

MAINVIEW[®] for DB2 User Guide Volume 2: Analyzers/Monitors/Traces

**Component of
SmartDBA System Performance for DB2**

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About This Book

This book describes how to use the online functions of MAINVIEW for DB2. It can be used by the DB2 database administrator, system programmer, or performance analyst to control resource usage and performance. Before using this book, you must be familiar with the IBM DB2 program product.

The batch reporting functions are described in the *MAINVIEW for DB2 Performance Reporter User Guide*.

How This Book Is Organized

This book is organized into two volumes:

- Volume 1: Views
- Volume 2: Analyzers/Monitors/Traces

The following information is included in Volume 1:

- Overview of how to use MAINVIEW for DB2. It includes
 - An introduction describing the major functions of MAINVIEW for DB2
 - Instructions for logging on to MAINVIEW for DB2
- Overview of how to use views and wizards
- Overview of how to manage views
- Description of the views you can use to analyze DB2 performance

The following information is included in Volume 2:

- Overview of how to use the MAINVIEW for DB2 services that run in full-screen mode. It includes
 - A description of the Primary Option Menu and how to access the MVDB2 functions
 - A description of the analyzers, monitors, and traces, and how they are used
 - The MVDB2 general commands and services
- DB2 resource analyzer display services
- DB2 resource and workload monitor data collection services
- Overview of how to use the trace facility
- DB2 application trace display services

Appendixes and an index are also included. A glossary of terms is included in the *Using MAINVIEW* book.

Throughout the body of this document, MVDB2 refers to MAINVIEW for DB2. The DMR acronym for the product is used occasionally in this book and in many online panels and messages.

Conventions Used in This Book

The following syntax notation is used in this book. Do not type the special characters.

- Brackets [] enclose optional parameters or keywords.
- Braces { } enclose a list of parameters; one must be chosen.
- A vertical line | separates alternative options; one can be chosen.
- An underlined parameter is the default.
- AN ITEM IN CAPITAL LETTERS indicates exact characters; usage can be all uppercase or lowercase.
- Items in lowercase letters are values that you supply.

Related Reading

This book is included as part of the MAINVIEW library, which documents all your MAINVIEW products and the tasks associated with using these products.

Several books from the DB2 Performance products and DB2 Administration products libraries are also included to help you install the selectable components of MAINVIEW for DB2. These components are also used by other DB2 Performance products provided by BMC Software.

See the “About This Book” section of Volume 1 of the *MAINVIEW for DB2 User Guide* for more information on

- The MAINVIEW library
- The DB2 Performance products and DB2 Administration products libraries
- The MAINVIEW for DB2 Library
- Other recommended reading

Chapter 1. Working in Full-Screen Mode

This chapter gives an overview of how to use the MAINVIEW for DB2 services that run in full-screen mode: analyzers, monitors, and traces.

Specific information about how to use each of these types of services is described in this book.

For information about working in full-screen mode that applies to multiple MAINVIEW products, see the *Using MAINVIEW* book.

MAINVIEW for DB2 Primary Option Menu

This section provides a brief overview of the MAINVIEW for DB2 Primary Option Menu shown in [Figure 1](#).

```
BMC Software ----- PRIMARY OPTION MENU ----- MAINVIEW FOR DB2 7.2.0
OPTION ===>                                     DATE -- 02/09/22
                                                TIME -- 13:45:08
                                                USERID -- CIR11
                                                MODE -- ISPF 4.2

    Managing DB2 Performance:
      1 STATUS          - DB2 Status (DB2ST)
      2 ANALYZERS       - Current Status/Activity Displays
      3 MONITORS        - Early Warnings/Recent History (Active Timer Requests)
      4 TRACES          - Current Application Traces
      5 HISTORY TRACES - Historical Trace Data Sets
      6 GRAPH           - Recent Thread History
      7 I/O             - DB2 I/O Analysis
      8 BBI INFO        - BBI Subsystem Information
      V VIEWS           - Windows Mode (New Facilities)

    DB2 administration:
      RX RxD2 FlexTools

    General Services:
      C CYCLE SETUP    - Service Refresh Cycle Setup
      L LOG DISPLAY    - Display Logs
      M MESSAGES       - Display Messages and Codes
      K KEYS           - Current PF Key Assignments
      T TUTORIAL       - Tutorials/News/Getting Started
      X EXIT           - Terminate
                                                PF1/13: HELP
                                                PF3/15: EXIT
```

Figure 1. MAINVIEW for DB2 Primary Option Menu

Managing DB2 Performance

The menu options to manage DB2 performance are organized for ease of use. You can obtain immediate analyzer, monitor, or trace data about your DB2 system by selecting one of Options 1 through 8 or Option V.

1 STATUS

Option 1 from the Primary Option Menu accesses the DB2ST display. DB2ST summarizes the activity and resource usage within your entire DB2 system so that you can determine quickly where there might be potential DB2 problems.

You can quickly access other displays by selecting them from the EXPAND line or by using the Tab key to move to a particular section about which you want more information and pressing ENTER. You also can use this panel to make direct requests for other analyzer or monitor services when you already know the requests that you want to make. [“DB2ST—DB2 System Status” on page 29](#) describes this display in detail.

2 ANALYZERS

Option 2 from the Primary Option Menu accesses the Analyzer Display Services panel and provides further access to detailed information about current DB2 status and activity.

This application, described in [“List Analyzer Services \(Option 2\)” on page 24](#), is a scrollable list of all the analyzer display services.

3 MONITORS

Option 3 from the Primary Option Menu accesses a list of Active Timer Requests. This application displays current monitor measurements (timer-driven samplers of key DB2 performance indicators) and provides access to historical plots of data collected by each monitor. It also provides you with control over all timer-driven requests (monitors, Image log requests, or trace requests).

This display, described in [“Active Timer Requests \(Option 3\)” on page 102](#), shows how many requests are already active and provides direct access with a select line command to a plot of data collected by an active monitor. Other line commands can be used to view current timer request options, access data entry panels to modify the current options or replicate them for another timer request, confirm a purge of a selected request, or stop a request.

You can also use the SM command from this display to access the Data Collection Monitors panel, which lists all the data collection monitor services that you are authorized to view. You can then use the S line command to select the Start Monitor Request panel for any of the listed monitors.

4 TRACES

Option 4 from the Primary Option Menu displays only the current application trace requests. See [“Controlling Current Traces \(Option 4\)” on page 159](#).

This display shows how many current application traces are active or complete and provides direct access with a select line command to the collected trace data. Other line commands can be used to view current trace request options, access data entry panels to modify the current options or replicate them for another similar trace request, confirm a purge of a selected trace, or stop a trace.

You can also use the ST command from this display to access the Start DB2 Trace Request panel to activate data collection for a summary or detail trace.

5 TRACE HISTORY

This application enables you to access and control the current and historical trace logs. See [“Using the History Traces Application \(Option 5\)” on page 166](#) for a complete description.

6 GRAPH

Option 6 from the Primary Option Menu provides direct access to a graphical presentation of the Trace Summary by Time (TSUMT) display. It shows recent thread history summarized by hour, sorted in descending sequence.

- The values are plotted as percentages of the maximum value measured.
- The maximum is shown in the column header.
- Values over 90% of the maximum are red (or highlighted).
- Values over 70% of the maximum are yellow.
- Values less than 70% are green.
- Values less than 10% but nonzero show < in the first graph position.

All the other trace displays are available from here. For example, cursor selection of one line accesses the LTRAC display that shows all the single threads executed in that period.

Note: The default trace identifier that is requested is THRDHIST, a continuous summary trace defined in the sample block BLKDMRW in the BBPARM data set. This block is predefined in AutoCustomization for auto-start. However, you can change the default definitions of this trace in BLKDMRW if desired.

See [“TSUMx—Trace Summary Displays” on page 249](#) and [“TSUMT—Trace Summary by Time \(INTERVAL START\)” on page 265](#) for a complete description of the TSUMT service.

7 I/O

Option 7 from the Primary Option Menu accesses the I/O Analysis Options panel. This panel provides direct access to displays of available I/O information as well as options to start I/O traces. See [“I/O Analysis Options” on page 5](#) for further information.

8 BBI INFO

This application shows the BBI-SS PAS status, timer facility activity statistics, and timer request default parameters in effect and summarizes the status of all the timer requests. See [“Display Timer Facility Statistics \(Option 8\)” on page 21](#) for a complete description.

V VIEWS

This option presents another menu of options that display data from all your DB2 subsystems in views that use the MAINVIEW windows-mode technology. These views display extensive DB2 data covering the analysis of DB2 subsystems, buffer pools and group buffer pools, page set status and I/O, lock contention lockout events, current thread activity, monitor data, and workload objectives. See Volume 1 for a complete description of these views.

General Services

The General Services options are described in detail in [“General Commands and Services” on page 14](#).

C CYCLE SETUP

Displays refreshable applications in a continuous timed cycle.

L LOG DISPLAY

Displays DB2 messages (optional), responses to DB2 commands, other service messages and monitor warnings, and all TS commands.

M MESSAGES

Displays descriptions of messages generated by MAINVIEW for DB2.

K KEYS

Displays supported terminals and the functions assigned to the PF keys by MAINVIEW for DB2.

T TUTORIAL

Displays online Help.

X EXIT

Terminates the BBI terminal session.

I/O Analysis Options

This application provides direct access to displays of available I/O information as well as control of I/O traces.

```
BMC Software ----- I/O ANALYSIS OPTIONS ----- RX AVAILABLE
COMMAND ==>                                           TGT==> DB2D

Display Buffer Pool I/O Data:

  1 I/O BY DB/TS   - Display Realtime Data by Database / Tablespace
  2 I/O BY BPOOL  - Display Realtime Data by Buffer Pool
  3 I/O BY VOLUME - Display Realtime Data by Volume
  4 I/O BY DATASET - Display Realtime Data by Data Set

Display I/O Data from a Trace:

  5 CURRENT TRACES - List Current I/O Traces: n Active, nn Complete
  6 HISTORY TRACES - List All History I/O Traces

Start a DMR I/O trace:

  7 START TRACE   - Review Primed Options / Activate (Start Trace Panels)

Print SMF/GTF I/O Traces

  8 DB2 TRACE     - Print Instructions
```

The following options are available:

1 I/O BY DB/TS

Option 1 displays I/O data kept in the buffer pools by DB2, summarized by database and table space. See [“DBIOx—I/O \(Real-Time\)” on page 76](#) for further information.

2 I/O BY BPOOL

Option 2 displays I/O data kept in the buffer pools by DB2, summarized by buffer pool. See [“DBIOx—I/O \(Real-Time\)” on page 76](#) for further information.

3 I/O BY VOLUME

Option 3 displays I/O data kept in the buffer pools by DB2, summarized by volume. See [“DBIOx—I/O \(Real-Time\)” on page 76](#) for further information.

4 I/O BY DATASET

Option 4 displays I/O data kept in the buffer pools by DB2, expanded to the data set level. See [“DBIOx—I/O \(Real-Time\)” on page 76](#) for further information.

5 CURRENT TRACES

Option 5 displays a list of current traces that include I/O events in the Current Traces application. The number of active and complete I/O traces available in Current Traces is shown here. Selecting one of these traces with the O line command accesses the DBIO display of I/O data by database / table space. From here, this data can be summarized and selected by several identifiers, such as plan name.

See [“Controlling Current Traces \(Option 4\)” on page 159](#) for a description of the Current Traces application. See [“DBIOx—I/O Analysis \(Trace\)” on page 312](#) for further information about these displays and how to use them.

6 HISTORY TRACES

Option 6 displays a list of all history traces that include I/O events in the History Traces application. Selecting one of these traces with the O line command accesses the DBIO display of I/O data by database / table space. From here, this data can be summarized and selected by several identifiers, such as plan name.

See [“Managing History Traces” on page 164](#) for a description of the History Traces application. See [“DBIOx—I/O Analysis \(Trace\)” on page 312](#) for further information about these displays and how to use them.

7 START TRACE

Option 7 primes the required keywords to start an I/O trace in MAINVIEW for DB2 and transfers to the Start Trace application. You can modify or add options before activating the trace. For example, you might want to narrow the selection criteria, make the title more descriptive, add SQL events, or set up logging. You must be authorized to start a detail trace with I/O events.

See [“Starting a Trace” on page 140](#) for information about the other available options. The primed options are

- A default parameter of IOhhmss as a trace ID
- A default title of *I/O Trace*
- TYPE=D for a detail trace
- Selection of the detail trace I/O events
- Selection of all threads with DB2AUTH=+ (special authorization required)

Note: If you are tracing a large number of concurrent threads on an active system, increase the TRBUFF number to 2–3 times the default number.

8 DB2 TRACE

Option 8 provides instructions on running a DB2 system I/O trace (performance class 4) to be written to SMF or GTF and printing the output.

First ensure that the selected output medium can handle the potential volume of data to be traced. The DB2 command syntax to start such a trace is

```
-START TRACE(PERFM) CLASS(4) DEST(SMF) or DEST(GTF)
```

Stop the trace when enough data has been collected.

The batch trace print utility DZTBTRAC can be used to print this trace data, formatting the same DBIOx displays available for an MVDB2 trace. A sample print job is in member DZTBTRAC in BBSAMP.

See [“Printing a Trace” on page 173](#) for information about the DZTBTRAC utility and [“DBIOx—I/O Analysis \(Trace\)” on page 312](#) for a description of the available displays that can also be printed as reports.

Overview of Services

The MAINVIEW for DB2 services that run in full-screen mode include

Analyzers

Show formatted full-screen displays of DB2 status and activity.

Monitors

Measure and collect data about DB2 resource or workload performance over time and detect exception conditions.

Traces

Track thread processing through DB2.

Traces require both monitor data collection and analyzer displays. ATRAC is a monitor service that activates trace data collection. LTRAC, STRAC, and DTRAC are analyzer displays of data collected by ATRAC.

These analyzer, monitor, and trace services measure the following DB2 activities and resources:

- General DB2 system
- User activity
- Locks
- EDM pool
- Buffer pools
- Logs
- MVS system interaction
- Distributed Data Facility (DDF)
- DB2 workload

Requests

Services are activated as user requests as follows:

- Analyzers can be selected from an analyzer service list, from an EXPAND selection bar, or can be requested from a Service Display panel by overtyping the service name.
- Timer-driven monitors that measure DB2 resources and workloads or track thread 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 special display services similar to analyzers.

- Timer-controlled requests that activate thread 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 are generated automatically from data entry panels and specified options are defined as keyword parameters. Optional service parameters narrow the scope of a single request and let several requests for the same service be active concurrently.

A standard set of timer-controlled monitor, trace, or logging requests can be started automatically with the BBI-SS PAS. Additional requests can be made at any time or requests can be modified or purged. Active monitors detect DB2 shutdown and startup. When the request is made, quiesce and restart options can be defined that specify the monitor action when DB2 stops or restarts. Monitors can be restarted automatically with previously collected data saved or deleted, or they can be purged or remain in a quiesced state when DB2 starts.

Analyzers

The DB2 analyzers are services that provide a formatted, full-screen display of current DB2 status and activity at a terminal in response to a request. The displays can also be logged automatically to the BBI-SS PAS Image log at time-driven intervals with SET service requests.

These displays show DB2 status, current user summary and detail status (from CICS, IMS, TSO, DBAT, and BATCH threads), locking, EDM and buffer pools, table spaces, logging, and DSNZPARM data for analyzing system performance and bottlenecks. An EXPAND function helps you move quickly from summary to detail information or from one display to other related displays. Screen prints can be written automatically by request.

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

Note: You can TRANSFER from many of the analyzer displays to related windows-mode views for more complete and up-to-date information. BMC Software recommends that you use the windows-mode views to do your analysis whenever possible.

Resource or Workload Monitors

These monitors are timer-driven services that collect data measurements about DB2 performance and detect exception conditions in response to a resource or workload monitor request.

A DB2 resource or workload monitor request specifies what is to be measured, the sampling frequency, the time of day to begin the sampling, the sampling duration, the disposition of data when the DB2 subsystem is not available, and the threshold that defines a warning condition for this monitor request.

Each timer-driven resource or workload monitor measures either resource or workload status, count of activity, or usage percentage. It might also calculate a ratio of resource or workload usage over time. The measurement obtained at each sampling interval is compared to a user-defined threshold for that request. The threshold comparison detects conditions for which user-defined warning messages can be issued. These messages can be captured by MAINVIEW AutoOPERATOR to take automatic actions. The collected measurements are stored online so that a plot of the recent history of a monitor request can be viewed at any time.

Traces

Trace services collect and display data about thread processing in DB2.

Data Collection

Data is collected for application traces and workload monitors using the IBM Instrumentation Facility Interface (IFI) (see [“Collecting Trace Data” on page 134](#)).

Application Tracking and Display

As described in [“Using a Trace” on page 131](#), a trace is activated by a request for the ATRAC monitor. The request can be tailored so that only the trace data needed to detect and solve problems is collected. The request specifies data collection categories, different selection criteria such as *elapsed time greater than 10 seconds*, and specific workloads such as by plan or by authorization ID.

The traced data is viewed in integrated displays so that it is easy to see which scans, sorts, or I/Os are caused by which SQL statements without having to perform manual correlation. Summary displays provide quick high-level answers such as which SQL statement is consuming the most elapsed or CPU time. A chronological event trace shows a replay of the exact sequence of traced events. Details can be hidden to improve understanding of event flow or revealed when needed for detailed analysis.

Logging Traces

Both summary and detail trace data can be logged to external VSAM data sets. Each trace request is assigned its own data sets at the time of the ATRAC request.

- [“Specifying Trace Logging Options” on page 156](#) describes each of the trace logging options.
- [“Managing History Traces” on page 164](#) describes how to display the historical trace data and how to use the History Traces application.
- [“Printing a Trace” on page 173](#) describes how to submit batch jobs to print the trace data.

Logging Analyzer and Monitor Displays

An MVDB2 display can be logged in different ways:

- At display time to the TS Image log by entering a Y for the yes option in the LOG field of the display (prints only what is displayed)
- After display to a BBISPRNT data set by pressing the SCREEN PRINT key (PF4)
- Without user interaction to the BBI-SS PAS Image log automatically by requesting automatic logging of an analyzer or monitor display service

Specifying an Image log request for a monitor service logs a PLOT display of the monitor-collected data to the BBI-SS PAS Image log.

An Image log request can be made by selecting a data entry panel from an analyzer service list (see [“Start Image Log Request \(I Line Command\)”](#) on page 26). The logging of a monitor PLOT display is coordinated automatically by specifying a LOG parameter with the monitor request. 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 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**). Logging of an analyzer display is set automatically to ATINTVL.

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 11.

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

The screen print images on BBISPRNT can be printed using the SLOGJCL member of BBSAMP.

Automatic BBI-SS PAS Image Logging of Analyzer Displays

The timer facility (SET service requests) can be used to automatically invoke a DB2 analyzer service and log the display at a user-specified interval to the BBI-SS PAS Image log. LOG=ATINTVL is the default.

For example:

```
SET
REQ=DB2ST,I=00:05:00
```

requests that the Image logging of the DB2 System Status be displayed every five minutes.

Automatic BBI-SS PAS Image Logging of PLOT Display

Defining logging for a monitor request automatically logs a graphic plot display to the Image log, as shown by the following request from the Service Display panel:

```
SET
REQ=SQLAC,DDL,I=00:01:00,LOG=ATPD
```

This request invokes the SQLAC data collection monitor to collect the number of SQL DDL statements 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.

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 from the service display panel:

```
SET
REQ=DMON,I=00:10:00
```

logs the DMON service display, which shows the current status of all active monitors every 10 minutes.

```
SET
REQ=DWARN,I=00:01:00,LOG=ATINTVL
```

logs the DWARN service display, which shows the current status of all active monitors with a warning condition, every minute.

Request Status

The Active Timer Requests panel (Option 3) 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 already active and provides direct access to the data collected by that request. You can access input panels that allow current options to be viewed or modified, purge an active request, or replicate a request as a model to start a new request as described in [“Line Commands” on page 105](#).

The Current Traces panel (Option 4) is similar to the Active Timer Requests panel, except the list of services shows only current trace requests.

The Display Statistics and Defaults panel (Option 6) provides general information about the Timer Facility, showing status information, some statistics, default parameters in effect, and a summary of the active timer requests. The information is shown for the BBI-SS PAS associated with the specified target (TGT==>). (See [“Display Timer Facility Statistics \(Option 8\)” on page 21](#).)

Grouping Requests

Multiple timer-driven services can be started by defining a series of requests in a member of the BBI-SS PAS BBPARAM data set. The member can be started from a TS or automatically when the BBI-SS PAS starts, as described in [“Making Requests” on page 17](#).

Issuing DB2 Commands

An authorized user can issue valid DB2 commands in the COMMAND line of any MAINVIEW application running in full-screen mode. The command results are shown in the Log Display. (See *Using MAINVIEW* for a description of the Log Display.)

The command syntax is

Syntax	Example
-db2cmd	-DIS THD(*)

where db2cmd is the DB2 command. Each command must have a - character as a prefix.

The command is issued against the DB2 specified in the TGT field.

Accessing RxD2

RxD2/FlexTools is integrated with all the MAINVIEW products. The RxD2/FlexTools facility integrates with the MAINVIEW products to provide quick access to information from the DB2 catalog or other DB2 tables.

Note: Access is possible to remote DB2 subsystems only if connected with DDF to a local DB2 (in the same MVS system as the TS).

Access with Hyperlinks

Expand buttons in many MAINVIEW for DB2 Analyzer and Trace displays provide quick hyperlinks to corresponding RxD2 displays and functions; for example:

- EXPLAIN information for a currently executing SQL statement, either static or dynamic
- SQL text and EXPLAIN/execute options for static SQL captured in a trace
- Catalog information for selected database objects

Access from a Menu Option

When installed, RxD2/FlexTools appears as an option on the MAINVIEW for DB2 Primary Option Menu. Choosing the RX option leads directly to the RxD2/FlexTools menu.

Access from the Command Line

When RxD2/FlexTools is installed, RX appears in the upper right corner of all service displays. You can type RX on the COMMAND line, optionally followed by a subcommand and parameters to invoke the RxD2/FlexTools services directly from any of the application panels of MAINVIEW for DB2 or any other BBI products. The RX commands can be entered on a COMMAND line or in a SERV field.

RX entered alone accesses the RxD2/FlexTools Primary Option Menu. The options provide direct access to plan information (PL), EXPLAIN data from a PLAN_TABLE (PT), a table (TB), or an index (IX).

Hyperlinks to MAINVIEW for CICS or MAINVIEW for IMS

You can expand directly to a related MAINVIEW for CICS or MAINVIEW for IMS display and return to MAINVIEW for DB2, as follows:

- For an active CICS thread
 - LOCKE expands to the MAINVIEW for CICS DB2TASK display
 - DUSER expands to the MAINVIEW for CICS TASKXPND display for that user
- For a CICS region attached to DB2
 - CICSR expands to the MAINVIEW for CICS DB2TASK list of DB2 threads
- For an active IMS thread
 - LOCKE expands to the MAINVIEW for IMS Region Summary display
 - DUSER expands to the MAINVIEW for IMS Region Summary display for that PST

Color Support

The DB2ST resource analyzer display, PLOT, DMON, DWARN, and Active Timer Request list application use color for graph output as described below (any color monitor can be used). The graph colors cannot be modified.

- DB2ST - DB2 System Status

This resource analyzer display (see [“DB2ST—DB2 System Status” on page 29](#)) uses color in the pool and CPU usage graphs as follows:

Pool Utilization	Usage graph is shown in
	Turquoise Value is below the deferred-write threshold.
	Yellow Value exceeds the deferred-write threshold, but it is less than the critical threshold.
	Red Value is at critical threshold.
CPU Utilization	Usage graph is shown in turquoise.

- Plot Display

The plot displays shown by the Active Timer Requests list application and the PLOT, DMON, and DWARN services use the same colors. These are

Red	Warning status.
Turquoise	Normal values for the current interval.
Yellow	Values for the current period are greater than the values for the previous period.

General Commands and Services

Note

This section is generally used only for reference.

See *Using MAINVIEW* for information on the General Services options accessed from the Primary Option Menu.

The general commands can be used for either the analyzer or the monitor services. These commands

- Provide automatic time-interval processing to start, modify, or purge monitors and to request automatic image logging of displays.
- Plot monitor data.
- Display monitor status, criteria, and warnings.
- Help the system programmer control and maintain MVDB2 service availability.

The general services are common to more than one online BMC Software product. These common online services are accessed from the Primary Option Menu. They can be used to

- Define an automatic refresh cycle of the service displays.
- View the messages and commands written to the Journal log.
- View a detailed explanation of a service message.
- Select a tutorial about the BBI-SS PAS environment and the installed BMC Software products.
- See what is new in the current release of MAINVIEW for DB2.

Table 1 shows the use of the general commands and services.

