cannot be used in a request within a BBPARM member.

Multiple BBPARM members with predefined requests can be included with the BLK request:

```
BLK=membername1(,membername2)(,...)
```

The member names must identify previously created members of a partitioned data set, like BBPARM, allocated to the BBI-SS PAS with the ddname BBIPARM (see the SSJCL sample member in BBSAMP). The record length must be 80 characters; blocksize can be any multiple of 80.

A SET BLK request is logged to the BBI-SS PAS Journal log. Any errors in the requests issued with SET BLK also are logged to the BBI-SS PAS Journal log.

Automatic Startup of Multiple Requests

Multiple requests can be started when the BBI-SS PAS starts. The name of the BBPARM member containing the block of requests is specified in the BBIISP00 member of BBPARM. The parameters are TARGET, BLK, USRID, and AUTOID. They are used as follows:

TARGET — Defines the IMS subsystem to be monitored. It must be on the same line as BLK and USRID.

BLK — Specifies a BBPARM member that contains a block of monitor requests to be started for the specified target IMS subsystem when the BBI-SS PAS starts. It must be on the same line as TARGET and USRID.

USRID — For each specified target IMS subsystem, USRID is the security authorization ID for each monitor request within the BBPARM member specified by BLK. It must be on the same line as TARGET and BLK. USRID overrides AUTOID.

AUTOID — Is a security authorization ID that applies to all the specified target IMS subsystems unless USRID is specified. AUTOID is written on a separate line from TARGET and BLK.

TARGET, BLK, and USRID must be written on the same line and can be repeated for different targets. TARGET and BLK are required; USRID and AUTOID are optional. If you do not specify USRID or AUTOID, BBPARM member USERID is used for the security authorization ID. If this is not a valid authorization ID, BMC Software strongly recommends that you specify either USRID or AUTOID.

For example:

```
TARGET=IMSA,BLK=BLKIMSA,USRID=$TIMSAR
TARGET=IMSB,BLK=BLKIMSB,USRID=$TIMSBX
TARGET=IMSC,BLK=BLKIMSC,USRID=$TIMSC
```

or

```
AUTOID=ADMIN
TARGET=IMSA,BLK=BLKIMSA
TARGET=IMSB,BLK=BLKIMSB
TARGET=IMSC,BLK=BLKIMSC
```

The first example assumes there are three active IMS subsystems. The monitors defined in BLKIMSA extract data from the IMSA subsystem and are associated with the user ID $TIMSAR. The monitors defined in BLKIMSB extract data from the IMSB subsystem and are associated with the user ID $TIMSBX.

Note: If the target IMS is not active, the QIS option defines the action to be taken for each request. The default is to quiesce until the target IMS starts.

Multiple Request Comments

Comments can be entered in a block request member of BBPARM. A comment is delimited by the * sign. A warning indicator is issued when invalid characters, which are treated as blanks, are encountered.

Note: If line numbers are used in a block request member, each number should be preceded by an * sign.

Request Termination

A service request can be terminated with the following SET request:

```
SERV ==> SET
PARM ==> PRG=reqid            Purges an existing request
```

SET Keyword Parameter Options

Table 20 on page 559 and Table 21 on page 562 describe the keyword parameters that can be specified with a SET request.

Nonmodifiable Keyword Options

The following options cannot be modified (`MOD=reqid`) because previously collected history would be distorted.

INTERVAL
RANGES
START
TITLE
HOLD

HOLD cannot be used for a request being modified. If a change needs to be made to one of these options for an active request, the request must be purged and a new request entered.

Selection Criteria

Workload requests can be qualified with selection criteria keywords as described in Table 14 on page 466. Once a workload request is activated, the selection criteria keywords cannot be changed. The request must be stopped and reactivated.

A + character can be used as a generic name qualifier for a workload request.

Keywords

The SET keywords define a timer request function. Table 20 lists the keywords by function. They are used to:

- Make a SET request from a display panel
- Make a SET request from within a BBPARM data set member
- Prime the data entry panels used to make a request for a time-driven data collection service

Table 20 is an index to the keywords used to make a SET request for a service. These keywords are described in:

- "Using the Workload Wait Data Entry Panel" on page 301
- "Using the Resource Monitor Data Entry Panel" on page 387
- "Using the Workload Monitor Data Entry Panel" on page 391
- "Using the Workload Global Region Call Monitor Data Entry Panel" on page 397
- "Using the Workload Trace Data Entry Panel" on page 461

Any of the keywords can be used to make block requests as described in "Multiple Requests" on page 556. Table 21 on page 562 describes the keywords that affect all service activation, including multiple requests defined in a BBPARM member or from the SERV field of a display panel.

Table 20. SET Keywords (Page 1 of 3)

Options	**Keywords**
SET Keywords to Define Requests	BLK MOD PRG REQ
SET Keywords to Define Request Activation	HOLD INTERVAL RST START STOP STOPCNT TARGET|TGT
SET Keywords to Define Warnings (monitors only)	WIF WIN WLIM WMAX|WVAL WMSG
SET Keywords to Define Special Options	LOG PLOTMAX QIS RANGES TITLE|T

Table 20. SET Keywords (Page 2 of 3)

Options	Keywords
SET Keywords to Define Workload Analyzer Parameters for MWAIT and MTRAC	CURPER HISTORY STORAGE TYPE WRAP
SET Keywords to Define Selection Criteria for Workload Analyzer MWAIT and MTRAC Services and Workload Monitor Services AND logic is used for keywords. OR logic is used for keyword operands.	ABEND CALLTYPE|CTYP CLASS DATABASE DB2PLAN TERM USERID PGMTYPE|PTYP PROG PSB REGION RGNID TRAN TRANTYPE|TTYP
SET Keywords to Define Trace Logging for MTRAC Service	TRARCSTC TRCYL TRDISP TRDSN TRNUMDS TRREUSE TRSMSDCL TRSMSMCL TRSMSSCL TRSWTIME TRSUFFIX TRVOLS

Table 20. SET Keywords (Page 3 of 3)

Options	Keywords
SET Keywords to Define Exception Filters for MTRAC Service	DB2CPU DBUSED DEPCPU DLICALL DLIDC DLIDLET DLIGTYP DLIISRT DLIMSGN DLIMSIN DLIMSPR DLIREPL DLITOT DLIUTYP ELAPSED FPCICON FPOBA FPWTBFR INPUTQ RDWRT RESPONS SERIO SQLDDL SQLDEL SQLDYN SQLINS SQLOPN SQLOTH SQLSEL SQLTOT SQLUPD TOTCPU

Table 21 describes the keywords that affect all service activation, including multiple requests defined in a BBPARM member or from the SERV field of a display panel

Table 21. SET Keywords Affecting Request Activation

Keyword	Operand	Description
BLK		Identifies a member in BBPARM that contains predefined service requests.
	name	Member name in BBPARM.
	RRR	Resets all requests according to their RST options. This is the same as starting IMS after the requests were quiesced. It could be used at midnight to reset statistics for daily monitors.
	SSS	Restart all quiesced requests according to their RST options after IMS is restarted.
	ZZZ	Internal use only.
HOLD	YES	Holds this request until the definition is completed with another SET with the same reqid. Use it to specify more keywords than will fit on the 55-byte parameter line of a service display. **Note:** The MOD keyword cannot be used to change this option. The request must be purged and a new request must be made.
	NO	Default in NO.
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. The MOD keyword cannot be used to change this option. The request must be purged and a new request must be made.

Table 21. SET Keywords Affecting Request Activation (continued)