Table 1. General Commands and Services

General Command	Execution
SET	Initiates and controls data collection for the timer-driven monitor services from a setup panel.
	Initiates and controls data collection for the trace services from a setup panel.
	Initiates and controls timer-driven image logging of service output displays.
PLOT	Displays graphic plot of data collected by a monitor service. Select in Active Timer Request panel or EXPAND from DMON or DWARN.
DMON	Displays activity summary and status of all monitor requests. Use DM application transfer command.
DWARN	Displays activity summary and status of only the monitor requests in a warning condition. Use DW application transfer command.
LOCK, ULOCK	Controls and maintains services.
General Service	Execution
Note: Select from the Primary Option Menu (See <i>Using MAINVIEW</i>).	
C REFRESH	Refreshes a series of displays in a timed cycle as specified by the user.
L LOG DISPLAY	Displays the BBI-SS PAS or TS Journal log.
M MESSAGES	Displays a list of all messages and codes that can be generated.
K KEYS	Displays the TS PF key assignments.
T TUTORIAL	Displays a tutorial main menu from which topics about the services or the BBI-SS PAS environment can be selected.
X EXIT	Terminates the TS.

SET Request

The SET request is used to initiate, modify, or purge timer-driven services for

- Data collection monitors or trace services
- Image logging of DB2 analyzer or monitor status displays

SET is the service that is used to control the start, stop, and modification of timer-driven requests like monitors. Such requests are generally made in data entry panels for the specific actions, and built for you. These panels are described in the appropriate sections, such as [“Using a Trace” on page 131](#) or [“Timer-Driven Resource and Workload Monitors” on page 93](#). Multiple SET requests can also be specified in a BBPARM member for a group request, such as starting a group of monitors and traces automatically at PAS startup (see [“Group requests \(SET BLK\)” on page 18](#)).

If necessary, a single SET request can also be made from any Service Display Panel, for example, DB2ST (Option 1). In this case, the service name “SET” is entered in the SERV==> field, and the string of keywords is entered in the PARM==> field. Messages are returned in the display. The most likely use for this function is to manually submit a group request either to start more predefined monitors, or to purge a group of active monitors.

Note: The parameter field is limited to 55 characters. If all options do not fit, enter HOLD=YES as the last option, submit the request (which will be held), and then complete the request with another SET request with the same request ID and the remaining options.

Making Requests

A SET request begins with one of the following keywords:

REQ=reqid	Defines a new request or continues a held request.
MOD=reqid	Modifies an existing request.
PRG=reqid	Stops an active request and purges any collected monitor or trace data.
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 request by its reqid. The reqid is the service select code (ssc) and, if necessary, a parameter, as follows:

```
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. For example, all queued threads (REQ=THDQD) or the number of queued threads to TSO (REQ=THDQD,TSO) or to batch jobs (REQ=THDQD,BATCH) can be measured.

Modifying or Purging a Request

Only authorized users or the user that created the request can purge or modify an existing request. This security is defined by the PMACCx option defined in the Basic Security section in *Implementing Security for MAINVIEW Products*.

The original reqid must be specified to modify or purge an active service request. To purge the THDQD service monitoring queued batch threads, the SET command must be

```
SET PRG=THDQD,BATCH
```

If the BATCH parameter is not specified, the service monitoring the total queued threads is purged.

Group requests (SET BLK)

A series of valid request keyword options for SET can be predefined in a member of the BBPARM data set. There are several sample block request members in the BBPARM data set named BLKxxxxx.

BLKDMRW is a suggested starter set of monitors and traces. BLKDMR1 lists most available monitors, and BLKDMR1P is a sample member to purge all the requests set by BLKDMR1. You can define a member with different requests for each DB2 subsystem, or for different shifts.

When a group request is submitted, either manually or automatically, the individual requests and any related errors are logged to the BBI-SS Journal log.

Manual Control of Group Requests

The group of requests defined in a BBPARM member can be started manually with the SET service as

```
SET
BLK=BLKxxxxx
```

If a related block member with corresponding PRG requests has been defined, all requests can be purged with

```
SET
BLK=BLKxxxxxP
```

Note: The P at the end of the name is just a convention, not a requirement.

Automatic Startup of Group Requests

Group requests can be started per DB2 target when the BBI-SS PAS starts. The automatic startup of group requests can be defined during AutoCustomization.

The name of the member containing the block of requests is specified in the BBIISP00 member of BBPARM.

See the *MAINVIEW Common Customization Guide* for more information.

SET Keyword Parameter Options

BBPARM member, BLKDMRKY, lists the keywords that are available to start workload traces and monitors in a BLKxxx member automatically. These keywords can also be used in MAINVIEW AutoOPERATOR EXECs with the IMFC command.

Nonmodifiable Keyword Options

Certain options, described in BBPARM member, BLKDMRKY, cannot be modified (MOD= reqid) because previously collected history would be distorted. These options are

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

Trace and workload monitor requests can be qualified with selection criteria keywords as described in BBPARM member, BLKDMRKY. Once a trace request is activated, only certain keywords can be changed. To change the others, the trace request must be stopped and reactivated. See [“Modifying a Trace” on page 162](#).

A + character can be used as a generic name qualifier for a workload monitor or summary trace request. It is not valid for a detail trace request.

Keyword Syntax

The syntax for entering keyword options 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 is recommended to improve readability.

Each request can start anywhere in a line from columns 1 to 79 and can continue onto the next line.

Note: The BLK keyword cannot be used in a request within a BBPARM member.

Comments can be entered in a block request member of BBPARM. A comment is delimited by the * sign. The commented text begins and ends with an * 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.

Service Utility Commands

The utility commands are for system programmer use. They are used to control and maintain service availability. These commands are distributed with a special security code of Z.

Lock a Service (LOCK)

LOCK can be used to remove a service from general availability. It prevents the use of a specific service until a corresponding ULOCK request is issued. LOCK can be entered in the SERV field of the Service Input Panel or as a line command (L) from the service list applications.

Unlock a Service (ULOCK)

A service can become locked if

- The service abended.
- The service was the target of a LOCK service.
- The service routine could not be loaded.

When the condition is corrected, ULOCK can be used to unlock the service. ULOCK can be entered in the SERV field of the Service Input Panel, specifying the service name in the **PARM** field or as a line command (U) from the service list applications.

Display Timer Facility Statistics (Option 8)

The timer facility controls all requests for timer-driven services, which include

- Data collection by the monitor and application trace services
- Image logging of the analyzer or monitor service displays

Selecting Option 8 from the MAINVIEW for DB2 Primary Option Menu displays general information about the Timer facility, as shown by [Figure 2](#).

```

BMC Software ----- DISPLAY STATISTICS AND DEFAULTS ----- PERFORMANCE MGMT
COMMAND ==>                                                    TGT ==> DB2A
                                                                TIME -- 15:23:04

BBI-SSID: FV1X   BBI Release level -- 2.6.0           SS Started: 15:14:01 19-SEP-02
                                                                SS Elapsed: 00:09:02

Requests:          30 Total request blocks           15 Unused blocks
Activity:          49 Service calls                   0 Warnings written

Parameters: ----- General -----                       - TRACE BUFFERS -
                  INTERVAL=00:01:00                   STORAGE=100K
                  ROUT=NONE                             TRBUFF=5
                  DESC=NONE                             TRSIZE=40K
                                                                TRLIM=200K

----- DEFINED REQUESTS BY TARGET -----
LC  TARGET  TYPE    ACTIVE  INIT  COMPLETE  HELD  INVALID  LOCKED  QIS  RST
-TOTAL-- --ALL--      15
DB2A  MONITOR      4
DB2A  IMG-LOG      3
DB2C  IMG-LOG      4
DB2C  MONITOR      4
***** END OF REQUESTS *****

```

Figure 2. Sample Timer Facility Display

This application shows the BBI-SS PAS status, 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.

Line Commands

Entering the following line command in the LC field of the Timer Facility application executes the line command function:

S SELECT

Selects the Active Timer Requests application showing

- All the BBI-SS PAS requests (see [“Active Timer Requests List”](#) on page 22). S is entered in the LC field for the TOTAL targets (see [Figure 2](#)).
- Only those requests for a specific target. S is entered in the LC field for the target identifier (see [Figure 2](#)).

Active Timer Requests (S Line Command)

The S line command displays the Active Timer Request application, described in “[Active Timer Requests \(Option 3\)](#)” on page 102. The list shown in [Figure 3](#) is displayed when the S line command is entered in the LC field for TOTAL. It displays all the timer requests active for the target shown in the TGT field.

```

BMC Software ----- ACTIVE TIMER REQUESTS ----- PERFORMANCE MGMT
COMMAND ==>> TGT ==>> DB2A
INPUT INTVL ==> 3 TIME -- 10:52:10
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+|
SOSCN SOS CONTRACTIONS 0 NZ | W |
DSOPN DB DATA SETS OPEN 38 60 |>>>> W |
DSOPR DB DATASET OPEN REQUESTS 0 3 | W |
DSOPR BP0 DB DATASET OPEN REQUESTS 0 3 | W |
DSOPR BP1 DB DATASET OPEN REQUESTS 0 NZ | W |
DSOPR BP2 DB DATASET OPEN REQUESTS 0 NZ | W |
DSUTL OPEN DB DATASET % UTIL 3 20 |* W |
CONUT TSO CONNECTION % UTILIZATION 10 40 |<< W |
CONUT BATCH CONNECTION % UTILIZATION 10 60 |* W |
THDUT THREAD % UTILIZATION 0 30 | W |
THDAC IMS ACTIVE THREADS 0 NZ | W |
THDAC BATCH ACTIVE THREADS 0 NZ | W |
THDAC CAF ACTIVE THREADS 0 5 | W |
THDQD QUEUED THREADS 1 NZ |*****W*****|
THDID IN DOUBT THREADS 0 NZ | W |
EDMLD AVG EDM REQUESTS/LOAD 0 140 | W |
EDMLD CT AVG EDM REQUESTS/LOAD 0 140 | W |
EDMLD DBD AVG EDM REQUESTS/LOAD 0 140 | W |
BPUTL BFR POOL % UTILIZATION 6 30 |* W |
BPUSE BFR POOL % IN USE 0 30 | W |
RWP READS WITH PAGING 0 NZ | W |
WWP WRITES WITH PAGING 0 NZ | W |
GETPG GETPAGE REQUESTS 144 20 |*****W*****|
GETPG BP0 GETPAGE REQUESTS 144 20 |*****W*****|
GETPG BP1 GETPAGE REQUESTS 0 20 | W |
GETPG BP2 GETPAGE REQUESTS 0 20 | W |
GETRI GETPAGES PER READ I/O 10 <30 |*****W*****|

```

Figure 3. Active Timer Requests List

Chapter 2. Analyzers (Current Status/Activity Displays)

This chapter describes each of the analyzer services.

The analyzer component is an analysis tool that provides many full-screen displays presenting a snapshot of DB2 status and activity data. Its services can be used to

- Select specific DB2 activities and resources for analysis.
- View the results of a service analysis to detect and diagnose DB2 performance problems.

Each of these service displays is described in this chapter as follows:

- Service display panel
- Valid parameters
- Description of the service
- Service messages (if available)
- List of all the displays you can expand to from the current display

To see definitions for the individual fields in each service display, press PF1 from the display panel and select the appropriate menu option in the MAINVIEW for DB2 online Help application.

Note: Unless otherwise specified, all activity counts in the DB2 analyzer displays are values accumulated since the last DB2 restart.

List Analyzer Services (Option 2)

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

With this application you can issue requests to

- Access the analyzer displays easily
- Print a screen image automatically to the online BBI-SS PAS Image log, to the TS Image log, or to your BBISPRNT data set

```

BMC Software ----- ANALYZER DISPLAY SERVICES ----- PERFORMANCE MGMT
COMMAND ==>> TGT ==>> DB2G

COMMANDS: SORT, AREA
LC CMDS: S(SELECT), I(IMAGE LOGGING), H(HELP)
LC  SERV  PARAMETER  TITLE  PARM TYPE  SEC  AREA  STAT
DB2ST  DB2ST  DB2 SYSTEM STATUS  (DELTA/RATE)  A  DSYS
DB2EX  DB2EX  DB2 EXCEPTIONS  (LEVEL)  A  DSYS
DBTS  DBTS  OPEN DB/TS STATUS  (SUBSET/FIND)  A  DSYS
ZPARAM  ZPARAM  DB2 SYSTEM PARAMETERS  A  DSYS
USERS  USERS  USER SUMMARY  (ATTACH-MODE)  A  USER
DUSER  DUSER  DETAIL USER STATUS  USERID  A  USER
CICSC  CICSC  CICS DB2 CONNECTIONS  A  USER
CICSR  CICSR  CICS DB2 RCT SUMMARY  CICS  A  USER
CICSE  CICSE  CICS DB2 RCT ENTRY  CICS  A  USER
LOCKD  LOCKD  LOCK CONTENTION BY DB/TS  (SUBSET/FIND)  A  LOCK
LOCKU  LOCKU  LOCK CONTENTION BY USER  (USERID)  A  LOCK
LOCKE  LOCKE  LOCK CONT USER DETAIL  (USERID)  A  LOCK
LKOUT  LKOUT  LOCKOUT HISTORY  A  LOCK
EDMPL  EDMPL  EDM POOL STATUS  (DELTA/RATE)  A  EDM
BFRPL  BFRPL  BUFFER POOL STATUS  (POOLID)  A  BUFR
RIDPL  RIDPL  RID POOL STATUS  (DELTA/RATE)  A  BUFR
CLAIM  CLAIM  CLAIM/DRAIN BY TS  (SUBSET/FIND)  A  LOCK
DLOGS  DLOGS  DB2 LOG STATUS  (DELTA/RATE)  A  LOG
DDFSM  DDFS  DDF STATISTICS SUMMARY  (DELTA/RATE)  A  DDF
DDFDT  DDFDT  DDF STATISTICS DETAIL  LOCATION  A  DDF
DDFVT  DDFVT  DDF VTAM STATUS  A  DDF
DDFCV  DDFCV  DDF CONVERSATIONS  (LUNAME)  A  DDF
DBIOR  DBIOR  I/O Analysis-DB/TS  (KEYWORDS)  A  WKLD
DBIOB  DBIOB  I/O Analysis-Bpool  (KEYWORDS)  A  WKLD
DBIOV  DBIOV  I/O Analysis-Volume  (KEYWORDS)  A  WKLD
DBIOD  DBIOD  I/O Analysis-Dataset  (KEYWORDS)  A  WKLD
*** END OF SERVICES ***

```

Figure 4. List Analyzer Display Services Application

This application allows service selection by line command and shows the allowable parameters for each service, the service security classification, the area of DB2 being analyzed, and the service status.

Primary Commands

The following commands can be entered on the COMMAND line of the Analyzer Display Service list application:

SORT

When the list of analyzer display services is displayed initially, the list is sorted by an internally defined sequence. SORT can be used 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).
- ST Sorts the list alphabetically by the service status displayed (STATUS column).

SORT with no parameters sorts the columns by the internally defined sequence.

AREA

You can use the AREA command to list only the services related to a specified area. The possible areas that can be specified are listed in the AREA column. For example, to list only the DB2 user activity services, on the COMMAND line type:

AREA USER

Type AREA 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 request in a series is submitted by pressing the ENTER key and then the END key to process the next request.

S SELECT

Selects a resource analyzer service for execution.

Selecting an analyzer displays the output of the service analysis in the service display panel. For a complete description of the input and output fields on the service display panel, press PF1 from the Analyzer Display Services application to access online Help.

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 26). A display is logged at the end of each interval.

H HELP

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

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 ULOCK

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

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	----	REQUEST ACCEPTED
COMMAND	==>			TGT ==> DB2A
DUSER - USER DETAIL STATUS				
PARM	==>	CIR8		(USERID)
INTERVAL	==>	00:01:00	START ==>	STOP ==> QIS ==>
RST	==>			(Restart Option: HOT,COLD,PUR,QIS)

Figure 5. 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. All keyword options are described in BBPARM member, BLKDMRKY.

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) redisplay the Analyzer Display Services list.

Using Analyzers

You can issue requests to

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

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

Selecting a Service 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 [“List Analyzer Services \(Option 2\)”](#) on page 24).

- EXPANDing from another display

With the Tab key, move to one of the EXPAND fields in an analyzer display and press ENTER to select

- A related analyzer display
- More detailed information about a data row in the display
- Related monitors shown on the Active Timer list application

From this list, you can use the S line command to view an historical plot display for the related monitor service.

(See the *Using MAINVIEW* book.)

- 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* book).

- Invoking an analyzer display from an AutoOPERATOR EXEC

Write an EXEC that invokes a resource analyzer service (a BMC Software MAINVIEW AutoOPERATOR product must be installed). Use the IMFEXEC IMFC command followed by the service name, optional parameters, and an identifier for the target DB2 system, as follows:

```
IMFEXEC IMFC DB2ST TARGET=db2ssid
```

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

- Invoking an analyzer display from another analyzer display

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

Logging a Resource 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
Use 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 before the display is requested.
- 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 26](#)
 - SET request as described in [“Logging Analyzer and Monitor Displays” on page 10](#)

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 and the TS Image log contain only screen images, while the BBI-SS PAS 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 a Resource 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 (Option 2) as described in [“Active Timer Requests \(Option 3\)” on page 102](#).
- Using a SET request
The SET parameters are described in [“SET Request” on page 16](#).
 - Purge the request
Issue a PRG request with SET from the Service Display panel (Option 4 (DB2ST) from the Primary Option Menu), BBPARM (see [“Grouping Requests” on page 11](#)), or an AutoOPERATOR EXEC IMFC command (an AutoOPERATOR product 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 original setup panel, the Service Display panel, or an AutoOPERATOR EXEC. For example:

```
SET
REQ=DB2ST,I=00:05:00,START=24:00:00,STOP=06:00:00
```


Select Code:

DB2ST

Parameter:

One of the following parameters can be specified for this service. If no parameter is entered, the current values from DB2 subsystem startup are displayed.

- DELTA** Displays the current values for this statistics interval. The statistics interval is a cumulative count within a predefined time interval (the default is 30 minutes). DELTA is the difference between the value sampled at the start of the current statistics interval and the value sampled by the current analyzer request.
- RATE** Displays the values for this statistics interval, calculated in a per minute rate. The rate is DELTA divided by the number of elapsed minutes.

Notes:

- Parameter choice for this service affects only the LOCKING statistics presentation.
- Statistics intervals are MVDB2, not DB2, statistics intervals. The interval time is predefined in minutes with the DB2STATS parameter in the BBIISP00 member of the BBPARM data set.

Description:

Displays information concerning key indicators that apply to the entire subsystem, such as active users, threads by type, DB2 CPU usage, locking, paging and buffer and Environmental Data Manager (EDM) pool activity and status. This information provides an overall view of DB2 system activity and shows problems within DB2 that can be diagnosed with MVDB2 facilities.

Exception conditions detected by the background Exception Sampler or active MVDB2 monitors are also shown.

This service is scrollable.

Service Message:

When either the DELTA or RATE parameter is used for this service, the following message is displayed in line 3:

INTERVAL (MIN) n1/n2

where

n1 Is the number of elapsed minutes.

n2 Is the length of the interval.

This message indicates the time elapsed within the current statistics interval. If interval times include fractions of a minute, these fractions are truncated on the display.

A message in the parameter field of the panel shows the sequence number of the first row of information displayed and the total number of rows that can be displayed in this scrollable service.

For example:

ROW 1 OF 20

Transfer:

You can TRANSFER from this display to the following related windows-mode views for more complete and up-to-date information. BMC Software recommends that you use the windows-mode views to do your analysis.

STDB2D DB2 Detail views

Expand:

The DB2ST display can be EXPANDED to the following displays:

DB2EX	DB2 Exceptions display
DBTS	Database and Table Space Status display
USERS	User Summary display
CICSC	CICS DB2 Connections display
LOCKU	Lock Contention by User display
LKOUT	Lockout History display
MON(ALL)	Active Timer Requests display of all active monitors
EDMPL	EDM Pool Status display
BFRPL	Buffer Pool Status display (with a DELTA parameter)
ZPARAM	DB2 System Parameters display

You also can move to each section header by using the Tab key and press ENTER to transfer to the following related displays:

Section	Service/Parameter Transferred To
USERS	USERS
TSO	USERS TSO
BATCH	USERS BATCH
CAF	USERS CAF
UTILITY	USERS UTILITY
IMS	USERS IMS
CICS	USERS CICS
STOR PROC	USERS SPAS
DB-ACCESS	USERS DBAT
RRSAF	USERS RRSAF
SYS THRDS	USERS SYSTEM
EDM	EDMPL
BPnn	BFRPL BPnn,DELTA
DDF	DDFSM
LOCKING	LOCKU
#DEADLOCKS	LKOUT
TIMEOUTS	LKOUT
EXCEPTIONS	DB2EX
WARN/MON	Active Timer Requests application
DATA SETS	DBTS
PRL	MON(BUFR)
GROUP BP	BFRPL
PAGING	MON(MVS)

DB2EX—DB2 Exceptions

The DB2 Exceptions panel shows exceptional conditions, the time they occurred, and the level of severity of the exception (I = Information, W = Warning, S = Severe, M = Resource or Workload Monitor-detected exceptions).

```

BMC Software -----          DB2 EXCEPTIONS          -----PERFORMANCE MGMT
SERV ==> DB2EX                RUNNING 11:25:05 INTVL => 3 LOG => N TGT ==> DB2A
PARM ==>                      EXCEPTIONS DISPLAYED 1 - 10 of 10 SCROLL=> CSR
TRANSFER: EZALERT (Alerts and Alarms), EZDEXCPT (Exception Menu)
EXPAND: MON(DSYS), LINESEL(MSG)

TIME      LEV  MSGNO          EXCEPTION
11:24:00  S  DZ1090S FINAL ACTIVE LOG DATASET 75% FULL
11:24:00  S  DZ1110S BSDS REDUCED TO SINGLE MODE
11:23:00  S  DZ1020S IMS TASK(S) QUEUED FOR THREAD(S)
11:20:00  S  DZ1050S BP(0) DM CRITICAL THRESHOLD REACHED
11:20:00  W  DZ0540W ARCHIVE LOG READS OCCURRING
11:20:00  W  DZ0550W MAX TSO USERS CONNECTED
11:15:30  I  DZ0030I LOG ARCHIVE JOB WAITING
10:56:00  I  DZ0010I (1) DB(s)/TS(s) STOPPED
10:45:45  W  DZ0520W BP(0) PREFETCH DISABLED
10:28:30  I  DZ0020I USER (CIR1) LOCK ESCALATED
***** END OF DISPLAY *****

```

Figure 7. DB2 Exceptions Panel

Select Code:

DB2EX

Parameter:

If no parameters are specified, all exceptions are displayed. Use one of the following parameters to view exceptions by severity level:

- I** Displays all information-only exceptions from the Background Exception Sampler.
- W** Displays all warning exceptions from the Background Exception Sampler.
- S** Displays all severe exceptions from the Background Exception Sampler.
- M** Displays all exceptions detected by the Resource or Workload Monitor services.

Description:

This display shows Background Exception Sampler, Resource Monitor, and Workload Monitor exceptions. A background exception sampler continuously scans the DB2 system at a fixed interval to detect if any exceptions exist. These exceptions, categorized by severity and time of occurrence, can be browsed in the exception display. Messages are deleted automatically when the condition no longer exists.

The exceptions are presented in descending time order (most recent exception first) and by severity within time (most severe exception first).

If the exceptions do not fit on one screen, the list can be scrolled.

See [Chapter 3, “Monitors and Exception Detection” on page 87](#) for a description of the individual exception messages. Resource and Workload Monitor exception messages are shown with the individual service descriptions. Background Exception Sampler messages are described in [“Background Exception Sampler Monitors” on page 88](#).

Service Message:

A message in the parameter field of the service shows the sequence number of the first exception that is displayed and the total number of exceptions that can be displayed in the scrollable list; for example:

ROW 3 OF 17

Transfer:

You can TRANSFER from this display to the following related windows-mode views for more complete and up-to-date information. BMC Software recommends that you use the windows-mode views to do your analysis.

EZALERT	Alerts and Alarms view
EZDEXCPT	Exception Menu

Expand:

The DB2EX display can be EXPANDED to the following displays:

MON(DSYS)

Active Timer Requests display of all active monitors in the general DB2 system (DSYS) area.

LINESEL(MSG)

Description of a warning message can be selected by positioning the cursor in one of the scrollable lines and pressing ENTER.

DBTS—Database and Table Space Status

The Database and Table Space Status panel displays information about successfully opened databases and table spaces as recognized by VSAM.

Note: This display is functionally stabilized; however, it will be removed from the product in future releases. This display is no longer documented in this book; however, extensive help panels are available online.

The same information is displayed in the windows-mode views for page sets, which can be accessed from the Page Set Easy Menu (EZDPS). These views also provide improved analysis capabilities, such as SSI views of DB2 I/Os to shared volumes (or data sets in a data-sharing environment).

You can use the TRANSFER function at the top of this display to access the Page Set Easy Menu (EZDPS) or the Page Set Status (PSSTAT) view.

BMC Software recommends that you use these updated windows-mode views to analyze I/O activity.

See Volume 1 of the *MAINVIEW for DB2 User Guide* for information about these views.

ZPARAM—DB2 System Parameters

The DB2 System Parameter panel is used to display installation parameters in effect.

Note: This display is functionally stabilized; however, it does not support all the new data for DB2 6.1 and will be removed from the product in future releases. This display is no longer documented in this book; however, extensive help panels are available online.

The new DB2 6.1 counts, as well as many parameters not previously shown, are supported in the windows-mode views for ZPARAM, which can be accessed from the Installation Parameters Easy Menu (EZDZPARAM). These views also provide hyperlinks to related statistics views to simplify analysis of the effects of various parameters on DB2 performance.

You can use the TRANSFER function at the top of this display to access the Installation Parameters Easy Menu (EZDZPARAM).

BMC Software recommends that you use these updated windows-mode views to analyze the installation parameters.

See Volume 1 of the *MAINVIEW for DB2 User Guide* for information about these views.

User Activity Displays

This section describes the analyzer display services that provide overall and detail information about the status and activity of users of a targeted DB2 system.

USERS—User Summary

The DB2 User Summary panel summarizes the overall status and activity of DB2 users.

```

BMC Software -----          USER SUMMARY          ----- RX AVAILABLE
SERV ==> USERS                INPUT 13:43:00 INTVL=> 3 LOG=> N TGT==> DB2F
PARM ==> ,SORT=US              ROW    1 OF    6 SCROLL=> CSR
TRANSFER: THDACTV (Active Threads), EZDTHD (Thread Menu)
EXPAND: MON(USER), THRDHIST, LINESEL(DUSER)
OPTION: CONNECT, CORRID

USER ID  PLAN      CONNECT  CPU      %CPU  ELAPSED  #STMTS #LCK  ACTIVITY STATUS
-----  -
ACCTDEP  TSMCOM3  CICSCN3   665 us  0.0%   35 s     0      1  SELECT  ACT-USR
ACCTDEP  TSMCOM3  CICSCN3  1,961 us 0.0% 00:01:32 1      1  SELECT  ACT-USR
CJN4     DB2CALL   18 s     0.0% 05:14:48 0      0
HHH2     DB2CALL   5,496 ms 0.3% 01:27:28 0      0
HHH3     DSNESPRR TSO       53 s * 0.0% 01:24:27 5      8      SWAP
OLTC     DB2CALL   22 s     0.0% 08:00:21 0      0
*****          END OF DATA          *****

```

Figure 8. DB2 User Summary Panel

Select Code:

USERS

Parameter:

The following parameters can be specified:

- User connection type or blank.

If no parameter is specified (blank), all users currently connected at thread level are displayed. Or, only those users with a specific connection type can be displayed by specifying

- TSO or T
- BATCH or B
- UTIL or U (Utility)
- CAF or X (Call Attach Facility)
- IMS or I
- CICS or C
- SPAS or P
- RRSAF or R
- SYSTM or S
- DBAT or D (Database Access Thread)
- DDF (Both DBAT and DIST, DDF servers/requesters)

If an ALL or A parameter is specified, all connections are displayed. This display includes system threads.

- ,DBTS=(dbname,tsname)

Selects only current users of the database, where dbname and tsname are the names of the database and table space. Only dbname is required.

- ,SUMM=YES

Displays a summary of DB2 connections and attach modes above the list of users.

- ,SORT=US

When the list of users is displayed initially, the list is sorted alphabetically by user ID (default) and ,SORT=US is displayed in the PARM field (the comma is a required positional parameter for SORT). Any of the column data in the USER display can be sorted by entering the first two characters of the column heading with the SORT parameter as

SORT=cc

where cc can be any of the following two characters:

US	Sorts the list alphabetically by user ID (USER ID column)
PL	Sorts the list alphabetically by plan name (PLAN column)
CO	Sorts the list alphabetically by connection type (CONNECT column)
CR	Sorts the list alphabetically by correlation ID (CORRID column)
CP	Sorts the list in a numerically descending order (CPU column)
%C	Sorts the list in a numerically descending order (%CPU column)
EL	Sorts the list in a numerically descending order (ELAPSED column)
#S	Sorts the list in a numerically descending order (#STMTS column)
#L	Sorts the list in a numerically descending order (#LOCKS column)
AC	Sorts the list alphabetically by DB2 activity (ACTIVITY column)
ST	Sorts the list alphabetically by the user status displayed (STATUS column)

Note: You also can sort on each column by moving to the column header (by using the Tab key) and pressing ENTER.

Description:

All current users of the DB2 subsystem, or a user-requested subset of users such as TSO or IMS DB2 users, are presented in a scrollable display by user ID. The current status, access facility used, activity indicators such as CPU usage and locks, the call in progress, the plan in use, and exception conditions for each thread are shown.

With this overview display of DB2 user activity, it is possible to determine how well the total system is performing and whether the activity of one user is impacting others. For example, a problem could exist because of excessive CPU usage or lock contentions on DB2 tables. Users queued for a thread are also shown as in an exception status.

Note: A pound sign (#) after the CPU column indicates that SRB time is being used for the relative CPU time while executing in DB2 code (Database Access Threads only).

An asterisk (*) is used in this display to indicate the following circumstances:

- An asterisk preceding the CONNECT column indicates that a Database Access Thread (DBAT) is working on behalf of a remote user.
- An asterisk after the CPU column indicates that the user is swapped out and Address Space Control Block (ASCB) time is reported.

- An asterisk after the PLAN column indicates that this plan is a parallel query or utility subtask.

Service Message:

A message in the parameter field of the service shows the sequence number of the first user that is displayed and the total number of users that can be displayed in a scrollable list.

For example:

```
ROW 1 OF 55
```

Transfer:

You can TRANSFER from this display to the following related windows-mode views for more complete and up-to-date information. BMC Software recommends that you use the windows-mode views to do your analysis.

THDACTV	Active Threads view
EZDTHD	Thread Menu

Expand:

The USERS display can be EXPANDED to the following displays:

MON(USER)

Active Timer Requests display of all active monitors in the user activity (USER) area.

THRDHIST

DB2 Trace Entries (LTRAC) display for the standard thread history trace, if active. Here you can view recently completed threads no longer shown in USERS.

LINESEL(DUSER)

A detailed display of information about a specific user (DUSER) can be selected from this user list by positioning the cursor on the line for that user and pressing ENTER.

Option:

You can select the information that is displayed in the CONNECT column with the following OPTION buttons:

CONNECT

Displays the connection type (default).

CORRID

Displays 8 bytes of the correlation ID. The information shown varies for each of these connection types:

IMS

Last 8 bytes of the correlation ID, which is equivalent to the PSB name that the transaction is using.

Database Access Thread (DBAT)

First 8 bytes of the correlation ID for the requesting connection.

All others

First 8 bytes of the correlation ID.

- For TSO and batch users, this value is equivalent to the TSO ID and the job name.
- For CICS users, this value contains the thread type, thread number, and transaction name.

Note: The correlation ID is a better identifier than connection type for CICS and Database Access threads.

DUSER—User Detail Status

The DB2 User Detail panel displays user connection and resource details.

The following figures show representative displays of each DUSER section:

```

BMC Software -----  DETAIL USER STATUS  -----  RX AVAILABLE
SERV ==> DUSER          INPUT  11:07:14  INTVL=> 3  LOG=> N  TGT==> DB2G
PARM ==> BOLHHH4              ROW    1 OF  110  SCROLL=> CSR
EXPAND: MON(USER), UTRAC, ST(START TRACE), LOCKE, EXPLAIN, PT, CICSE, CMRTASK
        ACCOUNTING: ENV, ELAPSED, SQLCOUNTS, BPOOL, LOCKS, PRL, SPAS, DDF
CURRENT.....11:07:13.53  PLAN.....DSNESPRR TYPE.....ALLIED
START.....10:58:49.39  AUTHID.....BOLHHH4  CONNECT.....TSO/TSO
ELAPSED.....00:08:24  ORIG PRIM AUTH.....BOLHHH4  CORR ID.....BOLHHH4
STATUS.....IN-DB2  COMMITS.....0  ROLLBACKS.....0
-----
RUNTIME ANALYSIS  IN DB2      IN APPL.      TOTAL      %IN DB2(=)  TOTAL(*)
-----
ELAPSED TIME      00:08:23      718 ms      00:08:24      | =====* |
CPU TIME          00:01:22      123 ms      00:01:22      | ===       |
DB2 WAIT TIME     20 s              | <         |
-----
ACTIVITY -----  KEY INDICATORS -----
TOTAL SQL.....2      SQL: DYNAMIC(PREPARE)= 1
GETPAGES.....416,803  I/O RSP: SYNC= 45 ms, ASYNC= 107 ms
SYNC READS (PRL=00) .....147
PREFETCH PAGES READ.....1,051
UPDATES/COMMIT.....0.0
BFR HIT RATIOS:...VP=100%,HP=100%
-----
-SQL STATEMENT ANALYSIS -----
STATEMENT #: 193      STATEMENT TYPE: OPEN
ACTIVE IN DB2      CPU TIME: 1,897 ms  ELAPSED TIME: 00:01:06
Package/DBRM: DSNESM68 (DYNAMIC)  PLAN ISOLATION LEVEL: RR
PROCEDURE/UDF/TRIGGER: DSN8SPAS_TEST
SELECT * FROM LONG_SQL ;
    
```

Figure 9. DB2 User Detail Status Panel (Base Section)

```

- - - - - ENVIRONMENTAL INDICATORS - - - - -
JOB NAME.....BOLHHH4   STEP NAME.....IKJDB2G   PROC STEP.....T021T004
LUWID.....USB00L01.LUDB2G.AC1E9056AFF70001   LUWID TOKEN.....174
RLF TABLE ID..NOT ACTIVE   PROGRAM NAME..DSNECP10

- - - - - CICS CONNECTION - - - - -
TRAN...D8CS   APPLID.....CICS332B
TERM...   TASK.....37   USERID.....   PROGRAM...DFHEDFX
DPMODE.HIGH   ROLBE...YES   THREAD TYPE..ENTRY   RCT TABLE DSNCRCTH
STATUS IN CICS...KCCOMPAT   CICS CPU TIME.....72 ms
ACCOUNTING TOKEN.....(TOKEN NOT SPECIFIED)

---or---

- - - - - IMS CONNECTION- - - - -
PST.....0001   REGION TYPE...MPP   PSB NAME...DSN8IC22
TRAN...DSN8ICS   CLASS.....1   PROGRAM...DSN8IC22
CONTROL REGION NAME...IMS31X   LTERM.....- none -
STATUS IN IMS: I/ACTV-USR

---or---

- - - - - UTILITY CONNECTION- - - - -
UTILITY.....STOSPACE   PHASE NAME....STOSPACE   REC COUNT.....   n/a
UTILITY QUALIFIER.....TEST.UTILITY

```

Figure 10. DUSER Environment (ENV) Section

```

- - - - - ELAPSED TIME ANALYSIS (ACCTG CLASSES 2,3 ONLY) - - - - -
CATEGORY          #EVENTS AVG/EVENT  ELAPSED  %TOTAL
-----
ELAPSED TIME
  IN DB2              00:12:39  99.86  *****
  IN APPLICATION      1,038 ms   0.13  <
  --TOTALS--          00:12:40  100.00 *****
WAITS IN DB2 (LOCAL)
  LOCK/LATCH          0         0 us    0 us    0.00
  I/O WAIT            19        21 ms   392 ms  0.05  <
  LOG WRITE I/O       0         0 us    0 us    0.00
  OTHER READ I/O      0         0 us    0 us    0.00
  OTHER WRITE I/O     0         0 us    0 us    0.00
  UNIT SWITCH EVENTS
  . . COMMIT/ROLLBK   0         0 us    0 us    0.00
  . . OPEN/CLOSE       6      8,965 ms  54 s    7.07  *
  . . SYSLGRNG         1         700 ms   700 ms  0.09  <
  . . DATASPACE MGR    4         243 ms   973 ms  0.12  <
  . . OTHER            0         0 us    0 us    0.00
  ARCH. LOG(QIS)      0         0 us    0 us    0.00
  ARCH. READ(TAPE)    0         0 us    0 us    0.00
  DRAIN LOCK          0         0 us    0 us    0.00
  CLAIM RELEASE       0         0 us    0 us    0.00
  PAGELATCH CONT.     0         0 us    0 us    0.00
  SPAS SERVER TCB     0         0 us    0 us    0.00
WAITS IN DB2 (GLOBAL)
  LOCKS               0         0 us    0 us    0.00
  MSG. PROCESSING     0         0 us    0 us    0.00
  ---TOTAL WAITS---   30      1,862 ms  56 s    7.34  *
  *NOT ACCOUNTED      00:11:44  92.54  *****

```

Figure 11. DUSER Elapsed Time (ELAPSED) Section

```

- - - - - SQL STATEMENT EXECUTION COUNTS - - - - -
SELECT.....0      LOCK TABLE.....0      CREATE.....0
INSERT.....0       GRANT/REVOKE.....0     DROP.....0
UPDATE.....0       SET CURR.SQLID.....0   ALTER.....0
DELETE.....0       SET HOST VAR. ....0
                   SET CURR.DEGREE.....0   COMMENT ON.....0
PREPARE.....1      SET CURR. RULES.....0  LABEL ON.....0
DESCRIBE.....0     CONNECT TYPE 1.....0
                   CONNECT TYPE 2.....0     CREATE TEMP.....0
OPEN.....1         SET CONNECTION.....0   RENAME TBL.....0
FETCH.....5        RELEASE.....0
CLOSE.....1        CALL.....0
                   ASSOCIATE LOCATOR.....0
                   ALLOCATE CURSOR.....0

** DML.....8      ** DCL.....0          ** DDL.....0
** REOPTIMIZED.....0

- - - - - DYNAMIC SQL CACHE COUNTS - - - - -
STMT FOUND.....0   KPDYN-PREP.AVOID.....0  STMT DISCRD.....0
STMT NOT FOUND.....0  KEEPDPYD_IMPL.PREP.....0  STMT PURGED.....0

```

Figure 12. DUSER SQL Statement Execution Counts (SQLCOUNTS) Section

- - - - - BUFFER POOL ACTIVITY - - - - -			
ACTIVITY	TOTAL	BP0	BP3
GETPAGES.....	30	25	5
SYNC READS.....	25	15	10
GETPAGES/READIO....	1.2	1.7	0
COND. GP FAILURES..	0	0	0
SEQ. PREFETCH REQS.	0	0	0
LIST PREFETCH REQS.	0	0	0
DYNAMIC PREFETCHES.	2	0	2
ASYNCH PAGES READ...	0	0	0
PAGES/PREFETCH REQ.	0.0	0.0	0.0
PAGE UPDATES.....	3	2	1
IMMEDIATE WRITES...	0	0	0
HP SYNC READS.....	0	0	0
HP SYNC READ FAIL..	0	0	0
HP ASYNCH PAGES READ	0	0	0
HP WRITES.....	0	0	0
HP WRITE FAILURES..	0	0	0
- - - - - GLOBAL BUFFER POOL (DATA SHARING ONLY) - - - - -			
CF READS (BUFFER CROSS INVALIDATION)			
-DATA RETURNED....	2	-	2
-R/W INTEREST.....	1	-	1
CF READS (DATA NOT IN BUFFER POOL)			
-DATA RETURNED....	2	-	2
-R/W INTEREST.....	1	-	1
-NO R/W INTEREST..	1	-	1
CF-WRITE (CHGD PGS)	2	-	2
CF-WRITE (CLEAN PG)	1	-	1
NBR UNREG PAGES....	1	-	1
NBR EXPLICIT XI....	0	-	0
NBR WRITES 2ND BP..	0	-	0

Figure 13. DUSER Buffer Pool (BPOOL) Section

----- LOCK ACTIVITY -----	
TIMEOUT.....0	MAX PAGE/ROW LOCKS.....1
DEADLOCK.....0	
	LOCK REQUEST.....6
SUSPEND-LOCK.....0	UNLOCK REQUEST.....9
SUSPEND-LATCH.....0	QUERY REQUEST.....0
SUSPEND-OTHER.....0	CHANGE REQUEST.....8
	OTHER REQUEST.....0
ESCALATION(SHR).....0	
ESCALATION(EXCL).....0	
DRAIN REQUEST.....0	DRAIN FAILURE.....0
CLAIM REQUEST.....2	CLAIM FAILURE.....0
	----- GLOBAL LOCK ACTIVITY -----
LOCK REQUEST.....1	XES LOCK REQUEST.....3
LOCK CHANGE REQUEST.....0	XES CHANGE REQUEST.....0
UNLOCK REQUEST.....0	XES UNLOCK REQUEST.....1
IRLM GLOBAL SUSPEND.....0	XES GLOBAL SUSPEND.....0
FALSE CONTENTION.....0	
INCOMPATIBLE RETAINED.....0	NOTIFY MESSAGES SENT.....0

Figure 14. DUSER Locks (LOCKS) Section

----- PARALLELISM -----	
MAXIMUM DEGREE.....2	FALLBACK - NO BUFFER.....1
GROUPS EXECUTED.....3	FALLBACK - NO ESA SORT.....0
-- PLANNED DEGREE.....1	FALLBACK - AMBIG. CURSOR.....1
-- REDUCED DEGREE.....2	
PARALLEL TASKS.....3	FALLBACK - NO ENCLAVE.....0
CORRELATION TOKEN.....X'00000000'	FALLBACK - RLF LIMITED.....NO
	----- SYSPLEX -----
COORDN/ASSISTANT.....COORDN	FALLBACK - NO COORDN.....1
PRL COORDN NAME.....	FALLBACK - ISOL RR/RS.....2
MAXIMUM MEMBERS.....2	REDUCED - VP SHORTAGE.....0
INTENDED PRL GROUPS.....0	
QUERY REFORMULATED (ENV).....0	QUERY REFORMULATED (BP).....0

Figure 15. DUSER Parallelism (PRL) Section

```

----- DDF SUMMARY -----
CURRENT LOCATION: DB2A      (ALLIED DIST REQUESTER)
  WORKSTATION USER ID...bo1bp12      WORKSTATION NAME..
  WORKSTATION TRANSACTION ID...db2bp.exe

MVS WLM SERVICE CLASS NAME.....DB2JWLM

REMOTE                                FROM          TO
LOCATION:                               DB2J
REMOTE PROD-ID:                        DSN06010
DB AGENT CPU..... 15 ms
ELAPSED LOCAL..... 945 ms
ELAPSED REMOTE..... 491 ms    MESSAGES          1          1

CONVERSATION ID: X'7F6893A8'
STATUS                               INACTIVE  SESSION ID      X'F077F7F6632FA4DE'
LAST VTAM ACTIVITY                     SEND    TIME OF LAST MESSAGE  14:36:55
    
```

Figure 16. DUSER DDF Summary (DDF) Section

```

----- -STORED PROCEDURES- -----
EXECUTING STORED PROC.....YES      WAITING FOR SCHEDULE.....NO
STORED PROCEDURE NAME...DSN8SPAS_TEST
THREAD TOKEN.....X'7FFFFFFF'

SPAS CPU TIME.....200 us           SQL CALLS.....9
SPAS IN-DB2 TIME.....200 us       CALLS ABENDED.....0
SPAS WAITING ON TCB.....600 ms    CALLS REJECTED.....0
                                     CALLS TIMED OUT.....0
Total elapsed time.....200 us     WAITS ON TCB.....6
Elapsed time in SQL.....200 us    SQL nest level.....5

---and/or---

----- USER-DEFINED FUNCTIONS-----
UDF CPU TIME.....200 us           UDFs executed.....9
UDF IN-DB2 TIME.....200 us       UDFs ABENDED.....0
UDF WAITING ON TCB.....600 ms    UDFs REJECTED.....0
                                     UDFs TIMED OUT.....0
Total elapsed time.....200 us     SQL STMTS executed.....15
Elapsed time (SQL).....200 us    SQL nest level.....5

---and/or---

----- TRIGGERS -----
-- non-enclave times --
CPU Time.....200 us           Stmt TRG activated.....9
Elapsed time.....600 ms       Row TRG activated.....0
Trigger SQL errors.....0
-- enclave times --
CPU time.....200 us           CPU time (before enclave)...200 us
Elapsed time.....200 us       SQL nest level.....5
    