Keyword	Operand	Description
LOG		Specifies if and when automatic logging occurs. Analyzer, DMON or DWARN, or PLOT displays can be logged to the BBI-SS PAS Image log. For the monitors, a PLOT of the latest data is written to the BBI-SS PAS Image log.
	NO	No logging. Default for monitor services. `LOG=NO` is the only valid option for monitors that only measure a condition against a warning threshold (data measurement type of warning only).
	ATSTOP	Logs display when processing of this request is stopped. If `QIS=Y` has been specified in the request, `LOG=ATSTOP` is invoked at IMS termination and at BBI-SS PAS termination.
	ATPD	Logs display at each period of 10 intervals.
	ATINTVL	Logs display at each interval as specified by the user with the INTERVAL parameter or in the BBIISP00 member of the BBPARM data set. Default for analyzers. ATINTVL is the default for logging images of the analyzer services to the BBI-SS PAS Image log.
	ATWARN	Logs a plot whenever a warning message is generated by the associated monitor. NO is the default for the monitor services.
MOD	reqid	Modifies an existing request.
PARM	`id`	The variable `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 request is to be logged to the BBI-SS PAS Image log for an image log request, to be displayed with the plot display service for a monitor request, or to be displayed by a trace display service for a trace request.
PRG		Purges existing request or requests (frees the request block).
	reqid	Purges a single request.
	ALL	Purges all existing requests if the user is authorized.
REQ	reqid	Defines a new request or continues a held request.

Table 21. SET Keywords Affecting Request Activation (continued)

Keyword	Operand	Description
QIS		Defines the action to be taken for the requested service when IMS is not active.
	YES	Specifies that the requested service is to be quiesced. This is the default.
	NO	Specifies that the requested service is to start or continue running. 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.
RST		Defines the restart option to be used when a service or Image log request is quiesced because of an inactive IMS subsystem or `RRR` is specified for BLK (see "Multiple Requests" on page 556). Default is HOT.
	HOT	Restarts the service request automatically without loss of previous data.
	COLD	Restarts the service request automatically; all previously collected data is deleted.
	PUR	Purges the service request 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 a start time for the service request. 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.

Table 21. SET Keywords Affecting Request Activation (continued)

Keyword	Operand	Description
STOP	`nn|hh:mm:ss`	Requests a stop limit for a service request 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 Option Menu 2) application. If the time entered is the same as the START time, 24 hours are added to the STOP time. **Note:** For block requests, you must specify either `hh:mm:ss` or `STOPCNT=nn`
STOPCNT	n	The number of intervals to be processed. Requests that have completed without collecting history data are purged. Default is no limit. Requests are processed until stopped or purged or until the BBI-SS PAS terminates. **Note:** For block requests, you must specify either `STOP=hh:mm:ss` or `STOPCNT=nn` where `nn` is the number of minutes until the monitor stops.
TARGET| TGT	jobname	TARGET is used to override the default target IMS identified in the TGT field. The new target IMS will be that specified by the name parameter. Valid entries are a 1- to 8-character IMS control region jobname or stepname. IMSID can be used if identified in BBPARM member BBIJNT00. MAINVIEW AutoOPERATOR must be installed. TARGET is required if the IMFC command is used in a MAINVIEW AutoOPERATOR EXEC to request analyzer or monitor services. A message is issued to the BBI-SS PAS Journal log if this keyword is not coded in the request.

Chapter 47. Displaying BBI-SS PAS Information (Primary Menu Option 5)

This application is used to control all requests for timer-driven services, which include:

- Data collection by the Resource Monitor, Workload Monitor, and Workload Analyzer wait and trace monitor services
- Image logging of the analyzer or monitor service displays

Selecting Primary Menu Option 5 from the Primary Option Menu displays general information about the Timer facility, as shown by Figure 29.

```
BMC SOFTWARE  ---------- DISPLAY STATISTICS AND DEFAULTS ----- PERFORMANCE MGMT
COMMAND ===>                                                   TGT ===> IMSxxx
                                                               TIME --  14:36:03

BBI-SSID: RS33         BBI Release -- 2.6.0      SS Started: 10:51:25 22-MAR-yy
MVIMS/EC 3.3.10        MVIMS/PAS 3.3.10          SS Elapsed: 03:44:37
EC TRACE BUFFERS= 0    IN USE= 0    SIZE= OK     PUT LEVEL= 0201C
MVIMS/IMS Components WA: D WM: D PR: D TA: D
MSIMS/SS  Components WA: D WM: D RA: Y RM: Y LM: Y
   Requests:           80 Total request blocks        56 Unused blocks
   Activity:       39,090 Service calls               20 Warnings written

   Parameters:  ---- General ----     -- IMS WA WAIT --     - TRACE BUFFERS -
                INTERVAL=00:01:00     CURPER=00:01:00       STORAGE=100K
                ROUT=NONE             HISTORY=00:30:00      TRBUFF=10
                DESC=NONE                                   TRSIZE=4K

------------------------ DEFINED REQUESTS BY TARGET --------------------------
LC  TARGET   TYPE     ACTIVE  INIT  COMPLETE  HELD  INVALID  LOCKED   QIS   RST
    -TOTAL-  --ALL--      24
    IMSxxx   AO-CALLX      1
    IMSxxx   MONITOR      23
     ************************** END OF REQUESTS ****************************
```