```

Figure 17. DUSER Routines (RTN) Section

Select Code:

DUSER

Parameter:

A parameter for this panel is required to identify the thread to be displayed. Any of the following identifiers can be used:

- Correlation ID
- User ID - the value shown on the USERS service display
- Authorization ID

If authorization ID is used and is not unique, the first thread found with that authorization ID is displayed.

To locate the user, the service first assumes the parameter is a correlation ID and searches for a match. The second search for a user match assumes the parameter is a user ID (jobname for batch or TSO or an authorization ID for CICS or IMS users). The final search to identify the user assumes an authorization ID for batch or TSO users (it is not necessary to repeat this search for CICS and IMS users).

Connection name also is accepted as an optional parameter to further identify the thread.

Note: This display can also be selected directly from the list of users displayed by the USERS service by positioning the cursor on the line for the user and pressing ENTER.

An optional parameter also is available, which issues a CANCEL THREAD or CANCEL DDF THREAD command (if you are authorized to issue DB2 commands):

- ,CANCEL

See the Usage Notes for these commands in the *DB2 Command and Utility Reference* for further information.

Note: The BBI-SS PAS must also have DB2 command authorization (see the *MAINVIEW for DB2 Customization Guide* for further information).

Description:

This service provides a complete display for one user. The most critical data for that user is summarized in the base section. All detail data is provided in sections that can be seen either by scrolling down or by using an expand button or tab point.

These sections provide information on

- Environmental Indicators
- Elapsed Time Analysis
- SQL Statement Execution Counts
- Buffer Pool Activity
- Lock Activity
- Parallelism
- DDF Activity
- Routines

Active Trace Selection:

If a detail trace is active for a user, the highlighted message, EXPAND FOR DETAIL TRACE, is displayed. You can then select a detailed display of the trace events for the current active thread for the specified user. Position the cursor on any line in the body of this panel and press ENTER.

Expand:

The DUSER display can be EXPANDED to the following panels:

MON(USER)

Active Timer Requests display of all active monitors in the user activity (USER) area

UTRAC

User Detail Trace display (if trace active)

ST(START TRACE)

Start DB2 Trace Request input panel

LOCKE

Lock Contention by User Detail display

EXPLAIN

RxD2 EXPLAIN for the current or last-executed dynamic or static SQL statement (displayed at the bottom of the base section), if RxD2 is installed

Note: Access is possible to remote DB2 subsystems only if they are connected by DDF to a local DB2 (in the same OS/390 system as the TS).

A qualifier panel is first displayed primed with the SQL text and query number 1. Your user ID is primed as the PLAN_TABLE owner. You can change these specifications before executing the EXPLAIN.

PT

RxD2 PLAN_TABLE display of existing EXPLAIN data for the current or last-executed static SQL statement (displayed at the bottom of the base section), if RxD2 is installed

Note: Access is possible to remote DB2 subsystems only if they are connected by DDF to a local DB2 (in the same OS/390 system as the TS).

A qualifier panel is first displayed primed with the query number (statement number) and program (DBRM or package). Your user ID is primed as the PLAN_TABLE owner. You can change this specification before proceeding to the actual EXPLAIN data.

CICSE

CICS RCT Entry Detail display (for CICS threads only)

CMRTASK

MAINVIEW for CICS Task Expand display for the task related to this DB2 thread, if MAINVIEW for CICS is installed (for CICS threads only)

DREGN

MAINVIEW for IMS Detail Region display for the region related to this DB2 thread, if MAINVIEW for IMS is installed (for IMS threads only)

ENV

DUSER Environmental Indicators display section

ELAPSED

DUSER Elapsed Time Analysis display section (accounting classes 2 and 3 only)

DUSER

SQLCOUNTS

DUSER SQL Statement Execution Counts display section

BPOOL

DUSER Buffer Pool Activity display section

LOCKS

DUSER Lock Activity display section

PRL

DUSER Parallelism display section

RTN

DUSER Routines display section (only if the transaction has issued stored procedure calls or user-defined functions or has been invoked by a trigger)

DDF

DUSER DDF Summary display section (only if there is DDF activity for the displayed thread)

You also can move to any one of several defined lines (using the Tab key) and press ENTER to transfer to the following related displays.

From the Base section:

Line Identifier	DUSER Section Transferred To
CURRENT	ENV
ELAPSED TIME	ELAPSED
TOTAL SQL	SQLCOUNTS
GETPAGES	BPOOL
SYNC READS (PRL=nn)	PRL
UPDATES/COMMIT	LOCKS

Any other position transfers to UTRAC.

Key Indicators:

A maximum of six key indicators are displayed in the Key Indicators area of the Base Section. They are selected in the following order of importance.

- These indicators show the cause of degradation and are highlighted:

- **STORED PROC. FAILED (reason) = nnnnnn**

Indicates the number of times a Stored Procedure call failed for one of the following reasons:

ABEND	Stored Procedure call terminated abnormally.
REJECT	Stored Procedure call was rejected.
TIMEOUT	Stored Procedure call was timed out while waiting to be scheduled.

Action: N/A

Field: QXCALLAB, QXCALLRJ, QXCALLTO

- **RID FAILURE - STORAGE**

Indicates that RID list processing for this unit of work failed because not enough storage was available.

Action: Review the storage allocations specified when DB2 was installed.

Field: QXNSMIAP

- **RID FAILURE - NUMBER OF RIDS**

Indicates that RID list processing for this unit of work failed because one of the internal limits was exceeded.

The internal limits include the physical limit of the number of RIDs that a RID list can contain and internal thresholds for the retrieval and manipulation of RIDs.

Action: N/A

Field: QXMRMIAP

- **CLAIM FAILURE**

Indicates that CLAIM processing failed for this unit of work.

Action: N/A

Field: QTXACLUN

- **DRAIN FAILURE**

Indicates that DRAIN processing failed for this unit of work.

Action: N/A

Field: QTXADRUN

– **PARALLEL CPU FALLBACK - reason**

Indicates that parallel CPU processing was turned off and sequential mode was used.

Possible causes indicated by *reason* are as follows:

NO ENCLAVE	The MVS ENCLAVE feature is not supported on this machine (MVS 5.2 or later is required).
RLF	The Resource Limit Facility has limited CPU parallelism for some SELECT statement.

Action: N/A

Field: QXDEGENC, QXRLFDPA

– **PARALLEL I/O FALLBACK - reason**

Indicates that parallel I/O processing was turned off and sequential mode was used.

Possible causes indicated by *reason* are as follows:

STORAGE	Storage shortage or insufficient buffers in the buffer pool.
ESA SORT	ESA sort feature is not installed on this machine.
AMBIG. CURSOR	Cursor in use is capable of UPDATE or DELETE.

Action: N/A

Field: QXDEGBUF, QXDEGESA, QXDEGCR

– **SYSPLEX PRL FALLBACK - reason**

Indicates that sysplex parallel processing was disabled and the parallel group was executed on a single DB2 (DB2 Version 5 and later only).

Possible causes indicated by *reason* are as follows:

COORDINATR=NO	Bound COORDINATOR=YES, but run on COORDINATOR=NO system.
ISOLAT..RR/RS	PLAN/PACKAGE was bound with isolation level of repeatable read.
BYPASS-BUFFER	Bypassed due to insufficient buffer pool storage.

Action: N/A

Field: QXCOORNO, QXISOOR, QXXCSKIP

– **PARALLEL I/O REDUCED DEGREE - nnnnnn**

Indicates that parallel I/O processing was reduced from the planned degree to a lesser degree because of insufficient storage or insufficient buffers in the buffer pool.

where

nnnnnn Number of times this situation has occurred

Action: If this number is not zero, consider increasing the size of the buffer pool or specifying a different buffer pool for the table space.

Field: QXREDGRP

– **INCREMENTAL BINDS = nnnnnn**

Indicates the number of incremental binds that this unit of work performed.

This response indicates that the plan/package had become invalid for some reason, such as an ALTER on an index or table.

Action: Nothing needs to be done for this plan, but you might want to explicitly bind any plans whose tables/indexes are being altered. Incremental binds can have a significant impact in an online transaction system.

Field: QXINCRB

– **SEE RTN FOR MORE CPU/ELAPSED**

Indicates that the total elapsed time may be less than the CPU time or DB2 wait time if stored procedures, user-defined functions, or triggers are present.

Action: See the Routines (RTN) section for more information on stored procedures, user-defined functions, and triggers when any of them are present.

Field: N/A

– **THREAD NOT IN PLAN**

Indicates that the user has established a connection to DB2, but that connection is currently not complete.

To complete this connection, the selected attachment facility (TSO, CICS, IMS, or CAF) must issue a CREATE THREAD to allocate a plan and obtain the resources necessary for that plan.

Action: N/A

Field: N/A

– **THREAD WAITING TO SCHEDULE STORED PROC.**

Indicates that this unit of work has issued a SQL CALL statement and is waiting for the Stored Procedure to be scheduled.

Action: N/A

Field: QW0148FL (bit QW0148SQ)

– **TOTAL DDL = nnnnnn**

Indicates the number of Data Definition Language (DDL) statements performed by this unit of work.

DDL statements, such as CREATE TABLE, can have a significant impact on system performance. To perform DDL operations, exclusive locks need to be obtained against the DB2 catalog.

Action: In an online transaction system, avoid designing transactions that use DDL operations.

Field: QXCRTAB, QXCRINX, and so on

– **TIME SINCE LAST COMMIT = ttttttt**

For threads that have updated DB2 resources, this response or indicator reports the amount of time that has elapsed since the start of the thread or since the last commit was issued.

This information is of value when deciding whether a thread should be cancelled. The longer the thread has been executing, the longer the rollback process will run.

Action: N/A

- The following indicators are informational in nature and are not highlighted:

– **GRANTS / REVOKES = nnnnnnn**

Indicates the number of GRANT or REVOKE SQL statements issued by this unit of work.

Action: N/A

Field: QXGRANT, QXREVOK

– **LOCK TABLE = nnnnnnn**

Indicates the number of LOCK TABLE SQL statements issued by this unit of work.

Action: Use LOCK TABLE carefully. It means that this unit of work owns exclusive control of the table, allowing no concurrent access.

Field: QXLOCK

– **LOCK ESCALATIONS = nnnnnnn**

Indicates the number of times that the total locks per table have exceeded the installation limit for this unit of work. When this limit is exceeded, DB2 promotes the current page locks to a single table space lock of the same type.

Action: Lock escalation usually indicates that the application has encountered an exceptional condition. If this situation occurs frequently, the design of the application should be reviewed.

Field: QTXALES, QTXALEX

– **PARALLEL I/O CONDITIONAL GETPAGE FAILURE**

Indicates that a conditional GETPAGE request was not satisfied for this buffer pool. This condition applies only to parallel I/O that is conditional in nature.

When this condition occurs, it indicates that a prefetch operation failed to retrieve a page before the application required it.

Action: N/A

Field: QBACNGT

– **SQL: SELECT=nnnnnn, FETCH=nnnnnn**

Summary of the number of SQL SELECT and FETCH statements issued by this unit of work.

In a DDF environment, the number of FETCH statements might not truly reflect the number of FETCHes issued by the application due to internal DDF processing.

Action: N/A

Field: QXSELECT, QXFETCH

– **SQL: INS=nnnnnn, UPD=nnnnnn, DEL=nnnnnn**

Summary of the number of SQL INSERT, UPDATE, and DELETE SQL statements issued by this unit of work.

Action: N/A

Field: QXINSRT, QXUPDTE, QXDELET

– **SQL: DYNAMIC(PREPARE)=nnnnnn**

Summary of the number of PREPARE SQL statements issued by this unit of work. Each PREPARE statement is equivalent to one dynamic SQL statement.

In a DDF environment, the number of PREPARE statements might not truly reflect the number of dynamic SQL statements issued by the application due to internal DDF processing.

Action: N/A

Field: QXPREP

– **THREAD RUNNING A STORED PROCEDURE**

Indicates that this unit of work has issued a SQL CALL statement and the Stored Procedure is currently being executed.

Action: N/A

Field: QW0148FL (bit QW0148SN)

– **I/O RSP: SYNC= time, ASYNC= time**

Provides an indication of the average I/O response times this unit of work is experiencing for synchronous and asynchronous requests.

Action: N/A

Field: For synchronous requests:
QWACARNE, QWACAWTI

For asynchronous requests:
QWACARNR, QWACARNW, QWACAWTR, QWACAWTW

– **LOCK SUSPENSIONS = nnnnnn**

Number of times this unit of work was suspended due to a lock or latch conflict with another unit of work.

This number should be small, ideally zero.

Action: N/A

Field: QTXASLOC, QTXASLAT, QTXASOTH

– **PARALLEL MAINTASK, SUBTASKS = nnnnnn**

Indicates that this unit of work is the primary, or originating unit of work in a group supporting a query or utility using parallel tasks. SUBTASKS shows the number of subtask units of work that were created to support this query or utility.

Action: N/A

Field: QWACPACE, QWACPCNT

– **PARALLEL - SUBTASK**

Indicates that this unit of work was created in support of a query or utility using parallel tasks.

Action: N/A

Field: QWACPACE

– **SYSPLEX PARALLELISM - COORDINATOR/ASSISTANT**

Indicates that a query is being processed across more than one DB2, where this DB2 is either the coordinator or an assistant (DB2 version 5 and later only).

Action: N/A

Field: QWDA

– **NUMBER OF DISTRIBUTED LOCATIONS = nnnnnn**

Number of separate DDF locations accessed by this unit of work.

Action: N/A

Field: N/A

– **RID LIST PROCESSING USED = nnnnnn**

Number of times RID list processing was used for this unit of work.

During RID list processing, DB2 produces a list of candidate record IDs from an index. The resulting RID list can be used to efficiently retrieve the qualifying rows.

Action: N/A

Field: QXMAIP

CICSC—CICS DB2 Connections

This display shows a summary of all the CICS regions connected to the DB2 shown in the TGT field.

```

BMC Software ----- CICS DB2 CONNECTIONS ----- RX AVAILABLE
SERV ==> CICSC          INPUT  12:37:02  INTVL=> 3  LOG=> N  TGT==> DB2G
PARM ==>                                     ROW   1 OF   2  SCROLL=> CSR
EXPAND:  USERS, LINESEL(CICSR)

  CICS
CONN ID  RCT NAME  ACTV  CONN  MAX  WAITS/  IN
          REQS THRDS THRDS OVERFLOW DOUBT      COMMITS  DB2 CALLS
-----
CICS41E3 DSN2CT41    1   21   160     0     0         0         1
CICS51E1 DSN2CT51    0   26   160     0     0         2         2
***** END OF DATA *****

```

Figure 18. CICS DB2 Connections

Select Code:

CICSC

Parameter:

None

Description:

This display shows a summary of all the CICS regions connected to this DB2.

Service Message:

A message in the parameter field of the service shows the sequence number of the CICS region displayed and the total number of CICS regions that can be displayed in a scrollable list. For example:

```
ROW   1 OF  2
```

Expand:

The CICS DB2 CONNECTIONS display can be EXPANDED to the following displays:

USERS

Transfers to the USERS service with a parameter of CICS to show just the active CICS connections.

LINESEL(CICSR)

Transfers to the RCT display (CICSR) for the CICS described by the cursor location. The parameter supplied to CICSR is the CICS connection name. To see more details about a particular CICS connection, move the cursor to the line for that CICS, and press ENTER.

CICSR—CICS DB2 RCT Summary

This display shows the detail of the CICS-DB2 connection as defined in the CICS Resource Control Table (RCT).

```

BMC Software ----- CICS DB2 RCT SUMMARY ----- RX AVAILABLE
SERV ==> CICSR          INPUT  15:18:50 INTVL=> 5 LOG=> N TGT==> DB2HHH
PARM ==> CICS52C1, SORT=RCT          ROW    1 OF   22 SCROLL=> CSR
EXPAND:  USERS, LINESEL(CICSE), CMRTASK

DB2CONN Name .....RCTHH  Connection Start Time .....27JUL 15.15.32.21
CICS Job Name ...CICS5201  CICS Auth ID ...CICS52C1  DB2 Subsystem ID ..DB2H

Create Thread Err ..ABEND  Err Dest ..CSMT,****,****  Statistics Dest ...CSSL
Connect Error ....SQLCODE  Standby Mode ...RECONNECT  Non-term Release ....NO
Purge Cycle (m,s) ...0,30  No. Plan Entries .....22  No. Tran Entries ....76

Current Tasks .....1  Max Tasks Used .....1  Max Task Limit .....160
INDOUBT THREADS .....0

----- THREADS ----- WAITS/ DB2 AUTH THD
TXID PLANNAME CURRENT MAXIMUM TWAIT OVERFLW CALLS COMMITS CHECKS RUSE
-----
*COMMAND 0 1 POOL 0 0 0 0 0
*POOL DSN8CC0 0 5 YES 0 0 0 0
ABCD ABCDXYZZ 0 1 YES 0 0 0 0
A100 TEST 0 1 POOL 0 0 0 0
DBBS DBBSRVR 0 2 YES 0 0 0 0
D8CS DSN8CC0 0 2 YES 0 0 0 0
H000 TSMPL03 1 25 YES 0 1 0 1
TSM TSMPL10 0 1 YES 0 0 0 0
TSMB TSMPL11 0 1 NO 0 0 0 0
TSMC TSMPL12 0 1 YES 0 0 0 0
TSM2 TSMPL02 0 1 YES 0 0 0 0
TSM4 TSMPL04 0 1 YES 0 0 0 0
TSM5 TSMPL05 0 1 YES 0 0 0 0
TSM6 TSMPL06 0 1 YES 0 0 0 0
TSM7 (DYN) 0 1 POOL 0 0 0 0
TSM9 TSMCOM9 0 1 YES 0 0 0 0
TST1 CMRGPL21 0 1 YES 0 0 0 0
TST2 CMRGPL21 0 1 YES 0 0 0 0
TST3 CMRGPL21 0 1 YES 0 0 0 0
TST4 CMRGPL21 0 1 YES 0 0 0 0
TXXX TSMPL08 0 1 POOL 0 0 0 0
XYZ1 CMRPLAN 0 1 POOL 0 0 0 0
***** END OF DATA *****

```

Figure 19. CICS DB2 RCT Summary for CICS/TS 1.2 and Later

```

BMC Software ----- CICS DB2 RCT SUMMARY ----- RX AVAILABLE
SERV ==> CICSR          INPUT   16:20:29  INTVL=> 3  LOG=> N  TGT==> DB2G
PARM ==> CICS51E2, SORT=RCT          ROW    1 OF   22  SCROLL=> CSR
EXPAND:  USERS, LINESEL(CICSE), CMRTASK

CICS JOB NAME .....CICS5102  RCT NAME .....DSN2CT51  STATISTICS DEST ..CSSL
CICS AUTHID .....CICS51E2  DYN ENTRY TRACEID ...449  ERRDEST CSMT, ****, ****
NO. TRANIDS .....74  DYN EXIT TRACEID ....450  SNAP SYSOUT CLASS ...R
RCT TABLE ENTRIES .....22  DB2 CALL TRACEID ....448  START TRAN ID ....DSNC

CURRENT THREAD REQUEST ...1  MAX THREAD LIMIT ....160  THRD PURGE TIME ...30
CURRENT SUBTASKS .....26  IN DOUBT THREADS .....0  CREATE THD ERR ...AEY9

#IN          ----- THREADS -----  WAITS/      DB2          AUTH  THD
TXID GRP PLANNAME CURR ACTV PROT  MAX TWAIT  OVERFLW  CALLS COMMITS CHECKS RUSE
-----
DSNC  0          0  1  1  1  POOL      0      0      0      0  0  0
P100  0 DSN8CC0  0  5  0  5  YES      0      0      0      0  0  0
D8CS  2 DSN8CC0  0  2  2  3  YES      0      0      0      0  0  0
TSM7  1 (DYN)    0  1  0  1  POOL     0      0      0      0  0  0
TXXX  2 TSMPL08  0  1  1  2  POOL     0      0      0      0  0  0
DBBS  1 DBBSRVR  0  2  0  2  YES      0      0      0      0  0  0
TST1  1 CMRGPL21 0  1  1  2  YES      0      0      0      0  0  0
TST2  1 CMRGPL21 0  1  1  2  YES      0      0      0      0  0  0
TST3  1 CMRGPL21 0  1  1  2  YES      0      0      0      0  0  0
TST4  1 CMRGPL21 0  1  1  2  YES      0      0      0      0  0  0
TSM2  1 TSMPL02  0  1  1  2  YES      0      0      0      0  0  0
TSM4  1 TSMPL04  0  1  1  2  YES      0      0      0      0  0  0
TSM5  1 TSMPL05  0  1  1  2  YES      0      0      0      0  0  0
TSM6  1 TSMPL06  0  1  1  2  YES      0      0      0      0  0  0
TSM9  1 TSMCOM9  0  1  1  2  YES      0      0      0      0  0  0
TSM A  1 TSMPL10  0  1  1  2  YES      0      0      0      0  0  0
TSM B  1 TSMPL11  0  1  1  2  NO       0      0      0      0  0  0
TSM C  1 TSMPL12  0  1  1  2  YES      0      0      0      0  0  0
XYZ1  1 CMRPLAN  0  1  0  1  POOL     0      0      0      0  0  0
ABCD  4 ABCDXYZZ 0  1  0  1  YES      0      0      0      0  0  0
H000 50 TSMPL03  1 25  5 25  YES      0      8      7      8  1  1
A100  1 TEST     0  1  0  1  YES      0      0      0      0  0  0
***** END OF DATA *****

```

Figure 20. CICS DB2 RCT Summary for CICS/TS 1.1 or Earlier

Select Code:

CICSR

Parameter:

The following parameters can be specified for this service:

- CICS connection id

DB2 connection name that is used by this CICS region. It is the same as the CICS VTAM APPLID. If this parameter is not specified, information for the first CICS connection that is detected is displayed.

- SORT=

SORT is an optional parameter that can be used to sort a displayed list by any of the column headings. The sort parameter values can be either typed directly in the PARM field or selected by moving the cursor to the column heading and pressing ENTER. The first two characters of the column heading are used with SORT as

SORT=cc

where cc can be any of the following characters:

RCT	Displays the RCT entries in the same sequence as they were specified on the RCT table generation. This entry is the initial default.
TX	Sorts in ascending sequence by TXID.
GR	Sorts in descending order by the number of transactions in the group (not valid for CICS/TS 1.2 and later).
PL	Sorts in ascending sequence by plan name.
CU	Sorts in descending order by the number of current threads.
AC	Sorts in descending order by the number of active threads (not valid for CICS/TS 1.2 and later).
PR	Sorts in descending order by the number of protected threads (not valid for CICS/TS 1.2 and later).
MA	Sorts in descending order by the maximum thread value for the group.
TW	Sorts in ascending sequence by TWAIT value.
OV	Sorts in descending order by the number of waits or overflows.
CA	Sorts in descending order by the number of DB2 calls.
CO	Sorts in descending order by the number of DB2 commits.
CH	Sorts in descending order by the number of DB2 authorization checks.

Note: You also can sort on each column by moving to the column header (by using the Tab key) and pressing ENTER.

Description:

This service shows the detail of the CICS to DB2 connection as defined in the CICS Resource Control Table (RCT).

Service Message:

A message in the parameter field of the service shows the sequence number of the first entry that is displayed and the total number of entries that can be displayed in the scrollable list; for example:

ROW 1 OF 16

Expand:

The CICS DB2 RCT summary display can be EXPANDED to the following displays:

USERS

Transfers to the USERS service with a parameter of CICS to show just the active CICS connections.

LINESEL(CICSE)

Transfers to the RCT Entry display (CICSE) for the TXID described by the cursor location. The parameter supplied to CICSE is the CICS connection name and the TXID.

To expand to the CICSE service showing all the detail about a particular RCT entry, move the cursor to the line for that entry and press ENTER.

CMRTASK

MAINVIEW for CICS DB2TASK display for all tasks accessing DB2 from the target CICS system.

Note: If MAINVIEW for CICS is not accessible, this EXPAND button is not highlighted and cannot be selected.

Scrolling

The display is scrollable except for the column headings.

The row xx of xx refers to the RCT table entries that are displayed, not the heading lines.

CICSE—CICS DB2 RCT Entry Detail

This display shows the detail for one RCT entry.

```

BMC Software ----- CICS DB2 RCT ENTRY ----- RX AVAILABLE
SERV ==> CICSE          INPUT  15:19:01  INTVL=> 5  LOG=> N  TGT==> DB2HHH
PARM ==> CICS52C1,H000          ROW    1 OF   32  SCROLL=> CSR
EXPAND:  USERS, LINESEL(DUSER), CICST

DB2Entry Name .....H000          DB2CONN Name .....RCTHH
CICS Connect ID .....CICS52C1    CICS Auth ID .....CICS52C1
DB2Entry Install time ..27JUL 15.13.30.48

- - - - THREAD COUNTS - - - -
TYPE .....ENTRY                  Current Threads .....1
AUTH String .....ACCTDEP         HWM Threads .....1
PLAN NAME .....TSMPL03          Thread Limit .....25
PLANExitname .....*****        Protected Threads .....0
TCB PRIority .....HIGH          HWM Protected Threads .....0
DRollback .....YES              Protected Thread Limit .....5
THREADwait .....YES             Thread Reuse Count .....0
DB2 Accounting Type .....UOW     Thread Terminations .....0
                                   Number of WAITS .....0
- - - TASK (TCB) COUNTS - - -
DB2 CALLS .....1                Current Tasks .....1
COMMITTS .....0                 HWM for Tasks .....1
READ-ONLY COMMITTS .....0       Tasks on ReadyQ .....0
ROLLBACKS .....0                HWM Tasks on ReadyQ .....0
AUTHORIZATIONS .....1
Total Transactions .....0

TRANIDS..... H000 H001 H002 H003 H004 H005 H006 H007 H008 H009
                H010 H011 H012 H013 H014 H015 H016 H017 H018 H019
                H020 H021 H022 H023 H024 H025 H026 H027 H028 H029
                H030 H031 H032 H033 H034 H035 H036 H037 H038 H039
                H040 H041 H042 H043 H044 H045 H046 H047 H048 TSM3

- - - - - THREAD RESOURCE ANALYSIS - - - - -

---SINCE CREATE THREAD---
THD#  STATUS  TOT CPU  #COMMITTS  #ABORTS  ELAPSED  TXID  PLAN  TASK  USERID
-----
0     ACTIVE   15 ms    0          0        17 s    TSM3  TSMPL03  29  BOLPJE1
***** END OF DATA *****
    
```

Figure 21. CICS DB2 RCT Entry for CICS/TS 1.2 and Later

```

BMC Software ----- CICS DB2 RCT ENTRY ----- RX AVAILABLE
SERV ==> CICSE          INPUT  12:38:21  INTVL=> 3  LOG=> N  TGT==> DB2G
PARM ==> CICS51E1,D8CS          ROW    1 OF   24  SCROLL=> CSR
EXPAND:  USERS, LINESEL(DUSER)

CICS CONNECT ID..... CICS51E1          RCT NAME ..... DSN2CT51
CICS AUTHID..... CICS51E1
GROUP ID.....(TXID)    D8CS          ----- STATISTICS -----
PLAN NAME.....(PLAN)  DSN8CC0        DB2 CALLS .....0
PLAN ALLOC EXIT(PLNPGME)              COMMITS .....0
TCB DISPATCHING.(DPMODE)    HIGH     READ-ONLY COMMITS .....0
ROLLBACK.....(ROLBE)    YES         ABORTS .....0
AUTH=..... USER,TERM,TXID           AUTHORIZATIONS .....0
TYPE.....(TYPE)    ENTRY
TWAIT.....(TWAIT)    YES           WAITS .....0
ACTIVE LIMIT.....(THRDA)    2        CURRENT THREAD REQUESTS .....0
PROTECTED THREADS(THRDS)    2        ACTIVE SUBTASKS .....2
THREAD MAX.....(THRDM)    3          MAX THREAD REQUESTS .....0
ACCOUNTING/TRAN.(TOKEN)    NO        THREAD REUSE .....0
TCBS ATTACHED .....4

TRANIDS.....(TXID)  DTST D8CS

- - - - - THREAD RESOURCE ANALYSIS - - - - -

          ---SINCE CREATE THREAD---
THD# P STATUS   TOT CPU #COMMIT #ABORTS  ELAPSED TXID PLAN      TASK USERID
-----
   0 P CONN      14 ms
   1 P CONN      19 ms
***** END OF DATA *****

```

Figure 22. CICS DB2 RCT Entry for CICS/TS 1.1 or Earlier

Select Code:

CICSE

Parameter:

The following parameters can be specified for this service. If no parameter is specified, the first RCT entry of the first CICS connection is displayed.

- CICS connection id

DB2 connection name used by this CICS region. It is the same as the CICS VTAM APPLID.

- txid

Name of this transaction group. This transaction is the first specified on the TXID operand. This parameter is optional. If it is omitted, the first RCT entry is displayed.

Description:

This service displays detail for one RCT entry.

Service Message:

A message in the parameter field of the service shows the sequence number of the first line that is displayed and the total number of lines that can be displayed. For example:

```
ROW 1 OF 16
```

Expand:

The CICS DB2 RCT Summary display can be EXPANDED to the following displays:

USERS

User Summary display with a parameter of CICS to show only the active CICS connections.

LINESEL(DUSER)

A detailed display of information about a specific thread (DUSER) can be selected from the Thread Resource Analysis section by positioning the cursor on the line for that thread and pressing ENTER.

CICST

CICS DB2 RCT Transactions display.

Scrolling:

The display can be scrolled up or down using the appropriate PF keys, or it can be moved forwards (PF11) or backwards (PF10) through the RCT table.

CICST—CICS DB2 RCT Transactions

This display shows all possible transactions that are defined for the given DB2Entry object of the CICS/DB2 Attachment Facility.

```

BMC Software ----- CICS DB2 RCT TXIDS ----- RX AVAILABLE
SERV ==> CICST          INPUT    15:21:14  INTVL=> 5  LOG=> N  TGT==> DB2HHH
PARM ==> CICS52C1,H000                ROW    1 OF    10  SCROLL=> CSR
EXPAND:  USERS, CMRTASK

DB2Entry Name .....H000                DB2CONN Name .....CICS52C1
CICS CONNECT ID .....RCTHH            CICS AUTHID .....CICS52C1

----- TRANSACTION LIST -----
TRANID..USED   TRANID..USED   TRANID..USED   TRANID..USED   TRANID..USED
-----
H000.....NO   H001.....NO   H002.....NO   H003.....NO   H004.....NO
H005.....NO   H006.....NO   H007.....NO   H008.....NO   H009.....NO
H010.....NO   H011.....NO   H012.....NO   H013.....NO   H014.....NO
H015.....NO   H016.....NO   H017.....NO   H018.....NO   H019.....NO
H020.....NO   H021.....NO   H022.....NO   H023.....NO   H024.....NO
H025.....NO   H026.....NO   H027.....NO   H028.....NO   H029.....NO
H030.....NO   H031.....NO   H032.....NO   H033.....NO   H034.....NO
H035.....NO   H036.....NO   H037.....NO   H038.....NO   H039.....NO
H040.....NO   H041.....NO   H042.....NO   H043.....NO   H044.....NO
H045.....NO   H046.....NO   H047.....NO   H048.....NO   TSM3.....YES
***** END OF DATA *****

```

Figure 23. CICS DB2 RCT Transactions

Select Code:

CICST

Parameter:

The following parameters are required for this service. If the parameter is invalid, an error message is returned.

- CICS connection id
DB2 connection name used by this CICS region. It is the same as the CICS VTAM APPLID.
- db2entry name
Name of this DB2Entry object.

Description:

This display shows all possible transactions that are defined for the given DB2Entry object of the CICS/DB2 Attachment Facility. All transactions that have been used are highlighted.

CICSE shows the first 50 defined transactions. You can use this display to see the complete list of transactions when more than 50 transactions are defined.

Service Message:

A message in the parameter field of the service shows the sequence number of the transaction displayed and the total number of transactions that can be displayed in a scrollable list. For example:

```
ROW    1 OF 2
```

Expand:

The CICS DB2 RCT Transactions display can be EXPANDED to the following displays:

USERS

User Summary display with a parameter of CICS to show only the active CICS connections.

CMRTASK

MAINVIEW for CICS DB2 Task display for all tasks accessing DB2 from the target CICS system.

Note: If MAINVIEW for CICS is not accessible, this EXPAND button is not highlighted and cannot be selected.

Lock Displays

This section describes the analyzer display services that provide lock contention information about a targeted DB2 system.

LOCKD—Lock Contention by DB/TS

The DB2 Lock Status screen is used to determine which objects and transactions have problems.

```

BMC Software -----LOCK CONTENTION BY DB/TS -----PERFORMANCE MGMT
SERV ==> LOCKD          INPUT  21:48:26 INTVL=> 3 LOG=> N TGT==> DB2A
PARM ==> ,H              ROW    1 OF    31 SCROLL=> CSR
EXPAND: MON(LOCK), DBTS, LKOUT, LOCKU, LINESEL(LOCKE)
- - - - - OBJECT - - - - - LOCK - - - LOCK OWNER - - WAIT - WAITING -
DATABASE TSPACE PAGE/PART TYPE STAT USER ID C PLAN CNT
-----
$$PLAN  BATLGEN                SKCT SHRD SHR-CNT = 003      0
$$PLAN  DB2CAFT2              SKCT SHRD CIR4      X DB2CAFT2  0
$$PLAN  DSNESPCS              SKCT SHRD HTS2      T DSNESPCS  0
$$PLAN  DSN8IC13              SKCT SHRD DSN8IC13 I DSN8IC13  0
$$PLAN  GMBPLAN                SKCT SHRD SHR-CNT = 002      0
DSNDB01                DBTS SHRD DB2LOAD2 B GMBPLAN  0
DSNDB01  DBD01                PSET ISHR DB2LOAD2 B GMBPLAN  0
DSNDB01  SCT02                PSET ISHR DB2LOAD2 B GMBPLAN  0
DSNDB06                DBTS SHRD HTS2      T DSNESPCS  0
DSNDB06  SYSDBASE            PSET ISHR HTS2      T DSNESPCS  0
DSNDB06  SYSGROUP            PSET IEXC HTS2      T DSNESPCS  0
DSNDB07                DBTS SHRD DSN8IC13 I DSN8IC13  0
DSNDB07  DSNTMP01            PSET IEXC DSN8IC13 I DSN8IC13  0
DSN8D13A                IPAG SHRD DSN8IC13 I DSN8IC13  0
DSN8D13A                IPAG SHRD DSN8IC13 I DSN8IC13  0
DSN8D13A  DSN8S13D 000002    DPAG SHRD DSN8IC13 I DSN8IC13  0
DSN8D13A  DSN8S13D                PSET ISHR DSN8IC13 I DSN8IC13  0
DSN8D13A  DSN8S13E      01    DSET ISHR DSN8IC13 I DSN8IC13  0
DSN8D13A  DSN8S13E 000002    DPAG SHRD DSN8IC13 I DSN8IC13  0
DSN8D13A  DSN8S13E      02    DSET ISHR DSN8IC13 I DSN8IC13  0
DSN8D13A  DSN8S13E      03    DSET ISHR DSN8IC13 I DSN8IC13  0
DSN8D13A  DSN8S13E      04    DSET ISHR DSN8IC13 I DSN8IC13  0
DSN8D13P  DSN8S13C                PSET ISHR DSN8IC13 I DSN8IC13  0
LOADDB1                DBTS SHRD HTS2      T DSNESPCS  0
LOADDB1  HTSTS2  00000C    DPAG EXCL HTS2      T DSNESPCS  0
LOADDB1  HTSTS2  00000D    DPAG EXCL HTS2      T DSNESPCS  0
LOADDB1  HTSTS2  00000E    DPAG EXCL HTS2      T DSNESPCS  1  LOADDB2-B
LOADDB1  HTSTS2  00000A    DPAG EXCL HTS2      T DSNESPCS  0
LOADDB1  HTSTS2  00000B    DPAG EXCL HTS2      T DSNESPCS  0
LOADDB1  HTSTS2                PSET IEXC HTS2      T DSNESPCS  0
LOADDB3  LOADTS9                PSET EXCL DB2LOAD2 B GMBPLAN  0

```

Figure 24. DB2 Lock Status Screen

By default, this panel only shows locks that have current waiters.

Select Code:
LOCKD

Parameter:

Database and table space lookup can be done system-wide, by specific object, or by object group with an object name qualifier.

One of the following parameters can be specified. If no parameters are entered, all databases and all table spaces holding locks that currently have waiters are displayed.

S database

Selects the specified database for display.

A generic group of databases can be selected for display.

For example:

S XYZ+

where the plus sign (+) indicates any character.

S database,table space

Selects the specified database and associated table space for display.

A generic group of table spaces can be selected for display by using the + qualifier.

For example:

S +,XYZ+

shows all table spaces with an XYZ prefix and their associated databases.

F database

Finds the specified database and displays it at the top of the list. The plus sign (+) can be used as a generic qualifier to represent any character in the database name.

F database,table space

Finds the specified database and associated table space and displays them at the top of the list. The plus sign (+) can be used as a generic qualifier to represent any character in the database or table space name.

,H

Displays all held locks.

,W

Displays all locks currently having waiters. This parameter is the default.

Parameters ,H and ,W can be specified with the S and F parameters as follows:

- S database,[,H | W]
- S database,table space[,H | W]
- F database,[,H | W]
- F database,table space[,H | W]

,PLAN

Replace the authorization ID in the WAITING field with the plan name.

,CORRID

Replace the authorization ID in the WAITING field with the correlation name.

Description:

This display is used to determine which objects and transactions have contention problems. You can also determine who holds exclusive locks on each table space and who is currently waiting because of lock contention.

The database and table space presentation is sorted by DATA BASE, TABLE SPACE, and PAGE/PART.

This list is scrollable.

Service Message:

A message in the parameter field of the service shows the sequence number of the first lock displayed and the total number of locks that can be displayed in the scrollable list.

For example:

```
ROW 1 OF 1,167
```

Expand:

The LOCKD display can be EXPANDED to the following displays:

MON(LOCK)

Active Timer Requests display of all active monitors in the resource or user lock (LOCK) area

DBTS

Database and Table Space Status display

LKOUT

Lockout History display

LOCKU

Lock Contention by User display

LINESEL(LOCKE)

A detailed display of information about a specific user (LOCKE) can be selected from this list by positioning the cursor on the line for that user and pressing ENTER.

LOCKU—Lock Contention by User (Summary)

The DB2 User Lock Summary screen is used to determine which users are experiencing or causing locking problems.

```

BMC Software -----LOCK CONTENTION BY USER -----PERFORMANCE MGMT
SERV ==> LOCKU          INPUT 17:18:14 INTVL=> 3 LOG=> N TGT==> DB2A
PARM ==>                ROW    1 OF    3 SCROLL=> CSR
EXPAND: MON(LOCK), LOCKD, LKOUT, LINESEL(LOCKE),
-----USER-----
USER ID  CONNECT  PLAN  CORRELATION  SHARED  EXCLUSIVE  WAIT  IN
-----
AMR1     TSO       DSNESPRR  AMR1          4        1         1
CIR4X    TSO       DSNESPRR  CIR4X         6        1         0 *
DSN8IC13 X14H     DSN8IC13  0002DSN8IC13  1        0         0
DSN8IH13 X14H     DSN8IH13  0001DSN8IH13 10       0         0
    
```

Figure 25. DB2 User Lock Summary Screen

Select Code:

LOCKU

Parameter:

None

Description:

The User Lock Summary screen, shown in [Figure 25](#), is used to determine which users are experiencing or causing locking problems.

The user lock summary is sorted by user ID, connection type, and plan.

If the user list does not fit on one screen, it can be scrolled.

Service Message:

A message in the parameter field of the service shows the sequence number of the first user ID displayed and the total number of user IDs that can be displayed in a scrollable list.

For example:

```
ROW 1 OF 38
```

Expand:

The LOCKU display can be EXPANDED to the following displays:

MON(LOCK)

Active Timer Requests display of all active monitors in the resource or user lock (LOCK) area.

LOCKD

Lock Contention by DB/TS display.

LKOUT

Lockout History display.

LINESEL(LOCKE)

A detailed display of lock contention information about a user (LOCKE) can be selected by positioning the cursor on the line for that user and pressing ENTER.

LOCKE—Lock Contention by User (Detail)

The DB2 User Lock Detail screen is used to determine how a specific user is experiencing or causing locking problems.

```

BMC Software ----- LOCK CONT USER DETAIL -----PERFORMANCE MGMT
SERV ==> LOCKE          INPUT   09:47:19  INTVL=> 3  LOG=> N  TGT==> DB2A
PARM ==> CIR4X          ROW     1 OF     8  SCROLL=> CSR
EXPAND: MON(LOCK), DUSER, DREGN
ID:CIR4X          CONNECT:TSO   ~
PLAN:DSNESP RR    CORRELATION:CIR4X
- - - - OBJECT - - - - - LOCK - HOLD/WAIT
DATABASE TSPACE PAGE/PART  TYPE STAT  COUNT  HOLDERS/WAITERS
-----
------(WAITING)-----
DSN8D13A DSN8S13E      01  DSET EXCL      1  AMR1  -T
------(HOLDING)-----
------(WAITERS)-----
$$PLAN  DSNESP RR      SKCT SHRD      0
DSNDB06          DBTS SHRD      0
DSNDB06  SYSDBASE      PSET IEXC      0
DSNDB06  DSNCTX01 00000A  IPAG SHRD      0
DSNDB06  SYSDBASE 000034  DPAG SHRD      0
DSNDB06  DSNDSX01 000005  IPAG SHRD      0
DSN8D13A          DBTS SHRD      0
    
```

Figure 26. DB2 User Lock Detail Screen

Select Code:

LOCKE

Parameter:

One of the following parameters can be specified to identify the user to be displayed on the User Lock Detail screen:

- Correlation ID
- User ID, which can be

Value	Connect Type
jobname (TSO logon ID)	TSO and batch
DB2 authorization ID	IMS and CICS

Description:

This display is used to determine how this user is experiencing or causing locking problems. It lists the objects with locks for this user and shows the IDs of users waiting for or holding a lock on an object. Positioning the cursor on the line of the user ID within the User Lock Summary screen (Figure 26 on page 67) and pressing the ENTER key produces this same display.

The HOLDERS/WAITERS area of the screen is presented in two parts: a WAITING section and a HOLDING section. The WAITING section is shown first if the user is waiting to obtain any locks. The HOLDING section shows the locks that this user is currently holding.

The HOLDING section objects are sorted and displayed by the highest wait count first, and then by database name, followed by table space name, and finally by page or part number. Thus, objects with users waiting for a lock held by this user are displayed before those with no users waiting. If the list does not fit on one screen, it can be scrolled.

Note: The WAITING section of the HOLDERS/WAITERS area shows HOLD count and HOLDERS data. The HOLDING section shows WAIT count and WAITERS data.

Service Message:

A message in the parameter field of the service shows the sequence number of the first lock displayed and the total number of locks that can be displayed in a scrollable list. For example:

```
ROW 1 OF 12
```

Expand:

The LOCKE display can be EXPANDED to the following displays:

MON(LOCK)

Active Timer Requests display of all active monitors in the resource or user lock (LOCK) area

DUSER

Detail User Status display

DREGN

MAINVIEW for IMS Detail Region display for the region related to this DB2 thread, if MAINVIEW for IMS is installed (for IMS threads only)

Note: If MAINVIEW for IMS is not accessible, this EXPAND button is not highlighted and cannot be selected.

CMRTASK

MAINVIEW for CICS DB2TASK display, which lists all current CICS/DB2 tasks, if MAINVIEW for CICS is installed (for CICS threads only)

Note: If MAINVIEW for CICS is not accessible, this EXPAND button is not highlighted and cannot be selected.

CLAIM—Claims and Drains for Table Space Partitions

The CLAIM displays provide summary and detail status of claims and drains on objects within a selected table space.

```

BMC Software ----- CLAIM/DRAIN BY TS ----- RX AVAILABLE
SERV ==> CLAIM          INPUT  17:30:03  INTVL=> 5  LOG=> N  TGT==> DB2D
PARM ==> DBTS=(DSNDB06,ACT)          ROW    1 OF    4  SCROLL=> CSR
EXPAND:  MON(LOCK), LOCKD, LOCKU, LINESEL(DETAIL)

-----OBJECT-----          ----CLAIM----  ----DRAIN----
DBNAME  TSPACE  PART TYPE STATUS          CS  RR WRITE  CS  RR WRITE WAIT
-----
DSNDB06  ACT          TS  RW          1          1
***** END OF DATA *****

```

Figure 27. Claim/Drain for Table Space Panel

Select Code:

CLAIM

Parameter:

The following parameter (with both operands) is required for this service. If the parameter is invalid, an error message is returned.

DBTS=(dbname,tsname)

Selects all partitions or data sets of the table space, where dbname and tsname are the names of the database and table space.

Description:

The purpose of this display is to show the status of all partitions within a table space to simplify utility scheduling with the partition independence feature of DB2.

This display is usually accessed with line selection from DBTS, since both dbname and tsname are required as parameters for CLAIM.

The summary display lists all partitions for the selected table space, showing the current number of claims and drains by class and the number of waiters for a drain lock (highlighted if not zero).

The database and table space presentation is sorted by DBNAME, TSNAME, and PART.

This list is scrollable.

Service Message:

A message in the parameter field of the service shows the sequence number of the first object displayed and the total number of objects that can be displayed in the scrollable list; for example:

ROW 1 OF 25

Expand:

The CLAIM display can be EXPANDED to the following displays:

MON(LOCK)

Active Timer Requests display of all active monitors in the resource or user lock (LOCK) area

LOCKD

Lock Contention by DB/TS

CLAIM

LOCKU

Lock Contention by User

LINESEL(DETAIL)

A detailed display of information about a specific object (table space partition or data set) can be selected from this list by positioning the cursor on the line for that object and pressing ENTER.

Claim/Drain Detail for a Partition

The display shown in [Figure 28](#) can be viewed by using the Tab key to move to a line in the CLAIM display and pressing ENTER. This detail display shows each thread needing access to that partition. Drain waiters are shown first (since they are being delayed by contention), followed by drain lock holders and then claim holders. Within this prioritization, the threads are sorted by CORRID.

```
BMC Software ----- CLAIM/DRAIN BY TS ----- RX AVAILABLE
SERV ==> CLAIM          INPUT  17:30:03  INTVL=> 5  LOG=> N  TGT==> DB2D
PARM ==> DBTS=(DSNDB06,ACT),DETAIL      ROW    1 OF    4  SCROLL=> CSR
EXPAND:  MON(LOCK), LOCKD, LOCKU, LINESEL(DUSER)

DBNAME: DSNDB06. TSNAME: ACT..... PART: .... TYPE: TS
STATUS: RW.....

-----DRAIN----- ---CLAIM-----
CORRID      CONNID      STATUS MODE CLASS SCOPE      CLASS SCOPE
-----
CIR10UTIL   UTILITY   HOLD  IX  WRITE DEALLOC
CIR10       DB2CALL                                     CS  COMMIT
***** END OF DATA *****
```

Figure 28. CLAIM - Claim/Drain Detail Panel

LKOUT—Lockout History

The Lockout History display provides an online history of timeouts (IFCID 196) and deadlocks (IFCID 172).

Note: This display is functionally stabilized; however, it will be removed from the product in future releases. This display is no longer documented in this book; however, extensive help panels are available online.

The same information is displayed in the windows-mode views for lockouts. These views also provide improved analysis capabilities, such as summaries of lock contention by resource or plan. Refer to the lockout views or to the lock contention tuning wizard.

You can use the TRANSFER function at the top of this display to access the Lockout Events (LKEVENT) view or the Locks Easy Menu (EZDLOCK).

It is recommended that you use these updated windows-mode views to analyze timeouts and deadlocks.

See Volume 1 of the *MAINVIEW for DB2 User Guide* for information about these views.

EDM Pool Display

This section describes the analyzer service that provides status and activity information about the EDM pool for a targeted DB2 system.

Note: This service does not support the new counts for DB2 6.1 or later. These new counts are supported in the windows-mode views, STEDMP and STEDMPD. See Volume 1 of the *MAINVIEW for DB2 User Guide* for information about these views.

EDMPL—DB2 Environmental Descriptor Manager (EDM) Pool Status

The EDM Pool Status panel displays the status and activity of the Environmental Descriptor Manager pool.

Note: NA is displayed for any fields not available in the installed target DB2 system.

```

BMC Software ----- EDM POOL STATUS ----- PERFORMANCE MGMT
SERV ==> EDMPL          INPUT  11:13:04  INTVL=> 3  LOG=> N  TGT==> DB2D
PARM ==>                                     LINE  1 OF  15  SCROLL=> CSR
TRANSFER: STEDMPD (EDM Pool Status)
EXPAND:  MON(EDM), EDMPL(FREE), EDMPL(DBD)

```

	# PAGES	% PAGES	REQUESTS	LOADS	% FOUND IN POOL
FREE PAGES	3,913	99.4			
SKCT'S	1	0.0			
SKPKG'S	1	0.0			
CT'S	0	0.0	1	1	0.0
DBD'S	22	0.6	19	2	89.5
PKG'S	0	0.0	1	1	0.0
TOTAL	3,937		21	4	81.0
SQL CACHE	0		0	0	0.0
DSPACE-TOTAL	0				
DSPACE-FREE	0	0.0			
*** FAILURES -DATA SPACE FULL ***		0			
*** FAILURES DUE TO POOL FULL ***		0			
***** END OF DATA *****					

Figure 29. EDM Pool Status Panel

Select Code:

EDMPL

Parameter:

One of the following parameters can be specified for this service. If no parameter is entered, the current values from DB2 subsystem startup are displayed.

DELTA Displays the current values for this statistics interval. The statistics interval is a cumulative count within a predefined time interval (the default is 30 minutes). DELTA is the difference between the value sampled at the start of the current statistics interval and the value sampled by the current analyzer request.

RATE Displays the values for this statistics interval, calculated in a per minute rate. The rate is DELTA divided by the number of elapsed minutes.

- FREE Displays the EDMPL Free Storage panel (see “Free Storage” on page 74).
- DBD Displays the EDMPL Database Descriptors panel (see “Database Descriptors” on page 75).

Notes:

- The DELTA and RATE parameters for this service affect only the REQUESTS and LOADS and % FOUND IN POOL statistics presentation.
- Statistics intervals are MVDB2, not DB2, statistics intervals. The interval time is predefined in minutes with the DB2STATS parameter in the BBIISP00 member of the BBPARM data set.

Description:

Displays the status and activity of the Environmental Descriptor Manager (EDM) pool. This display shows when critical thresholds defined for resource usage are exceeded, which might impact users by degrading performance. This information can be used to determine whether installation parameters need to be adjusted to expedite DB2 throughput.

Service Message:

When either the DELTA or the RATE parameter is used for this service, the following message is displayed in line 3:

INTERVAL (MIN) n1/n2

where

n1 Is the number of elapsed minutes.

n2 Is the length of the interval.

This message indicates the time elapsed within the current statistics interval. If interval times include fractions of a minute, these fractions are truncated on the display.

Transfer:

You can TRANSFER from this display to the following related windows-mode view for more complete information. BMC Software recommends that you use the windows-mode views to do your analysis.

STEDMPD EDM Pool Status view

Expand:

The EDMPL display can be EXPANDED to the following displays:

MON(EDM)

Active Timer Requests display of all active monitors in the Environmental Descriptor Manager pool (EDM) area

EDMPL(FREE)

EDMPL Free Storage display panel

EDMPL(DBD)

EDMPL Database Descriptors display panel

Note: You can access the Free Storage and Database Descriptors displays with either of these methods:

- With the Tab key, move to the EXPAND button and press ENTER
- With the Tab key, move to either the FREE PAGE or the DBD'S line in the EDMPL display and press ENTER

Free Storage

The display shown in [Figure 30](#) can be viewed by moving with the Tab key to the FREE PAGES line in the EDMPL display and pressing ENTER or by selecting the FREE expand button.

```

BMC Software ----- EDM POOL STATUS ----- RX AVAILABLE
SERV ==> EDMPL          INPUT   10:00:03 INTVL=> 3 LOG=> N TGT==> DB2E
PARM ==> FREE           LINE    1 OF 15 SCROLL=> CSR

                EDM FREE STORAGE

TOTAL EDM FREE PAGES           = 1,999
PERCENT OF PAGES FREE IN EDM   = 95.6
TOTAL EDM FREE ENTRIES         = 10
LARGEST CONTIGUOUS FREE ENTRIES = 80,      18,      7,      6,      3

LARGEST CT/PT: DSN8IC0         = 20480 --CT

***** END OF DATA *****

```

Figure 30. EDMPL Free Storage Panel

Database Descriptors

The display shown in [Figure 31](#) can be viewed by moving with the Tab key to the DBD'S line in the EDMPL display and pressing ENTER or by selecting the DBD expand button.

```

BMC Software ----- EDM POOL STATUS ----- RX AVAILABLE
SERV ==> EDMPL          INPUT  10:00:03  INTVL=> 3  LOG=> N  TGT==> DB2E
PARM ==> DBD,SORT=DN                                LINE   1 OF  14  SCROLL=> CSR
EXPAND:  LINESEL (DBTS)

          DATABASE DESCRIPTORS
          DBD NAME      DBD SIZE
          -----
          DSNDB01        8866
          DSNDB02        1866
          DSNDB03        2866
          DSNDB04        4866
          DSNDDF         4028
          DWTAZSD        8866
          DZTEST         28188
          MWDMRDB1       32294
          MWRXDDB1       32294
          NHJTEST        24218
          NHJ1DB2        8200
          PRDBTEST       10184
          PRDB1          12184  (I)
          TEST12         17142
          ***** END OF DATA *****

```

Figure 31. EDMPL Database Descriptors Panel

EDMPL DBD Sort

The EDMPL DBD display can be sorted by any column.

To request a sort of the display, enter the following in the command PARM field:

,SORT=value

where value can be

DN DBD Name - alphabetic sort (default)
DS DBD Size - numeric descending sort

EDMPL DBD Expand

From the EDMPL DBD display, you can expand to the following display:

LINESEL(DBTS)

A detailed display of information about a specific database (DBTS with a parameter of S database) can be selected from this list by positioning the cursor on the line for that database and pressing ENTER.

Buffer Pool Displays

This section describes the analyzer services that provide status and activity information about the buffer pools and RID pool for a targeted DB2 system.

BFRPL—DB2 Buffer Pool Status

The Buffer Pool Status display shows the status and utilization of DB2 buffer pools.

Note: This service supports the new 8K and 16K buffer pools; however, it does not support the new counts for DB2 6.1 and will be removed from the product in future releases. This service is no longer documented in this book; however, extensive help panels are available online.

These new counts are supported in the windows-mode views for local buffer pools and global buffer pools, which can be accessed from the DB2 Buffer Pool Easy Menu (EZDBFRPL). You can also use the TRANSFER function at the top of this display to access the Buffer Pools (BFRPL) and Buffer Pool Hit Ratios (BFRPLH) views.

BMC Software recommends that you use these updated windows-mode views to analyze the status and utilization of DB2 buffer pools.

See Volume 1 of the *MAINVIEW for DB2 User Guide* for information about these views.

DBIOx—I/O (Real-Time)

The I/O Analysis (Real-Time) panels display information about I/O activity and buffer pool cache statistics that is collected by DB2 per data set. There are two types of displays: one showing I/O activity and one showing buffer pool cache statistics. For each, there are four displays from this data, where the only difference is in the degree of granularity:

- DBIOR—I/O ANALYSIS—DB/TS
- DBIOB—I/O ANALYSIS—BPOOL
- DBIOV—I/O ANALYSIS—VOLUME
- DBIOD—I/O ANALYSIS—DATASET

Note: These displays are functionally stabilized; however, they will be removed from the product in future releases. These displays are no longer documented in this book; however, extensive help panels are available online.

The same information is displayed in the windows-mode views for page sets, which can be accessed from the Page Set Easy Menu (EZDPS). These views also provide improved analysis capabilities, such as SSI views of DB2 I/Os to shared volumes (or data sets in a data sharing environment).

It is recommended that you use these updated windows-mode views to analyze I/O activity.

See Volume 1 of the *MAINVIEW for DB2 User Guide* for information about these views.

RIDPL—RID Pool Status

The Record ID (RID) Pool Status panel shows the RID pool usage and failure statistics.