Figure 29. Sample BBI Information Display (Primary Menu Option 5)

This application shows the BBI-SS PAS status; status of the currently active Event Collector, analyzer, monitor, and offline components; timer facility activity statistics; and timer request default parameters in effect and summarizes the status of all the timer requests.
The information shown is for the BBI-SS PAS connected to the target specified in the TGT field of the display.

The panel components are:

BBI-SS PAS Status Information
Component Status Information
Timer Facility Activity Statistics
Timer Request Default Parameters
Defined Timer Requests by Target

The panel fields are shown and described by panel component in the sections that follow.

BBI-SS PAS Status Information

This area displays BBI-SS PAS status information.

```
BBI-SSID: RS33         BBI Release -- 2.6.0      SS Started: 10:51:25 22-MAR-yy
                                                 SS Elapsed: 03:44:37
                                                 PUT LEVEL= 0201C
```

Figure 30. BBI-SS PAS Status (Timer Statistics and Defaults)

These fields show the status of the BBI-SS PAS by:

Field	Description
BBI-SSID	A two- to four-character code that identifies the active SS (subsystem).
BBI Release	The installed release level (not the product release) of the BBI platform.
SS Started	The date and time the BBI-SS PAS was started.
SS Elapsed	The length of time the BBI-SS PAS has been active.
PUT LEVEL	The level of the latest installed PUT tape

Component Status Information

This area displays the status of the currently active Event Collector, Workload Analyzer, Workload Monitor, Resource Analyzer, Resource Monitor, Performance Reporter, and Transaction Accountant.

```
MVIMS/EC 3.3.10        MVIMS/PAS 3.3.10
EC TRACE BUFFERS= 0    IN USE= 0    SIZE= OK
MVIMS/IMS Components WA: D WM: D PR: D TA: D
MSIMS/SS  Components WA: D WM: D RA: Y RM: Y LM: Y
```

Figure 31. Product and Component Status (Timer Statistics and Defaults)

These fields show the status of the currently active components.

Field	Description
MVIMS/EC	Active release of the Event Collector.
MVIMS/PAS	Active release of MVIMS or MVDBC.
EC TRACE BUFFERS	Number of allocated Event Collector trace buffers.
IN USE	Number of allocated Event Collector trace buffers actually being used.

SIZE — Actual size of the Event Collector trace buffers.

Note: If you change TRBUFF and TRSIZE in BBPARM member IMFBEX00 and use the following RESET BBI-2 control command to reset them to your changed values:

```
.RESET PARM IMFBEX00
```

your changes do not take effect until the IN USE field in this display is zero.

For a complete description of the RESET command, see the *MAINVIEW Common Customization Guide*.

MVIMS/IMS Components — Product components active in the IMS control region. N indicates not active, Y indicates active, and D indicates active with DB2 extensions. The components are shown as:

- WA Workload Analyzer
- WM Workload Monitor
- PR Performance Reporter
- TA Transaction Accountant

MVIMS/SS Components — Components active in the BBI-SS PAS. N indicates not active, Y indicates active, and D indicates active with DB2 extensions. The components are shown as:

- WA Workload Analyzer
- WM Workload Monitor
- RA Resource Analyzer
- RM Resource Monitor
- LM Resource Analyzer and Resource Monitor

Timer Facility Activity Statistics

This area displays timer facility activity statistics.

```
Requests:           80 Total request blocks        56 Unused blocks
Activity:       39,090 Service calls               20 Warnings written
```

Figure 32. Timer Facility Activity (Timer Statistics and Defaults)

These fields show the timer facility activity by:

Field	Description
Requests	Total Request Blocks The maximum number of timer requests that can be defined concurrently as specified with the MAXREQ parameter in BBPARM member BBIISP00 (see “BBI Libraries and Data Sets” in the *MAINVIEW Common Customization Guide* for a description of BBIISP00). Unused Blocks The number of blocks that are still available for new timer requests.
Activity	Service Calls The number of times the timer facility has invoked a service. This number includes requests for data collection monitors and automatic Image logging of analyzer or monitor displays. Warnings Written The number of initial warning condition messages issued by the requested data collection monitors.

Active Default Parameters

This area displays active default parameters.

```
Parameters:  ---- General ----     -- IMS WA WAIT --     - TRACE BUFFERS -
             INTERVAL=00:01:00     CURPER=00:01:00       STORAGE=100K
             ROUT=NONE             HISTORY=00:30:00      TRBUFF=10
             DESC=NONE                                   TRSIZE=4K
```

Figure 33. Active Default Parameters (Timer Statistics and Defaults)

These fields show the timer facility default parameters in effect. The defaults are defined in the BBIISP00 member of the BBPARM data set. These are described below in alphabetical order.

Field	Description
CURPER	The interval specified for the CURRENT PERIOD area of the DWAIT (workload wait data) display.
DESC	The descriptor code(s) for monitor warning WTO messages. NONE is the default.
HISTORY	The interval specified for the HISTORY area of the DWAIT (workload wait data) display.
INTERVAL	The default timer request interval specified in the BBITSP00 member of the BBPROF data set. This value is used if the INTERVAL keyword is not specified when a timer request is defined.
ROUT	The OS/390 console route code(s) for monitor warning WTO messages. NONE is the default.
STORAGE	The amount of extended BBI-SS PAS private area storage allocated for the trace entry buffer.
TRBUFF	The number of trace buffers allocated for each active detail trace.
TRSIZE	The size of each trace buffer.

The IBM Messages and Codes manual describes the codes that may appear in the ROUT and DESC fields.

Defined Requests by Target

This area displays defined requests by target.

```
------------------------ DEFINED REQUESTS BY TARGET --------------------------
LC  TARGET   TYPE     ACTIVE  INIT  COMPLETE  HELD  INVALID  LOCKED   QIS   RST
    -TOTAL-  --ALL--      24
    IMSxxx   AO-CALLX      1
    IMSxxx   MONITOR      23
```

Figure 34. Request Summary by Target. Timer Statistics and Defaults

This portion of the Timer Statistics panel is a scrollable list of all the requests per target for the BBI-SS PAS shown in the BBI-SSID field (see "BBI-SS PAS Status Information" on page 568). It shows the request type for each target and the amount of activity for each request state by:

Field	Description
LC	A line command input field. A one-character line command (see "Line Commands" on page 573) can be entered in this field to select a list display of the active timer requests, as described in "Active Timer Requests (S Line Command)" on page 573.
TARGET	IMS job name or ID.
TYPE	Types of timer requests: MONITOR — Monitor service requests IMG-LOG — Automatic Image logging requests of analyzer or monitor displays AO-CALLX — Time-initiated EXEC requests that use the CALLX service.

The total number of requests per target is shown for each of the following request states:

ACTIVE	Active requests.
INIT	Requests waiting to be invoked (a start time was specified, but it has not been reached).
COMPLETE	Requests that completed normal execution.
HELD	Requests being held and pending release.
INVALID	Requests that terminated because of an invalid parameter or measurement. The BBI-SS PAS Journal log contains descriptive messages of the request errors.
LOCKED	Requests that terminated because of a LOCK command or a service routine ABEND.
QIS	Requests that quiesced because the target IMS subsystem was not active.

RST — The number of requests waiting until the current interval expires before performing restart processing after the target IMS subsystem has restarted. It is specified by the RST keyword in the original request.