```

BMC Software ----- RID POOL STATUS ----- PERFORMANCE MGMT
SERV ==> RIDPL          INPUT  11:44:25  INTVL=> 3  LOG=> N  TGT==> DB2D
PARM ==>                                     ROW 1 OF 10  SCROLL=> CSR
TRANSFER: STRIDD (RID Pool Views)
EXPAND:  MON(BUFR), BFRPL

          TOTAL BLOCKS:    420                BLOCKS AVAILABLE:    400
          MAXIMUM USED:    20                 BLOCKS IN USE:       20 (5%)

- - - - - FAILURES - - - - -
          EXCEEDED RDS LIMIT:    0             INSUFFICIENT POOL SIZE:    0
          EXCEEDED DM  LIMIT:    0             TOO MANY CONCURRENT:      0

***** END OF DATA *****

```

Figure 32. Record ID Pool Status Panel

Select Code:

RIDPL

Parameter:

One of the following parameters can be specified for this service. These parameters apply only to the failure statistics. If no parameter is entered, the current values from DB2 subsystem startup are displayed.

DELTA Displays the current values for this statistics interval. The statistics interval is a cumulative count within a predefined interval. The default is 30 minutes.

DELTA is the difference between the value sampled at the start of the current statistics interval and the value sampled by the current analyzer request.

RATE Displays the values for this statistics interval, calculated at a per minute rate. The rate is DELTA divided by the number of elapsed minutes.

Description:

The Record ID (RID) Pool Status panel shows the RID pool usage and failure statistics.

Service Message:

When either the DELTA or RATE parameter is used for this service, the following message is displayed in line 3:

INTERVAL (MIN) n1/n2

where

n1 Is the number of elapsed minutes.

n2 Is the length of the interval.

This message indicates the time elapsed within the current statistics interval. If interval times include fractions of a minute, these fractions are truncated on the display.

A message in the parameter field of the panel shows the sequence number of the first row of information displayed and the total number of rows that can be displayed in this scrollable service. For example:

ROW 1 OF 10

Transfer:

You can TRANSFER from this display to the following related windows-mode view for more complete information. BMC Software recommends that you use the windows-mode views to do your analysis.

STRIDD RID Pool view

Expand:

The RIDPL display can be expanded to the following displays:

BFRPL

Buffer Pool Status display

MON(BUFR)

Active Timer Request display of all active monitors in the DB2 buffer pool (BUFR) area

Log Display

This section describes the analyzer service that provides status and activity information about the logs for a targeted DB2 system.

DLOGS—DB2 Log Status

The DB2 Log Status panel shows log status, configuration, and activity.

```

BMC Software ----- DB2 LOG STATUS ----- PERFORMANCE MGMT
SERV ==> DLOGS          INPUT 20:30:02 INTVL=> 3 LOG=> N TGT=> DB2A
PARM ==>                                ROW 1 OF 20 SCROLL=> CSR
TRANSFER: STLOGD (Log Statistics)
EXPAND: MON(LOG)
----- LOG DATA SET CONFIGURATION -----
TYPE    CURRENT MODE  DEVICE VOLUME  UNIT  DEFINED  AVAILABLE  % USED
ACTIVE-1 DS03  SNGL  3350  IMF010  472    3          2         7%

ARCHIVE-1 A00045 SNGL  SYSDA  BLKSIZE: 8,192  CI'S ARCHIVED: 600

----- BSDS DATA SET CONFIGURATION ----- CHECKPOINTS -----
TYPE    MODE  DEVICE VOLUME  UNIT  ACCESSES  FREQUENCY  5,000
BSDS-1  DUAL  3350  IMF010  472    184      NEXT CKPT: 4,335
BSDS-2  DUAL  3350  IMF010  472      RBA: 0000048F8AFC

----- BUFFERS -----
BUFFER SIZE(K)  400  CI'S CREATED  922  WRITE REQ-FORCE  144
# BUFFERS      100  WRITES      12,786  WRITE REQ-NOWAIT 12,642
WRITE THRESHOLD  20  THRESHOLD %-BFRS  20  WRITE REQ-WAIT  0
INPUT BUFFER(K)  28  WAITS UNAVAIL.BFRS  0  %
FORCE REQS      1%

----- RETRIEVAL EFFICIENCY -----
CURRENT/MAX ALLOC  0/ 3  FROM ARCHIVE  0  FROM ACTIVE  203
DELAYED FOR ALLOC  0  READ ALLOCS  0  FROM BUFFERS  0
DELAYED FOR VOLUME  0  LOOK-AHEAD  0
LK-AHD FAIL  0

```

Figure 33. DB2 Log Status Panel

Select Code:

DLOGS

Parameter:

One of the following parameters can be specified for this service. If no parameter is entered, the current values from DB2 subsystem startup are displayed.

DELTA Displays the current values for this statistics interval. The statistics interval is a cumulative count within a predefined time interval (the default is 30 minutes). DELTA is the difference between the value sampled at the start of the current statistics interval and the value sampled by the current analyzer request.

RATE Displays the values for this statistics interval, calculated in a per minute rate. The rate is DELTA divided by the number of elapsed minutes.

Note: Statistics intervals are MVDB2, not DB2, statistics intervals. The interval time is predefined in minutes with the DB2STATS parameter in the BBIISP00 member of the BBPARM data set.

Description:

This display shows log status, configuration and activity. It is scrollable.

Service Messages:

When either the DELTA or the RATE parameter is used for this service, the following message is displayed in line 3:

INTERVAL (MIN) n1/n2

where

n1 Is the number of elapsed minutes.

n2 Is the length of the interval.

This message indicates the time elapsed within the current statistics interval. If interval times include fractions of a minute, these fractions are truncated on the display.

A message in the parameter field of the panel shows the sequence number of the first row of information displayed and the total number of rows that can be displayed in this scrollable service.

For example:

ROW 1 OF 20

Transfer:

You can TRANSFER from this display to the following related windows-mode view for more complete information. BMC Software recommends that you use the windows-mode views to do your analysis.

STLOGD Log Statistics view

Expand:

The DLOGS display can be EXPANDED to the following display:

MON(LOG) Active Timer Requests display of all active monitors in the DB2 log (LOG) area

DDF Displays

This section describes the analyzer services that provide distributed processing statistics for a targeted DB2 system.

- DDFSMS provides summary statistics about data flow between remote locations.
- DDFDFT displays additional statistics for a specific location.
- DDFVFT and DDFCV display VTAM-related information.

DDFSM—DDF Statistics Summary

The DDF Statistics Summary panel displays a row of statistics for each remote location for which the target DB2 has statistics.

```

BMC Software ----- DDF STATISTICS SUMMARY ----- RX AVAILABLE
SERV ==> DDFSMS          INPUT  07:00:22  INTVL=> 5  LOG=> N  TGT==> DB2F
PARM ==>                ROW      1 OF      1  SCROLL=> CSR
EXPAND: DDFVFT, USERS, DDFCV, LINESEL (DDFDFT)
LOCATION:  DB2F                DDF ADDRESS SPACE CPU:      0.0%
LUNAME:   LUDB2F             DATABASE ACCESS THREADS:    0/10
DDF STATUS: STARTED          DIST ALLIED THREADS:        1
DBAT Q:    0                  CONVERSATIONS DEALLOC:      0

TYPE 1  CURRENT INACTIVE:    0      CONNECTIONS COLD STARTS:    0
        MAXIMUM INACTIVE:    0      WARM STARTS:                0
                                           RESYNC ATTEMPTS:            0
                                           RESYNC SUCCESSES:          0

REMOTE LOCATION  LUNAME      TRANSACTION  CONVERSATION  BYTES      CONV
                LUNAME      TO FROM      TO FROM      SENT REC     Q'D
-----
DB1F             LUDB1F        2    0          2    0      2690 3316  0
***** END OF DATA *****

```

Figure 34. DDF Statistics Summary Panel

Select Code:

DDFSM

Parameter:

One of the following parameters can be specified for this service. If no parameter is entered, the current values from DB2 subsystem startup are displayed.

DELTA Displays the current values for this statistics interval. The statistics interval is a cumulative count within a predefined time interval (the default is 30 minutes). DELTA is the difference between the value sampled at the start of the current statistics interval and the value sampled by the current analyzer request.

RATE Displays the values for this statistics interval, calculated in a per minute rate. The rate is DELTA divided by the number of elapsed minutes.

Note: Statistics intervals are MVDB2, not DB2, statistics intervals. The interval time is predefined in minutes with the DB2STATS parameter in the BBIISP00 member of the BBPARM data set.

Description:

Displays a row of statistics for each remote location for which the target DB2 has statistics.

Expand:

The DDFSMD display can be EXPANDED to the following displays:

DDFVMT

DDF VTAM Status display

USERS

User Summary display with the DDF parameter

DDFCV

DDF Conversations display

LINESEL(DDFDT)

Detailed display of information about a specific remote location (DDFDT) can be selected from this location list by positioning the cursor on the line for that location and pressing ENTER

DDFDT—DDF Statistics Detail

This service displays statistics about a specific remote location.

```

BMC SOFTWARE ----- DDF STATISTICS DETAIL ----- RX AVAILABLE
SERV ==> DDFDT          INPUT 15:58:40 INTVL=> 3 LOG=> N TGT==> DB2K
PARM ==> DRDA REMOTE LOCS          ROW 1 OF 19 SCROLL=> CSR
EXPAND: DDFVT, DDFCV

          LUNAME      LOCATION          CONV Q      DBAT Q
          -----
REMOTE..  DRDA REMOTE LOCS          N/A          N/A
LOCAL... LUB2K          DB2K          0            0

          FROM      TO          FROM      TO
          REMOTE    REMOTE          REMOTE    REMOTE
SQL STATEMENTS..... 94      0      2PH PREPARE..... 0      0
ROWS..... 0      749      2PH LAST AGENT.. 0      0
BYTES..... 18,844 181,843 2PH COMMITS..... 0      0
MESSAGES..... 115 119      2PH BACKOUTS... 0      0
TRANSACTIONS..... 15 0      2PH FORGET RSP.. 0      0
CONVERSATIONS..... 13 0      2PH REQ COMMIT.. 0      0
COMMITTS..... 15 0      2PH BACKOUT RSP. 0      0
ABORTS..... 4 0
BLOCK FETCH ROWS... 830 830
BLOCK FETCH BLOCKS.. 0 41
***** END OF DATA *****
    
```

Figure 35. DDF Statistics Detail Panel

Select Code:

DDFDT

Parameter:

Required parameter:

location name Specifies the name of the remote site. If this service is selected from the DDFSM service, this value is primed.

Optional parameters:

One of the following parameters can be specified for this service. It must be separated from the location name with a comma. If neither of these parameters is entered, the current values accumulated since DB2 subsystem startup are displayed.

,DELTA Displays the current values for this statistics interval. The statistics interval is a cumulative count within a predefined time interval (the default is 30 minutes). DELTA is the difference between the value sampled at the start of the current statistics interval and the value sampled by the current analyzer request.

,RATE Displays the values for this statistics interval, calculated in a per minute rate. The rate is DELTA divided by the number of elapsed minutes.

Note: Statistics intervals are MVDB2, not DB2, statistics intervals. The interval time is predefined in minutes with the DB2STATS parameter in the BBIISP00 member of the BBPARM data set.

Description:

Displays statistics for the specified remote location.

Expand:

The DDFDT display can be EXPANDED to the following displays:

DDFVT

DDF VTAM Status display

DDFCV

DDF Conversations display

DDFVT—DDF VTAM Status

The DDF VTAM Status panel displays a row of VTAM data for each logmode for an LU.

BMC Software -----		DDF VTAM STATUS		-----PERFORMANCE MGMT					
SERV ==>	DDFVT	INPUT	18:08:47	INTVL=>	3	LOG=>	N	TGT==>	DB2D
PARM ==>				ROW	1	OF	1	SCROLL=>	CSR
EXPAND:	DDFSM, LINESEL(DDFCV)								
LOCATION:	SEATTLE	VTAM LEVEL:	0340						
LOCAL NETWORK:	USB00L01	CONVERSATIONS:	10						
LU NAME:	SEDB2A								
LUNAME	LOGMODE	SYSTEM LOGMODE	REMOTE LOCATION	CONV LIM	CNOS SESS	CONVS	DISTR THRDS	DBASE THRDS	CONV Q'D
NYDB2A	IBMDB2LM	IBMDB2LM	NEW_YORK	10	10	2	0	1	0
NYDB2A	DB2LMNY	IBMDB2LM	NEW_YORK	10	10	2	0	1	0
CHDB2A	DB2LMCH	IBMDB2LM	CHICAGO	10	10	2	0	1	0
NODB2A	IBMDB2LM	IBMDB2LM	NEW_ORLEANS	10	10	2	0	1	0
NODB2A	DB2LMNO	IBMDB2LM	NEW_ORLEANS	10	10	2	0	1	0
***** END OF DATA *****									

Figure 36. DDF VTAM Status Panel

Select Code:

DDFVT

Parameter:

One of the following parameters can be specified for this service. If no parameter is entered, the current values from DB2 subsystem startup are displayed.

DELTA Displays the current values for this statistics interval. The statistics interval is a cumulative count within a predefined time interval (the default is 30 minutes). DELTA is the difference between the value sampled at the start of the current statistics interval and the value sampled by the current analyzer request.

RATE Displays the values for this statistics interval, calculated in a per minute rate. The rate is DELTA divided by the number of elapsed minutes.

Note: Statistics intervals are MVDB2, not DB2, statistics intervals. The interval time is predefined in minutes with the DB2STATS parameter in the BBIISP00 member of the BBPARM data set.

Description:

Displays rows of VTAM data for each remote location and logmode combination for which the target DB2 has statistics.

Expand:

The DDFVT display can be EXPANDED to the following displays:

DDFSM

DDF Statistics Summary display.

LINESEL(DDFCV)

Detailed display of information about DDF conversations for a remote location (DDFCV) can be selected from this location list by positioning the cursor on the line for that location and pressing ENTER.

DDFCV—DDF Conversations

The DDF Conversations panel displays a row of information for each active conversation.

```

BMC Software ----- DDF CONVERSATIONS -----PERFORMANCE MGMT
SERV ==> DDFCV          INPUT  18:09:09  INTVL=> 3  LOG=> N  TGT==> DB2D
PARM ==>                                     ROW   1 OF   4  SCROLL=> CSR
EXPAND: DDFVT, USERS
LOCATION: SEATTLE

LUNAME  LOGMODE  SESSION ID      LAST REQ  STATE  PLAN NAME AUTHID  TYPE
-----
NYDB2A  DB2LMNY  009F01ADF20A0E38  17:49:11.8  RECEIVE  RXDB2    CIR7    DBAT
NYDB2A  DB2LMNY  009F01ADF20A0E37  17:49:10.2  RECEIVE  RXDB2    CIR7    DBAT
NYDB2A  IBMDB2LM F09F01ADF20A0E35                SEND                SYS-S
NYDB2A  IBMDB2LM 009F01ADF20A0E36                SEND                SYS-P
***** END OF DATA *****

```

Figure 37. DDF Conversations Panel

Select Code:

DDFCV

Parameter:

The following parameter can be specified for this service:

luname Specifies that only conversations for a specific LUNAME are displayed. This value is primed if the service is entered from a line select option in the DDFVT service.

Description:

Displays a row of statistics for each active conversation.

Expand:

The DDFCV display can be EXPANDED to the following displays:

DDFVT

DDF VTAM Status display.

USERS

User Summary display with the DDF parameter.

Chapter 3. Monitors and Exception Detection

This chapter describes the facilities available to define exception conditions to produce warning messages about the status of DB2 resources or workloads.

Introduction

The following facilities in MVDB2 allow you to define exceptions and control the warning messages that they produce. Each has its own particular strength and focus.

- Background exception sampler monitors detect transient exception conditions such as active threads using excessive resources or special resource constraints in logging or any buffer pool. These exception detection samplers can be activated in BBPARM member DMRBEX00. The member can be changed and reset to use the new specifications if needed (see *Using MAINVIEW* for a description of the control command RESET).
- Timer-driven monitor services each measure a key DB2 system resource or workload variable over time, comparing it to a defined threshold. Since each monitor is of limited scope, the overhead to run a set of these monitors is very low. A short-term history of the measurements is kept for each monitor request. A basic set of monitors with default thresholds is predefined in the BBPARM member BLKDMRW and can be activated automatically. Online views show the status of all active monitors, including the graphic history, and input panels support modifications and additions.
- MVDB2 shares the common MAINVIEW component, MV ALARM Manager, which allows online user definition of exception conditions based on one or more data elements in any windows-mode view. Since these alarms each invoke a view to gather data, they can use more resources than the simpler monitors described above. They should be used for specially tailored exceptions, with filter conditions on the view to avoid unnecessary data collection.

All exception facilities basically test whether a defined condition exists or a user-specified threshold has been exceeded. When either of these conditions occur, a warning message is issued, perhaps refreshed multiple times, and an all-clear message is issued when the condition is relieved. A message can be sent to a display, to the system console (WTO), or both. The first two monitor types can also send messages to a TSO ID, to a chronological log of product messages (Journal), and to a MVDB2 Exception display, DB2EX. MV ALARM messages are posted to the common MAINVIEW Alerts views.

If MAINVIEW AutoOPERATOR is present, full destination control and automated actions are also available. All exception conditions, from MVDB2 and other MAINVIEW products, can be consolidated by MAINVIEW AutoOPERATOR in the Alerts views by queue name.

When MAINVIEW AutoOPERATOR is not available, it is recommended that the new operand ALERTQ be specified in BBIISP00 per DB2 target to also direct the two types of monitor exception messages to the Alert views (see the *MAINVIEW for DB2 Customization Guide*). This action enables the consolidation of all MVDB2 exceptions in one place. If possible, choose an alert queue name that can be used consistently both for MVDB2 monitors and alarms, such as “DB2” or “MVDB2”. The consolidated Alert views enable you to focus on just the DB2 messages when needed.

Background Exception Sampler Monitors

Background sampling is used to detect exception conditions in critical DB2 system resources (such as the logs or buffer pools) and also to detect thread exceptions during execution (runaway queries) that could be serious enough to impact DB2 performance.

Exception Handling

An exception sampler automatically scans the system on a fixed interval to detect whether one or more of the exception conditions listed in this section exists. If so, it is compared to the conditions found during the previous scan and updated when necessary. If an exception is new, it is time-stamped and added to the list displayed with the DB2EX service. The same message, with the target DB2 subsystem name appended in front, is written to the Journal log. If an AutoOPERATOR product is installed in the same BBI-SS PAS, the message can invoke an automation EXEC. The purpose of the message number is to allow AutoOPERATOR, if installed, to detect this message, to possibly undertake some corrective action, and add or remove an AutoOPERATOR exception condition to the AO system.

If the exception previously existed, no action is taken.

When a condition that previously existed is no longer detected, it is removed from the DB2EX display list, and a condition-cleared message is sent to the Journal log. The text begins with EXCEPTION CLEARED: followed by the original message text. For example, when a DZ1090S FINAL ACTIVE LOG DATASET 75% FULL condition no longer exists, a DZ1091I message is issued as

```
DZ1091I  EXCEPTION CLEARED:  FINAL ACTIVE LOG DATASET 75% FULL
```

List of Exceptions

Predefined exception conditions cause entries to be placed on the exceptions screen. These entries show the severity level of the exception as

I	Information Only
W	Warning
S	Severe
M	Resource or Workload Monitor-detected exceptions

To change the parameter definitions for these exceptions, see “Customizing Background Processing” in the *MAINVIEW for DB2 Customization Guide*.

Note: Messages with buffer pool identifiers, shown as BP(n), can show the following values:

- 0—49 for 4K pools
- K0—K9 for 8K and 16K pools
- K—K9 for 32K pools

Information Only Exceptions

- **DZ0010I - (n) DB(s)/TS(s) STOPPED**
There are (n) number of databases and objects in the databases that are stopped.
Note: Not currently available for DB2 4.1 and 5.1.
- **DZ0020I - USER (user) LOCK ESCALATED**
The NUMLKTS installation parameter was exceeded by this user, which caused lock escalation.
- **DZ0030I - LOG ARCHIVE JOB WAITING**
The job that archives the active log is waiting to execute.
- **DZ0040I - BP(n) DEFERRED WRITE DISABLED**
The deferred write threshold (50 percent of buffer utilization) was reached, causing asynchronous write activity to be started.

Warning Exceptions

- **DZ0510W - LAST ACTIVE LOG OPENED FOR OUTPUT**
The last available active log data set was opened for output. Archiving might have been delayed.
- **DZ0520W - BP(n) PREFETCH DISABLED**
The sequential prefetch threshold (90% of buffer utilization) was reached, disabling sequential prefetch activity.
- **DZ0530W - (n) DB(s)/TS(s) RESTRICTED**
There are (n) number of databases and objects in the databases that have restricted usage defined in DB2.
Note: Not currently available for DB2 4.1 and 5.1.
- **DZ0540W - ARCHIVE LOG READS OCCURRING**
Read activity is taking place from the archive log for a backout or recovery. Consider increasing the active log size.
- **DZ0550W - MAX TSO USERS CONNECTED**
All available, defined TSO connections are in use.
- **DZ0560W - MAX BATCH USERS CONNECTED**
All available, defined batch connections are in use.
- **DZ0570W - MAX DATASETS OPEN**
The maximum number of data sets is now open.

- DZ0610W - dddd RUNAWAY IMS MPP

```
CPU% =nnn|GETPAGES=ggggg|GP-RATE=rrrrr|CPUTOT=cccc |
ELAPSED=eeee |UPDCOM=nnnnn
J=jjjjjjj PST=nnnn TRAN=ttttttt TYPE=tttt CRGN=cccccc
USER xxxxxxxx
TOKEN=nnnnnnnn
```

IMS MPP user xxxxxxxx is using resources that exceed defined thresholds for DB2 subsystem dddd. Message shows specific resource exceeding the threshold (CPU, GETPAGE requests, or update requests without issuing a COMMIT).

- DZ0620W - dddd RUNAWAY CICS TRANSACTION USER xxxxxxxx

```
CPU% =nnn|GETPAGES=ggggg|GP-RATE=rrrrr|CPUTOT=cccc |
ELAPSED=eeee |UPDCOM=nnnnn
J=jjjjjjj TRAN=ttttttt TASK=nnnn
TOKEN=nnnnnnnn
```

CICS user xxxxxxxx is using resources that exceed defined thresholds for DB2 subsystem dddd. Message shows specific resource exceeding the threshold (CPU, GETPAGE requests, or update requests without issuing a COMMIT).

- DZ0630W - dddd RUNAWAY TSO QUERY USER xxxxxxxx

```
CPU% =nnn|GETPAGES=ggggg|GP-RATE=rrrrr|CPUTOT=cccc |
ELAPSED=eeee |UPDCOM=nnnnn
PGM=ppppppp PLAN=lllllll
TOKEN=nnnnnnnn
```

TSO user xxxxxxxx is using resources that exceed defined thresholds for DB2 subsystem dddd. ppppppp is the name of the program and llllll is the DB2 plan this user is executing. Message shows specific resource exceeding the threshold (CPU, GETPAGE requests, or update requests without issuing a COMMIT).

- DZ0640W - dddd RUNAWAY BATCH USER xxxxxxxx

```
CPU% =nnn|GETPAGES=ggggg|GP-RATE=rrrrr|CPUTOT=cccc |
ELAPSED=eeee |UPDCOM=nnnnn
J=jjjjjjj PGM=ppppppp PLAN=lllllll
TOKEN=nnnnnnnn
```

Batch user xxxxxxxx is using resources that exceed defined thresholds for DB2 subsystem dddd. ppppppp is the name of the program and llllll is the DB2 plan this user is executing. Message shows specific resource exceeding the threshold (CPU, GETPAGE requests, or update requests without issuing a COMMIT).

- DZ0650W - dddd RUNAWAY CAF USER xxxxxxxx

```
CPU% =nnn|GETPAGES=ggggg|GP-RATE=rrrrr|CPUTOT=cccc |
ELAPSED=eeee |UPDCOM=nnnnn
J=jjjjjjj PGM=ppppppp PLAN=lllllll
TOKEN=nnnnnnnn
```

CAF user xxxxxxxx is using resources that exceed defined thresholds for DB2 subsystem dddd. ppppppp is the name of the program and llllll is the DB2 plan this user is executing. Message shows specific resource exceeding the threshold (CPU, GETPAGE requests, or update requests without issuing a COMMIT).

- DZ0660W - dddd RUNAWAY UTILITY FUNCTION USER xxxxxxxx