Line Commands

Entering the following line command in the LC field of the Timer Facility application executes the line command function:

Line Command	Description
S	SELECT. Selects the Active Timer Requests application showing: • All the BBI-SS PAS requests (see Figure 35). S is entered in the LC field for the TOTAL targets (see Figure 34 on page 572). • Only those requests for a specific target. S is entered in the LC field for the target identifier (see Figure 34 on page 572).

Active Timer Requests (S Line Command)

The S line command displays the Active Timer Request application, described in Chapter 19, “Displaying a List of Active Timer Requests (Primary Menu Option 2)” on page 357. The list shown in Figure 35 is displayed when the S line command is entered in the LC input field for TOTAL. It displays all the timer requests active for the target shown in the TGT field.

```
BMC SOFTWARE  -------------- ACTIVE TIMER REQUESTS --------- COMMAND(S) ISSUED
COMMAND ===>                                                   TGT ===> IMSxxx

                                   INPUT  INTVL ==> 3        TIME --  14:32:27
  COMMANDS: SM (START MONITORS), SORT, AREA, X ON/OFF, DM (DMON), DW (DWARN)
  LC CMDS:  S (SELECT), W (SHOW),      M (MODIFY)
            P (PURGE),  R (REPLICATE), H (HELP), Z (STOP)                   >>>
  LC   SERV  PARM     TITLE                  CURRENT  WVAL  -8-6-4-2-0+2+4+6+8+
       DBIO           DB I/O COUNT BY SUBPOOL     36    10| *********W********* |
       DBIO  1        DB I/O COUNT BY SUBPOOL      0      |                     |
       DBIO  3        DB I/O COUNT BY SUBPOOL     13      |                     |
       DBIO  2        DB I/O COUNT BY SUBPOOL      0      |                     |
       DBHIT          OSAM HIT RATIO BY SP        93   <80| *******  W          |
       DBHIT 1        OSAM HIT RATIO BY SP         0   <90|          W          |
       DBHIT 3        OSAM HIT RATIO BY SP       100   <80| ******   W          |
       VHIT           VSAM HIT RATIO BY SP       100      |                     |
       OBUFW          OLDS BUFFER WAITS            0     1|          W          |
       OCHKW          OLDS CHECK WRITES           13     1| *********W********* |
       WADIO          WADS I/O                    15     1| *********W********* |
       DPAGE          DEMAND PAGING BY REGION    498   500| *********W          |
       CSAUT          CSA % UTILIZATION           56    80| ******   W          |
       ECSAU          ECSA % UTILIZATION          61    60| *********W          |
       DLIO  ++++++++ DL/1 EXCP COUNT BY DDNAM    31      |                     |
       SYSIO ++++++++ EXCP COUNT BY DDNAME        21      |                     |
       SHMSG          SHORT MSG QUEUE % UTIL       0    10|          W          |
       LGMSG          LONG MSG QUEUE % UTIL        4    10| ***      W          |
       QBLKS          QBLKS % UTILIZATION          0    10|          W          |
       LHELD          IRLM LOCKS HELD              2      |                     |
       LKREQ          IRLM LOCK REQUESTS           0      |                     |
       LSUSP          IRLM SUSPENSIONS             0      |                     |
```

Figure 35. Active Timer Requests List (Timer Facility Application S Line Command)

Part 7. Appendixes

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Appendix A. IMS Dump Analysis

This appendix describes how to analyze an IMS dump with MAINVIEW for DBCTL or MAINVIEW AutoOPERATOR for IMS installed.

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 information should be noted about IMS dumps:

- MAINVIEW for DBCTL register save areas are inMAINVIEW for DBCTL 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 DBCTL module at entry saves the registers of an IMS module in the next IMS prechained save area pointed to by R13.
- MAINVIEW for DBCTL module registers are always saved in MAINVIEW for DBCTL 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 DBCTL 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 DBCTL 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 DBCTL area to the previous IMS save area. While aMAINVIEW for DBCTL 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 DBCTL 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 DBCTL 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 DBCTL SAR, 4 bytes in front of the address pointed to by the R14 in the IMS save area.

Note: When MAINVIEW for DBCTL interfaces between two IMS modules, MAINVIEW for DBCTL 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 Are 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 22 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 22. 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*.

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