```
CPU% =nnn | GETPAGES=ggggg | GP-RATE=rrrrr | CPUTOT=cccc |
ELAPSED=eeee | UPDCOM=nnnnn
J=jjjjjjjj PGM=pppppppp PLAN=llllllll
TOKEN=nnnnnnnn
```

Utility user xxxxxxxx is using resources that exceed defined thresholds for DB2 subsystem dddd. pppppppp is the name of the program and llllllll is the DB2 plan this user is executing. Message shows specific resource exceeding the threshold (CPU, GETPAGE requests, or update requests without issuing a COMMIT).

- DZ0670W - dddd RUNAWAY DBAT USER xxxxxxxx

```
CPU% =nnn | GETPAGES=ggggg | GP-RATE=rrrrr | CPUTOT=cccc |
ELAPSED=eeee | UPDCOM=nnnnn
J=jjjjjjjj
TOKEN=nnnnnnnn
```

Database access thread user xxxxxxxx is using resources that exceed defined thresholds for DB2 subsystem dddd. Message shows specific resource exceeding the threshold (CPU, GETPAGE requests, or update requests without issuing a COMMIT).

- DZ0680W - dddd RUNAWAY IMS BMP

```
CPU% =nnn | GETPAGES=ggggg | GP-RATE=rrrrr | CPUTOT=cccc |
ELAPSED=eeee | UPDCOM=nnnnn
J=jjjjjjjj PST=nnnn TRAN=tttttttt TYPE=tttt CRGN=cccccccc
USER xxxxxxxx
TOKEN=nnnnnnnn
```

IMS BMP user xxxxxxxx is using resources that exceed defined thresholds for DB2 subsystem dddd. Message shows specific resource exceeding the threshold (CPU, GETPAGE requests, or update requests without issuing a COMMIT).

- DZ0690W - dddd RUNAWAY IMS TBMP

```
CPU% =nnn | GETPAGES=ggggg | GP-RATE=rrrrr | CPUTOT=cccc |
ELAPSED=eeee | UPDCOM=nnnnn
J=jjjjjjjj PST=nnnn TRAN=tttttttt TYPE=tttt CRGN=cccccccc
USER xxxxxxxx
TOKEN=nnnnnnnn
```

IMS transaction BMP (TBMP) user xxxxxxxx is using resources that exceed defined thresholds for DB2 subsystem dddd. Message shows specific resource exceeding the threshold (CPU, GETPAGE requests, or update requests without issuing a COMMIT).

- DZ0700W - dddd RUNAWAY RRSF USER xxxxxxxx

```
CPU% =nnn | GETPAGES=ggggg | GP-RATE=rrrrr | CPUTOT=cccc |
ELAPSED=eeee | UPDCOM=nnnnn
J=jjjjjjjj PGM=pppppppp PLAN=llllllll
TOKEN=nnnnnnnn
```

RRSAF user xxxxxxxx is using resources that exceed defined thresholds for DB2 subsystem dddd. pppppppp is the name of the program and llllllll is the DB2 plan this user is executing. Message shows specific resource exceeding the threshold (CPU, GETPAGE requests, or update requests without issuing a COMMIT).

Severe Exceptions

- **DZ1010S - INDOUBT THREADS**
Indoubt threads exist.
- **DZ1020S - IMS TASK(S) QUEUED FOR THREAD(S)**
IMS transactions are waiting for threads.
- **DZ1030S - CICS TASK(S) QUEUED FOR THREAD(S)**
CICS transactions are waiting for threads.
- **DZ1040S - EDM POOL FULL FAILURES**
EDM pool limit was reached, causing allocation failures.
- **DZ1050S - BP(n) DM CRITICAL THRESHOLD REACHED**
Data Manager critical threshold (95 percent buffer utilization) was reached for buffer pool BP(n). When this error occurs, DB2 considers all active buffer pools to be at this threshold and issues GETPAGE and RELEASEs at the row level instead of page level.
- **DZ1060S - BP(n) IMMEDIATE WRITE THRESHOLD REACHED**
Immediate write threshold (97.5 percent buffer utilization) was reached for buffer pool BP(n). When this error occurs, any update causes an immediate write.
- **DZ1070S - BP(n) BUFFER LOCATE FAILURE, POOL FULL**
Usable buffers could not be located in the virtual buffer pool because the pool is full.
- **DZ1080S - BP(n) EXPANSION FAILURE, VIRTUAL STORAGE SHORTAGE**
ALTER was requested and the buffer pool (BPn) could not expand because of a shortage of virtual storage.
- **DZ1090S - FINAL ACTIVE LOG DATASET 75% FULL**
Last available active log is nearly full and archiving will be required soon.
- **DZ1100S - ACTIVE LOG REDUCED TO SINGLE MODE**
Log data set error made one of the dual logs unusable (if dual logging was in effect). DB2 switched to single mode.
- **DZ1110S - BSDS REDUCED TO SINGLE MODE**
BSDS error made one of the dual BSDSs unusable (if dual BSDSs were in use). DB2 switched to single mode.
- **DZ1130S - OUT OF SPACE IN ACTIVE LOG DATA SETS**
Last available active log is full and archiving is now required.
- **DZ1140S - INDOUBT THREADS NOT AVAIL THIS CYCLE**
IRLM or DB2 data structures or both are temporarily inconsistent because of system activity.

Timer-Driven Resource and Workload Monitors

There are over 200 monitors available to check for common exception conditions. Resource monitors are generally checking DB2 statistics or status indicators, while workload monitors measure accumulated data from completed thread accounting records, perhaps qualified for a particular workload by various DB2 identifiers.

Data Collection

A request for a resource or workload monitor service specifies

- The monitor to be used (service select code and parameter)
Note: This value defines the DB2 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)
- A warning threshold
- Workload selection criteria (workload monitors only)
- Which service functions should be performed

The active service request automatically measures the corresponding system variable (see [“Data Measurements” on page 94](#)) at the time interval specified on the SET request. This data can be accessed online, automatically logged, or refreshed as described in the *Using MAINVIEW* book.

The workload monitors and resource monitors use the same timer and SET facility to activate and control requests. For data collection, they use different facilities:

- Application trace and workload monitors use the IBM Instrumentation Facility Interface (IFI).
- Resource monitors collect data through their own timer-driven services.

Historical Data Storage

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 data is the total accumulated in the time the request has been active. It is updated at each interval when a new measurement is made.

Note: Both the summary periods and the total are shown as averages-per-interval in the graphic display so the plotted detail values can be compared.

- A frequency distribution. This distribution is updated at each interval if range limits are defined with the request. From two to five ranges are allowed. The new measurement value is compared to the defined limits to find the range in which it belongs and the number of occurrences for that range is incremented by one.
- The high-water mark. This value is the maximum value ever measured at any interval and the time that it occurred.

An example of the storage of historical data follows:

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 covering the last 10 minutes, from 10:25 to 10:35
- The current period from 10:20 to 10:30
- The previous period from 10:10 to 10:20
- The total from 10:00 to 10:35

Data Measurements

Four types of automatic service measurements can be taken periodically and shown by the PLOT display request. These are

COUNT

An activity count over time; for example, the number of create thread 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 number of EDM page requests per load I/O 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 EDM page requests per load I/O, both the number of EDM page requests and load I/O are shown.

STATUS

The status level at the moment of measurement; for example, the number of active threads or table space locks

PERCENT

The resource usage at the moment of measurement, expressed as a percentage of the maximum; for example, percent buffer pool utilization

See [“History PLOT Display \(S Line Command for Monitor Request\)” on page 106](#) for a sample PLOT display and a complete description of the display contents.

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
- Active Timer Requests panel (see [“Request Status” on page 11](#))
- Warning message issued when the measurement of the resource exceeds a threshold defined for the monitor

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 in length. This process is described in “Service Table Definition” in the *MAINVIEW for DB2 Customization Guide*. The default titles of all the monitor services are listed in [“Alphabetical Reference of Monitors” on page 118](#).

Warning Conditions

SET request parameters for a resource or workload 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-defined threshold or is less than a minimum-defined 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 time the exception was detected
- 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 exception messages are also posted and cleared from the DB2EX analyzer exception display.

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 this value 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 MAINVIEW for DB2 Primary Option Menu can be used to view the BBI-SS PAS Journal log.
- Send warning messages also to the MVS console through the write-to-operator (WTO) facility or a TSO ID (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 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, repeated warnings only after another 5 minutes, and a limit of 10 warnings (the problem is known and investigated by then).

Note: The messages in the Journal log are usually identified by the target field. However, if you are looking at the whole PAS and using the PAS subsystem ID as the target, the DB2 subsystem ID is in the Origin field and you need to scroll left to see it. If you used the WTO option to send the messages to the MVS console or to a TSO ID, the PAS ID followed by the target specification (TGT=xxxx) is shown at the end of the messages.

Warning Message Format

Each resource or workload monitor service has a unique warning message associated with it. A warning message is issued when the condition established by you 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 for either a resource monitor or a workload monitor. DS indicates resource monitor. DW indicates workload monitor.
nnn	Is the numerical message identifier associated with the requested service.
W	Represents a warning message.
(nn)	Is the number of times the warning message was issued.
hh:mm:ss	Is a time stamp in hours, minutes, and seconds.
title	Is a default or user-defined title for the service (see “Monitor Request Title” on page 95).
(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 text is included in the warning message only when a COUNT data type is measured (see “Data Measurements” on page 94).
srvdata	Is an additional field (12-character maximum) used for identification data issued specifically by the MXLOK monitor service. See online Help for a definition of the data displayed.
(>thrshld)	Is the threshold value specified by the WMAX or WVAL keyword of the SET request for the monitor service. (A less-than sign (<) is used for a minimum threshold.)
*****	Emphasizes 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 condition clear 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 WMAX keyword of the SET request for the monitor service.

For example, the warning message ID for the THDQD service is DS0090W. If the user request is

```
SET  
REG=THDQD,WMSG=WTO,WMAX=5,T='QUEUED THREADS'
```

and the sampled measurement is greater than 5 threads at 1:00 PM, the following DS0090W message is issued:

```
DS0090W(01) 13:06:01 QUEUED THREADS(TOTAL) = 7 (>5)
```

When the condition no longer exists, the following DS0091I message is issued:

```
DS0091I(01) 13:30:00 QUEUED THREADS(TOTAL) NO LONGER > 5
```

Note: Since multiple DB2 subsystems can be monitored from one BBI-SS PAS, 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.

Starting a Monitor

A monitor can be started by

- 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 [“Grouping Requests” on page 11](#)). The default member is BLKDMRW. BLKDMRW or a customized member can be specified for each target in BBIISP00. The request keywords are defined in member BLKDMRKY.

- 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 (Option 3). Then use the S line command to select a service (see [“Data Collection Monitors \(SM Start Monitor Command\)” on page 111](#)).

The workload monitor service names start with either a # or @ prefix.

- Replicating an active monitor request from the Active Timer list application

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 (Option 3) to view all monitors.
- Use the D line command from the Data Collection Monitors service list application to access the Active Timer list for only the selected service.
- Move the cursor to the EXPAND line for the MON(xxxx) field in a resource analyzer or application trace display and press ENTER to view related monitors in the Active Timer list (see the *Using MAINVIEW* book).

- Starting a monitor service from a MAINVIEW AutoOPERATOR EXEC

Write an EXEC that starts a monitor service (a BMC Software MAINVIEW AutoOPERATOR product must be installed).

Use the IMFEXEC IMFC command followed by the service name, optional parameters, and an identifier for the target DB2 system, as follows:

```
IMFEXEC IMFC SET REQ=BPUTL BP0 I=00:06:00 TARGET=db2ssid
```

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 [“Active Timer Requests \(Option 3\)” on page 102](#).
- Setting a stop time for automatic completion of data collection
Specify the STOP value (as a time stamp or interval count) on the Start or Modify panel for the monitor, or in a request defined in a member like BLKDMRW. 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 [“Active Timer Requests \(Option 3\)” on page 102](#).

Modifying a Monitor

A monitor can be modified by

- Modifying an active monitor request from the Active Timer list application
You can modify a monitor service request by using the M line command in the Active Timer list (see [“Modify Timer Request \(M Line Command\)” on page 108](#)).

Displaying Monitor Data

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

- Hyperlinking to the various monitor views in windows mode from the Easy Menus. The data is available for one DB2 or in SSI mode.
- Selecting a scrollable list of active monitors and their current values as described in [“Active Timer Requests \(Option 3\)” on page 102](#).
 - Access the Active Timer Request list application directly from the Primary Option Menu (Option 3) to view all active monitors.
 - Move the cursor to the EXPAND line for the MON(XXXX) field in a resource analyzer or application trace display and press ENTER to view related monitors in the Active Timer list application (see the *Using MAINVIEW* book).
 - Use the D line command from the Data Collection Monitors service list application to access the Active Timer list for only the selected service.
- Selecting a graphic plot of the historical data collected by one monitor
 - Hyperlink from any monitor in a tabular view like DSERV to select a plot of the data collected by that active monitor
 - Use the S line command in the Active Timer list (Option 3) to select a plot of the data collected by that active monitor.
- 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). See the *Using MAINVIEW* book.

Active Timer Requests (Option 3)

All the monitor data can be viewed in windows-mode views (see “Monitors” in Volume 1 for a description of these views). However, the Active Timer Requests application is used to control the monitors, enabling you to perform such functions as starting, stopping, and modifying the monitors.

The Active Timer Requests list can be accessed by selecting Option 3 from the Primary Option Menu or by using the D line command from the Data Collection Monitors list application. Option 3 from the Primary Option Menu displays all the active timer requests (workload or resource monitor service requests, application trace service requests, and Image log requests for analyzer or monitor summary service displays) that you are authorized to view. Using the D line command displays the active timer requests for the selected service only.

With this application you can

- View or modify active monitors
- View plot or graphic monitor summary displays
- 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

```

BMC Software ----- ACTIVE TIMER REQUESTS ----- PERFORMANCE MGMT
COMMAND ==>>>                                     TGT ==>>> DB2A
                                                    TIME -- 10:52:10
INPUT      INTVL ==> 3
COMMANDS: SM (START MONITORS), SORT, AREA, X ON|OFF
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+|
SOSCN      SOS CONTRACTIONS      0  NZ  |  W  |
DSOPN      DB DATA SETS OPEN    38  60  |>>>>|  W  |
DSOPR      DB DATASET OPEN REQUESTS 0  3  |  W  |
DSOPR BP0  DB DATASET OPEN REQUESTS 0  3  |  W  |
DSOPR BP1  DB DATASET OPEN REQUESTS 0  NZ  |  W  |
DSOPR BP2  DB DATASET OPEN REQUESTS 0  NZ  |  W  |
DSUTL      OPEN DB DATASET % UTIL  3  20  |*  |  W  |
CONUT TSO  CONNECTION % UTILIZATION 10  40  |<<  |  W  |
CONUT BATCH CONNECTION % UTILIZATION 10  60  |*  |  W  |
THDUT      THREAD % UTILIZATION    0  30  |  W  |
THDAC IMS  ACTIVE THREADS          0  NZ  |  W  |
THDAC BATCH ACTIVE THREADS          0  NZ  |  W  |
THDAC CAF  ACTIVE THREADS          0  5  |  W  |
THDQD      QUEUED THREADS          1  NZ  |*****W*****|
THDID      IN DOUBT THREADS        0  NZ  |  W  |
EDMLD      AVG EDM REQUESTS/LOAD    0  140 |  W  |
EDMLD CT   AVG EDM REQUESTS/LOAD    0  140 |  W  |
EDMLD DBD  AVG EDM REQUESTS/LOAD    0  140 |  W  |
BPUTL      BFR POOL % UTILIZATION   6  30  |*  |  W  |
BPUSE      BFR POOL % IN USE        0  30  |  W  |
RWP        READS WITH PAGING        0  NZ  |  W  |
WWP        WRITES WITH PAGING       0  NZ  |  W  |
GETPG      GETPAGE REQUESTS        144  20  |*****W*****|
GETPG BP0  GETPAGE REQUESTS        144  20  |*****W*****|
GETPG BP1  GETPAGE REQUESTS         0  20  |  W  |
GETPG BP2  GETPAGE REQUESTS         0  20  |  W  |
GETRI      GETPAGES PER READ I/O    10  <30 |*****W*****|

```

Figure 38. Active Timer Requests Application (Before Scrolling Right)

```

BMC Software ----- ACTIVE TIMER REQUESTS ----- PERFORMANCE MGMT
COMMAND ==>>>                                     TGT ==>>> DB2A
                                                    TIME -- 10:52:10
                                                    INPUT  INTVL ==> 3
COMMANDS: SM (START MONITORS), SORT, AREA, X ON|OFF
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
SOSCN  SOS CONTRACTIONS  CIR7  DB2A  A  DSYS  ACTV
DSOPN  DB DATA SETS OPEN  CIR7  DB2A  A  DSYS  ACTV
DSOPR  DB DATASET OPEN REQUESTS  CIR7  DB2A  A  DSYS  ACTV
DSOPR BP0  DB DATASET OPEN REQUESTS  CIR7  DB2A  A  DSYS  ACTV
DSOPR BP1  DB DATASET OPEN REQUESTS  CIR7  DB2A  A  DSYS  ACTV
DSOPR BP2  DB DATASET OPEN REQUESTS  CIR7  DB2A  A  DSYS  ACTV
DSUTL  OPEN DB DATASET % UTIL  CIR7  DB2A  A  DSYS  ACTV
CONUT TSO  CONNECTION % UTILIZATION  CIR7  DB2A  A  USER  ACTV
CONUT BATCH  CONNECTION % UTILIZATION  CIR7  DB2A  A  USER  ACTV
THDUT  THREAD % UTILIZATION  CIR7  DB2A  A  USER  ACTV
THDAC IMS  ACTIVE THREADS  CIR7  DB2A  A  USER  ACTV
THDAC BATCH  ACTIVE THREADS  CIR7  DB2A  A  USER  ACTV
THDAC CAF  ACTIVE THREADS  CIR7  DB2A  A  USER  ACTV
THDQD  QUEUED THREADS  CIR7  DB2A  A  USER  ACTV
THDID  IN DOUBT THREADS  CIR7  DB2A  A  USER  ACTV
EDMLD  AVG EDM REQUESTS/LOAD  CIR7  DB2A  A  EDM  ACTV
EDMLD CT  AVG EDM REQUESTS/LOAD  CIR7  DB2A  A  EDM  ACTV
EDMLD DBD  AVG EDM REQUESTS/LOAD  CIR7  DB2A  A  EDM  ACTV
BPUTL  BFR POOL % UTILIZATION  CIR7  DB2A  A  BUFR  ACTV
BPUSE  BFR POOL % IN USE  CIR7  DB2A  A  BUFR  ACTV
RWP  READS WITH PAGING  CIR7  DB2A  A  BUFR  ACTV
WWP  WRITES WITH PAGING  CIR7  DB2A  A  BUFR  ACTV
GETPG  GETPAGE REQUESTS  CIR7  DB2A  A  BUFR  ACTV
GETPG BP0  GETPAGE REQUESTS  CIR7  DB2A  A  BUFR  ACTV
GETPG BP1  GETPAGE REQUESTS  CIR7  DB2A  A  BUFR  ACTV
GETPG BP2  GETPAGE REQUESTS  CIR7  DB2A  A  BUFR  ACTV
GETRI  GETPAGES PER READ I/O  CIR7  DB2A  A  BUFR  ACTV

```

Figure 39. 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 as well as up and down (see the *Using MAINVIEW* book). 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 DB2 of the request, the service security classification, the area of DB2 being monitored, and the service status.

Primary Commands

The following primary commands can be entered on the COMMAND line of the Active Timer Requests list application showing all timer requests:

SM (START MONITORS)

SM is an application transfer command that displays the Data Collection Monitors panel, which lists all the data collection monitor services that you are authorized to view. (See [“Data Collection Monitors \(SM Start Monitor Command\)”](#) on page 111.) 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.

SORT

When the list of active timer requests is displayed initially, the list is sorted in the order the requests were made. SORT can be entered on the COMMAND line of the display to sort the list by any of the following column headings. Two characters of the column heading are used with SORT as

```
SORT cc
```

where **cc** can be any of the following two characters:

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

AREA

You can use the AREA command to list only the services related to a specified area. The possible areas that can be specified are listed in the AREA column. For example, to list only the DB2 workload services, on the COMMAND line type

```
AREA WKLD
```

Type **AREA** to return to the list of all the services.

X ON|OFF

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.

Line Command Description

S	<p>SELECT. Displays a plot of collected data or a list of scrollable trace entries.</p> <p>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)”.</p> <p>Note: The S line command (SELECT a plot) is not valid for an active Image log request of an analyzer or general service display.</p>
W	<p>SHOW. Shows a read-only display panel of the timer request options defined for the selected request (see “Show Timer Request (W Line Command)” on page 107).</p>
M	<p>MODIFY. Shows a data-entry panel of the timer request options defined for the selected request; the options can be changed (see “Modify Timer Request (M Line Command)” on page 108).</p>
P	<p>PURGE. Displays a PURGE panel to verify a purge of the selected request (see “Purge Request (P Line Command)” on page 110).</p>
R	<p>REPLICATE. Shows a data entry panel of all 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 109). The request must be unique (defined by the service select code plus a parameter).</p>
H	<p>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.</p>
Z	<p>Stops the request and retains collected data. The STOP time equals the current time.</p>

Show Timer Request (W Line Command)

The W line command can be used for any request shown in the Active Timer Requests list. The requests in the list are generally for monitor services, but might also show logging requests of a 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 41](#):

```
BMC Software ----- SHOW RESOURCE MONITOR REQUEST ----- PERFORMANCE MGMT
COMMAND ==>> TGT ==>> DB2A

                DSOPR - DB DATASET OPEN REQUESTS

PARM:          BPO                                (Resource Selection Parameter)
INTERVAL:      00:01:00  START:  09:18:00  STOP:          QIS:  YES
WVAL:          3          WMSG:          WLIM:  10  WIF:  1  WIN:  1
RST:           HOT                                (Restart Option: HOT,COLD,PUR,QIS)
TITLE:         DB DATASET OPEN REQUESTS          (Title)
PLOTMAX:              (Maximum PLOT X-Axis Value)
RANGES:              (1-4 Range Distr. Upper Limits)
LOG:            NO                                (NO,ATSTOP,ATPD,ATINTVL,ATWARN)
```

Figure 41. Show Resource Monitor Request Options Application

Each option is suffixed by a colon (:), which means the option value cannot be changed. The options are defined in “[SET Request](#)” on page 16. Press the END key to redisplay the Active Timer Requests list.

[Figure 41](#) is an example of a resource monitor request. The panels for workload monitor requests show the different options available for these services (see “[Start Workload or Resource Monitor \(S Line Command\)](#)” on page 113).

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 monitor service or Image logging for a display service. Previously defined option values that are prefixed with an ===> can be changed, as shown by the example in [Figure 42](#).

```

BMC Software ----- MODIFY RESOURCE MONITOR REQUEST --- REQUEST ACCEPTED
COMMAND ===>                                           TGT ===> DB2A

                                THDQD - QUEUED THREADS

PARM:                                (Resource Selection Parameter)
INTERVAL:  00:00:20  START:  09:18:00  STOP ==>                                QIS ==> YES
WVAL  ==> NZ      WMSG ==>                                WLIM ==> 10  WIF ==> 1  WIN ==> 1
RST    ==> HOT                                (Restart Option: HOT,COLD,PUR,QIS)
TITLE:  QUEUED THREADS                        (Title)
PLOTMAX ==>                                (Maximum PLOT X-Axis Value)
RANGES:                                (1-4 Range Distr. Upper Limits)
LOG     ==> ATWARN                            (NO,ATSTOP,ATPD,ATINTVL,ATWARN)

```

Figure 42. Modify Resource Monitor Request Options Application

Values shown for options with a colon (:) suffix cannot be changed. The options are defined in [“SET Request” on page 16](#).

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) redisplay the Active Timer Requests list.

Resource Monitor Request

The M line command for a resource monitor service displays the timer request options previously used to start data collection (see [“Start Workload or Resource Monitor \(S Line Command\)” on page 113](#)). As shown in [Figure 42](#), the following options have fields prefixed with an ===> (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 above for resource monitor requests.

Note: Workload monitor selection criteria cannot be modified.

Replicate Timer Request (R Line Command)

The R line command displays a data-entry panel for the selected service, as shown in [Figure 43](#).

```
BMC Software ----- REPLICATE RESOURCE MONITOR REQUEST --- PERFORMANCE MGMT
COMMAND ==>                                         TGT ==> DB2A

                                THDQD - TSO QUEUED THREADS

PARM    ==> TSO                                     (Resource Selection Parameter)
INTERVAL ==> 00:01:00 START ==> 12:51:00 STOP ==>                               QIS ==> YES
WWAL    ==> 4          WMSG ==> WTO          WLIM ==> 5  WIF ==> 1  WIN ==> 1
RST     ==> HOT                                       (Restart Option: HOT,COLD,PUR,QIS)
TITLE   ==> TSO QUEUED THREADS                     (Title)
PLOTMAX ==>                                         (Maximum PLOT X-Axis Value)
RANGES  ==>                                         (1-4 Range Distr. Upper Limits)
LOG     ==> ATWARN                                   (NO,ATSTOP,ATPD,ATINTVL,ATWARN)
```

Figure 43. Replicate Timer Request Options Application

All of the options that were defined to start the request are displayed (see [“Start Workload or Resource Monitor \(S Line Command\)” on page 113](#)). All values prefixed with an ==> can be modified. This application can be used to start a new request for the selected service. [“SET Request” on page 16](#) describes each option and the value that can be specified. Each request must be defined by a unique parameter in the PARM field.

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) redisplay the Active Timer Requests list.

Purge Request (P Line Command)

Selecting a service with the P line command displays a purge confirmation panel, shown in [Figure 44](#).

```
BMC Software ----- CONFIRM PURGE REQUEST ----- REQUEST ACCEPTED
COMMAND ==>                                     TGT ==> DB2A

                                #SQLD - DDL SQL STATEMENTS

PARM:                                Parameter / Identifier

STATUS:          ACTV
START:           12:01:00 (0 days)
STOP:

INSTRUCTIONS:

    Press ENTER key to confirm purge request.

    Enter END command to cancel purge request.
```

Figure 44. Purge Request Application

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) redisplay the Active Timer Requests list.

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

Stop Timer Request (Z Line Command)

The Z line command sets the STOP time of the selected timer request to the current time. Data collection stops, but previously collected data is retained.

Data Collection Monitors (SM Start Monitor Command)

This application is a scrollable list of all the data collection monitor services you are authorized to view. Use this application to activate new monitors.

```

BMC Software ----- DATA COLLECTION MONITORS ----- PERFORMANCE MGMT
COMMAND ==>                                           TGT ==> DB2C

COMMANDS: SORT, AREA
LC CMDS: S(SET UP), D(DISPLAY ACTIVE), H(HELP)
LC  SERV  # ACTIVE  TITLE                                PARM TYPE  SEC  AREA  STAT
SOSAB      1    SOS ABENDS                                A  DSYS
SOSCN      1    SOS CONTRACTIONS                                A  DSYS
DSOPN      1    DB DATA SETS OPEN                                A  DSYS
DSOPR      5    DB DATASET OPEN REQUESTS (POOLID)  A  DSYS
DSUTL      1    OPEN DB DATASET % UTIL  A  DSYS
CONUT      3    CONNECTION % UTILIZATION (TSO/BATCH)  A  USER
THDUT      1    THREAD % UTILIZATION  A  USER
THDAC      7    ACTIVE THREADS (ATTACH-MODE)  A  USER
THDQD      1    QUEUED THREADS (ATTACH-MODE)  A  USER
THDID      1    IN DOUBT THREADS  A  USER
THDCR      1    CREATE THREAD REQUESTS  A  USER
THDWT      1    CREATE THREAD WAITED  A  USER
THDAB      1    ABORTED THREADS  A  USER
COMP2      1    PHASE 2 COMMITS  A  USER
COMSY      1    SYNC COMMITS  A  USER
EOMFL      1    EOM FAILURES  A  USER
EOTFL      1    EOT FAILURES  A  USER
BINDS      1    SUCCESSFUL AUTO BINDS  A  USER
BINDF      1    FAILED AUTO BINDS  A  USER
  
```

Figure 45. 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 DB2 being monitored, and the service status.

Primary Commands

The following commands can be entered on the COMMAND line of the Data Collection Monitors list application:

SORT

When the list of data collection monitor services is displayed initially, the list is sorted by resource area. SORT can be used 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.

SORT without parameters sorts the list by resource area.

AREA

You can use the AREA command to list only the services related to a specified area. The possible areas that can be specified are listed in the AREA column. For example, to list only the general DB2 system services, on the COMMAND line type

```
AREA DSYS
```

Type **AREA** 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.

S SETUP.

Displays a data-entry panel showing the valid request options to start timer-driven data collection (see [“Start Workload or Resource Monitor \(S Line Command\)” on page 113](#)). 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 117](#).

H HELP.

Displays the HELP information for the service. This panel 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 Workload or Resource Monitor (S Line Command)

Each request must be unique and is defined by the service select code and an optional parameter (reqid). The parameter is required if the same service is requested more than once. The service field is preset with the code of the selected service. The input fields are prefixed with a highlighted ==> symbol. Any default values for a field are displayed.

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) redisplay the Data Collection Monitors list.

Workload Monitor Data Entry Panel

This data entry panel shows the options that can be specified to request data collection for the selected workload monitor.

```
BMC Software ----- START DB2 WORKLOAD MONITOR REQUEST --- PERFORMANCE MGMT
COMMAND ==>                                               TGT ==> DB2C

                                #DDLK - DEADLOCKS

PARM      ==>
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 Selection Criteria:
ICHECK    ==> NO                                           (Check elapsed versus Interval time)
CONNTYPE  ==>                                               (TSO, IMS, CICS, BATCH, CAF or blank)
DB2PLAN   ==>
DB2AUTH   ==>
DB2CONN   ==>
DB2CORR   ==>
DB2LOC    ==>
```

Figure 46. Start Workload Monitor Data Collection Request Application

where

INTERVAL **hh:mm:ss**

The time interval between successive invocations of the requested service. The default is one minute (00:01:00) or as specified in the BBIISP00 member of the BBPARM data set.

START **hh:mm:ss**

Requests processing 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. Default is the next full minute.

STOP **hh:mm:ss | nnn**

Requests processing stop limit, either as a timestamp or the number of intervals to process. If the time entered is the same as the START time, 24 hours are added to the STOP time.

Processing ends 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, and W line commands from the Active Timer Requests application.

QIS **YES | NO**

Defines the action to be taken for the service when DB2 is not active.

YES specifies that the service is to be quiesced. This option is the default for all analyzer and monitor services.

NO specifies that the service is to start or continue running.

Note: When QIS=NO is specified, monitors that require DB2 continue to be scheduled at each interval; however, they return zero values.

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.

WMSG **WTO** | **LOG** | **tso id**

Directs warning messages to the system console (WTO) or a TSO ID in addition to the active BBI-SS PAS Journal log. Default is to write only to the log.

If an ID is entered, a TSO send is done for the warning and warning clear messages, but not for the monitor start / stop / quiesce messages.

Only one TSO ID of four or more characters can be specified. If less than four characters are specified, the value must be either LOG or WTO.

An existing warning message to the WTO can be reset to the Journal log only by using the LOG operand.

Routing and descriptor codes can be specified for WTO messages in the BBIISP00 member of the BBPARM data set.

WLIM **n**

Defines the maximum number of warning messages to be sent for one continuous occurrence of the warning condition. Resets automatically when the condition no longer exists. Default is 10.

WIN **n**

Defines the number of times the exception is to be detected between messages. Default is 1.

TITLE **'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.

RST **HOT** | **COLD** | **PUR** | **QIS**

Defines the restart option to be used when a service is quiesced because of an inactive DB2 subsystem or SETBLK=RRR request. Default is HOT.

HOT restarts the service automatically without the loss of history data. The intervals during which DB2 was terminated show values of zero.

COLD restarts the service automatically; all previously collected data is deleted.

PUR purges the service automatically when the target DB2 starts.

QIS keeps the service in a quiesced state until it is purged by an authorized user.

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.

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 [“History PLOT Display \(S Line Command for Monitor Request\)”](#) on page 106).

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.

LOG **NO | ATSTOP | ATPD | ATINTVL | ATWARN**

Specifies if and when automatic logging of the PLOT display to the BBI-SS PAS Image log occurs.

NO specifies no logging. Default for monitor services.

ATSTOP logs display when processing of this request is stopped. If QIS=Y has been specified in the request, LOG=ATSTOP is invoked at DB2 termination and at BBI-SS PAS termination.

ATPD logs display at each period of 10 intervals.

ATINTVL logs display at each interval.

ATWARN logs a plot whenever a warning message is generated by the associated monitor.

ICHECK **YES | NO**

Qualifies workload monitor data collection. YES specifies that the transaction is discarded if the elapsed time is greater than the requested interval time. NO is the default.

CONNTYPE **TSO | IMS | CICS | BATCH | CAF | IMSMPP | IMSBMP |
IMSTBMP | IMSCTL | DLI | SYSSERV | APLSERV | UTIL | blank**

Qualifies workload monitor data collection by connection type. Blank collects data for all connection types.

DB2PLAN **name**

Qualifies workload monitor data collection by a 1- to 8-character DB2 plan name. The maximum number of operands is the total field length (60 characters). The operands can contain + characters as name qualifiers.

DB2PKG **name**

Qualifies workload monitor data collection by a 1- to 18-character DB2 package name (only when accounting class 7/8 is active). The maximum number of operands is the total field length (60 characters). The operands can contain + characters as name qualifiers.

DB2AUTH **id**

Qualifies workload monitor data collection by DB2 authorization ID. The maximum number of operands is the total field length (60 characters). The operands can contain + characters as name qualifiers.

DB2CONN **name**

Qualifies workload monitor data collection by a 1- to 8-character connection name. The maximum number of operands is the total field length (60 characters). The operands can contain + characters as name qualifiers.

DB2CORR id

Qualifies workload monitor data collection by a 1- to 8-character correlation ID. The maximum number of operands is the total field length (60 characters). The operands can contain + characters as name qualifiers.

DB2LOC id

Qualifies workload monitor data collection by a 1- to 16-character location ID. The maximum number of operands is the total field length (60 characters). The operands can contain + characters as name qualifiers. Both server and requester activity with this location is selected (DBAT and DIST threads).

Resource Monitor Data Entry Panel

This data entry panel shows the options that can be specified to request data collection for the selected resource monitor. The previous descriptions apply also to the Resource Monitor requests.

```

BMC Software ----- START RESOURCE MONITOR REQUEST --- REQUEST ACCEPTED
COMMAND ==>                                           TGT ==> DB2A

                                THDQD - QUEUED THREADS

PARM    ==> TSO                                (Resource Selection Parameter)
INTERVAL ==> 00:01:00 START ==>                STOP ==>                QIS ==> YES
WVAL    ==> 4          WMSG ==> WTO          WLIM ==> 5    WIF ==> 1    WIN ==> 1
RST     ==> HOT                                (Restart Option: HOT,COLD,PUR,QIS)
TITLE   ==> TSO QUEUED THREADS                (Title)
PLOTMAX ==>                                     (Maximum PLOT X-Axis Value)
RANGES  ==>                                     (1-4 Range Distr. Upper Limits)
LOG     ==> ATWARN                             (NO,ATSTOP,ATPD,ATINTVL,ATWARN)

```

Figure 47. Start Resource Monitor Data Collection Request Application

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

This 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 [“Active Timer Requests \(Option 3\)” on page 102](#).

```

BMC Software ----- ACTIVE TIMER REQUESTS ----- PERFORMANCE MGMT
COMMAND ==>                                           TGT ==> DB2A
                                INPUT   INTVL ==> 3    TIME -- 10:52:10
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  PARAMETER  TITLE                                USER ID  TARGET  SEC AREA  STAT
DSOPR      DB DATASET OPEN REQUESTS CIR8X    DB2A     A  DSYS  ACTV
DSOPR BP0   DB DATASET OPEN REQUESTS CIR8X    DB2A     A  DSYS  ACTV
DSOPR BP1   DB DATASET OPEN REQUESTS CIR8X    DB2A     A  DSYS  ACTV
DSOPR BP2   DB DATASET OPEN REQUESTS CIR8X    DB2A     A  DSYS  ACTV
DSOPR BP32  DB DATASET OPEN REQUESTS CIR8X    DB2A     A  DSYS  ACTV
***** END OF REQUESTS *****

```

Figure 48. Selected Monitor Active Timer Requests List

Alphabetical Reference of Monitors

This section provides an alphabetical reference for all the MAINVIEW for DB2 monitors that run in full-screen mode. These services measure DB2 activities and resources in each of the following areas:

- General DB2 system
- User activity
- Locks
- EDM pool
- Buffer pools
- Logs
- MVS system interaction
- Distributed Data Facility (DDF)
- DB2 workload

These monitors are grouped in the following tables by the DB2 activity or resource area measured. The available parameters and warning message for each monitor are also provided. For more complete information about each of these monitors, use line command, H, next to a listed monitor in either the Active Timer Requests application or the Data Collection Monitors application.

General DB2 System Monitors

The monitors listed in [Table 2](#) measure DB2 system activity and status.

Table 2. DB2 System Monitors

Monitor	Parameter	Warning
DBTQD—Database Thread Queued		DS0650W
DROWA—Direct Row Access	[USED FAILIX FAILTS FAILURES]	DS1590W
DSOPN—Database Data Sets Open		DS0030W
DSOPR—Database Data Set Open Requests	[BP0—BP49 BP8K0—BP8K9 BP16K0—BP16K9 BP32K—BP32K9]	DS0040W
DSUTL—Open Database Data Set Utilization		DS0050W
LOBMX—Maximum LOB Storage		DS1670W
NESTM—Maximum Nested SQL Level		DS1610W
SPROC—Stored Procedures	[CALLS ABENDS TIMEOUTS REJECTS FAILURE]	DS1400W
TRIGR—Trigger Usage	[STMT ROW ERROR]	DS1600W
UDF—UDF Usage	[EXECS ABENDS TIMEOUTS REJECTS FAILURES]	DS1620W

User Activity Monitors

The monitors listed in [Table 3](#) measure user activity.

Table 3. User Activity Monitors

Monitor	Parameter	Warning
BINDF—Failed Automatic Binds		DS0190W
BINDS—Successful Automatic Binds		DS0180W
BNPKF—Failed Automatic Binds for Packages		DS0710W
BNPKS—Successful Automatic Binds for Packages		DS0700W
COMP2—Phase 2 Commits		DS0140W
COMRO—Read-Only Commits		DS0640W
COMSY—Sync Commits		DS0150W
CONUT—Connection Percent Utilization	[TSO BATCH DBAT]	DS0060W
EOMFL—End of Memory Failures		DS0160W
EOTFL—End of Task Failures		DS0170W
PKBND—Number of Packages Bound	[BIND REBIND]	DS0690W
PLBND—Number of Plans Bound	[BIND REBIND]	DS0680W
PRLF—I/O Parallel Groups with Fallback to Sequential	[CURSOR NOSORT NOBFR NOENCLAV]	DS0820W
PRLG—I/O Parallel Groups Executed	[PLANNED REDUCED]	DS0810W
PRLSF—Sysplex Parallel Query Failures	[COORNO ISORR CSKIP]	DS0830W
RSQLR—Remote SQL Statements Received	[location name]	DS0670W
RSQLS—Remote SQL Statements Sent	[location name]	DS0660W
SQLAC—SQL Activity	[DDL AUTH SEL LOCK UID DYN CTL OPEN CLOSE CALL]	DS0200W
THDAB—Rollback Requests		DS0130W
THDAC—Active Thread Status	[TSO BATCH CAF UTIL SPAS IMS CICS DBAT DIST DDF RRSF]	DS0080W

Table 3. User Activity Monitors (Continued)

Monitor	Parameter	Warning
THDCR—Create Thread Requests		DS0110W
THDID—In Doubt Thread Status		DS0100W
THDQD—Queued Thread Status	[TSO BATCH CAF UTIL SPAS IMS CICS DBAT DIST DDF RRSAF]	DS0090W
THDUT—Thread Percent Utilization		DS0070W
THDWT—Create Thread Waited		DS0120W

EDM Pool Monitors

The monitors listed in [Table 4](#) measure the EDM pool.

Table 4. EDM Pool Monitors

Monitor	Parameter	Warning
EDMDS—EDM Data Space Percent Utilization		DS1630W
EDMLD—Average EDM Requests per Load I/O	[CT PT DBD]	DS0310W
EDMUT—EDM Pool % Utilization	[NOSK]	DS0300W

Lock Monitors

The monitors listed in [Table 5](#) measure locking activity.

Table 5. Lock Monitors

Monitor	Parameter	Warning
CLM—Claim Requests		DS0770W
CLMF—Claim Failures		DS0780W
DRN—Drain Requests		DS0790W
DRNF—Drain Failures		DS0800W
GNEG—Negotiate P-Lock	[PGSET PAGE CHNG OTHER]	DS1440W
GNOEN—No Engines—P-Lock		DS1450W
GNTFM—Notify Messages	[SENT RECV]	DS1480W
GPLK—Global P-Lock Requests	[LOCK CHANGE UNLOCK]	DS1410W
GSUSP—Global Lock Suspensions	[IRLM XES FALSE INCOMPAT]	DS1430W
GXES—Global Lock XES Requests	[LOCK CHANGE UNLOCK ASYNC]	DS1420W
ILREQ—IRLM Request Counts	[QUERY CHANGE OTHER]	DS0580W
IXLOK—Index Space Locks	[SHR EXCL]	DS0230W
LDEAD—Lock Deadlock Failures		DS0260W
LESCL—Lock Escalations	[SHR EXCL]	DS0290W
LREQ—Lock Requests	[LOCK UNLOCK]	DS0570W
LSUSP—Suspensions	[LOCK LATCH OTHER]	DS0270W
LTIME—Lock Timeout Failures		DS0280W
MXLOK—Maximum Page Lock Held by User		DS0250W
PGLOK—Page Locks	[SHR EXCL]	DS0240W
TSLOK—Table Space Locks	[SHR EXCL]	DS0220W
USLOK—Users Suspended for Locks	[TSO BATCH CAF UTIL DBAT DIST DDF IMS CICS SPAS RRSAP]	DS0210W

Buffer Pool Monitors

The monitors listed in [Table 6](#) measure the buffer pools.

Table 6. Buffer Pool Monitors

Monitor	Parameter	Warning
BPUSE—Buffer Pool Percent in Use	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0330W
BPUTL—Buffer Pool Percent Utilization	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0320W
DESRD—Number of Pages for Which Destructive Read Requested	[buffer pool id]	DS0730W
DWTX—Vertical Deferred Write Threshold Reached	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0840W
G2WRF—GBP Coupling Facility Write Fail Secondary	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS1640W
GCAST—GBP Castout Requests	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS1520W
GCTPG—GBP Castout Pages	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS1530W
GETPG—GETPAGE Requests	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0360W
GETRI—GETPAGE (GET) Requests per Read I/O (RIO)	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0410W
GFAIL—GBP Failures	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS1560W
GOTHR—GBP Other Requests	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS1570W
GPGWR—GBP Pages Written	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS1510W
GRDIN—GBP Read Requests—Interest	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS1540W
GRDNO—GBP Read Requests—No Interest	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS1550W
GRDRQ—GBP Read Requests with Data	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS1500W
HPRDF—Read Pages Failures	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS1100W
HPVPA—Successful Asynchronous Reads for HP-to-VP	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS1070W
HPVPS—Successful Synchronous Reads for HP-to-VP	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS1060W

Table 6. Buffer Pool Monitors (Continued)

Monitor	Parameter	Warning
HPWRF—Write Page Failures	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS1090W
LSTPF—Number of List Prefetch Requests	[buffer pool id]	DS0720W
MAXPF—Maximum Concurrent Parallel I/O Prefetch Streams	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS1080W
MIAPF—Multi-Index Failures	[STOR #RIDS]	DS0630W
MIGDS—Migrated Data Sets	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0590W
PF Dio—Dynamic Prefetch Read I/O	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0950W
PFDPG—Dynamic Prefetch Pages Read	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0960W
PFDRQ—Dynamic Prefetch Requests	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0940W
PFIOF—Prefetch I/O Failures	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0970W
PFLIO—List Prefetch Read I/O	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0920W
PFLPG—List Prefetch Pages Read	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0930W
PFLRQ—List Prefetch Requests	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0910W
PFSIO—Sequential Prefetch Read I/O	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0890W
PFSPG—Sequential Prefetch Pages Read	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0900W
PFSRQ—Sequential Prefetch Requests	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0880W
PFTIO—Total Prefetch Read I/O	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0860W
PFTPG—Total Prefetch Pages Read	[BP0–BP49 BP8K0– BP8K9 BP16K0–BP16K9 BP32K– BP32K9]	DS0870W
PFTRQ—Total Prefetch Requests	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0850W
PIO—Prefetch Read I/O	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0610W
PRLGF—Conditional GETPAGE Failures	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS1000W

Table 6. Buffer Pool Monitors (Continued)

Monitor	Parameter	Warning
PRLQ—Parallel Query Requests	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0980W
PRLQF—Parallel Query Request Failures	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0990W
PRL12—Prefetch Reduced to 1/2	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS1010W
PRL14—Prefetch Reduced to 1/4	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS1020W
PWS—System Pages Written	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0400W
PWSWI—System Pages Written (PWS) per Write I/O (WIO)	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0430W
RIDUT—RID Pool Percent Utilization		DS0620W
RIO—Read I/O Activity	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0370W
RTO—Recall Time-Outs	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0600W
RWP—Reads with Paging	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0340W
SEQIO—Sequential Read I/O Requests	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS1120W
SEQPG—Sequential GETPAGE Requests	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS1110W
SWS—System Page Updates	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0380W
SWSPW—System Page Updates (SWS) per System Pages Written (PWS)	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0420W
WIO—Write I/O Activity	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0390W
WKMAX—Max Workfiles Used Concurrently	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS1150W
WKNBF—Workfile Not Created—No Buffers	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS1140W
WKPFZ—Workfile Prefetch Quantity Is Zero	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS1130W
WWP—Writes with Paging	[BP0–BP49 BP8K0–BP8K9 BP16K0–BP16K9 BP32K–BP32K9]	DS0350W

Log Monitors

The monitors listed in [Table 7](#) measure logging activity.

Table 7. Log Monitors

Monitor	Parameter	Warning
ARCDL—Read Accesses Delayed		DS1040W
ARCRA—Archive Log Read Allocations		DS0450W
ARCTC—Tape Volume Contention Read Delays		DS1030W
ARCTM—Look-Ahead Tape Mounts	[FAIL SUCCESS]	DS1050W
ARCWA—Archive Log Write Allocations		DS0440W
ARCWR—Archive Log CIs Written		DS0460W
BSDSA—BSDS Access Requests		DS0510W
CHKPT—Number of Checkpoints		DS0520W
CKPFR—Checkpoint Frequency		DS1580W
LOGRD—Log Reads for Backout/Recovery	[BUFFER ACTIVE ARCHIVE]	DS0500W
LOGUT—Active Log Percent Utilization		DS0490W
LOGWR—Log Write Requests	[FORCE NOWAIT]	DS0480W
LOGWT—Log Buffer Waits		DS0470W

OS/390 Services

The monitors listed in [Table 8](#) measure OS/390 activities that might affect DB2 performance.

Table 8. OS/390 Services

Monitor	Parameter	Warning
CSAP—CSA Percentage of Utilization		DS0550W
CSAPG—CSA Paging		DS0540W
DB2DP—Demand Paging	[IRLM SSAS DBAS SPAS DB2 DDF]	DS0530W
ECSAP—Extended CSA Percentage of Utilization		DS0560W

DDF Monitors

The monitors listed in [Table 9](#) measure activity in the DB2 Distributed Data Facility address space.

Table 9. DDF Monitors

Monitor	Parameter	Warning
CNVLM—Conversations Deallocated—ZPARM Limit		DS1160W
DBATQ—DBATs Queued—MAXDBAT Reached	[NEW]	DS1660W
DDFBR—DDF Bytes Received	[location name]	DS0750W
DDFBS—DDF Bytes Sent	[location name]	DS0740W
DDFCQ—DDF Conversations Queued	[lu name]	DS0760W
DDFT1—Connections Terminated—Maximum Type 1		DS1650W
NACTC—Current Inactive DB Threads	[TYPE1 TYPE2]	DS1170W
P2CON—2-Phase Connections	[COLD WARM]	DS1180W
P2RMC—Remote Location Coordinator COMMITS	[location name]	DS1250W
P2RMI—Remote Location Coordinator INDOUBTS	[location name]	DS1240W
P2RMR—Remote Location Coordinator ROLLBACKS	[location name]	DS1260W
P2RMT—Remote Location Coordinator Total Operations	[location name]	DS1230W
P2RSY—2-Phase Resync Connections	[FAIL SUCCESS]	DS1200W

DB2 Workload Monitors

Table 10 lists the monitors that measure DB2 workloads. These monitors measure the following types of data about DB2 workloads:

- The number and type of SQL calls made
- The amount of buffer usage activity
- The use of CPU time by a transaction
- Lock activity and contention
- Elapsed time for a transaction, DB2 processing, I/O operations, or lock or latch waits
- The amount of DB2 transactions processed
- The amount of parallel I/O for a transaction

A # prefix means that monitor collects a count; an @ prefix means that monitor collects averages.

Table 10. DB2 Workload Monitors

Monitor	Parameter	Warning
#CALL—SQL Call Statements	[id]	DW0400W
#CLMF—Claim Failures	[id]	DW0240W
#DDLK—Deadlocks	[id]	DW0090W
#DRNF—Drain Failures	[id]	DW0250W
#DYN—Dynamic SQL Statements	[id]	DW0030W
#ESCL—Escalations	[id]	DW0130W
#GETF—Conditional GETPAGE Failures	[id]	DW0320W
#GETP—GETPAGE Requests	[id]	DW0040W
#GFAL—False Contention Suspensions	[id]	DW0500W
#GLKX—Global Lock XES Requests	[id]	DW0560W
#GLRQ—Global P-Lock Lock Requests	[id]	DW0520W
#GNTS—Notify Messages Sent	[id]	DW0590W
#GRTA—Incompatible Retained Lock Suspensions	[id]	DW0510W
#GSRD—GBP Synchronous Reads	[id]	DW0440W
#GSUS—Global Contention Suspensions	[id]	DW0490W
#GSWC—GBP Clean Pages Written	[id]	DW0460W

Table 10. DB2 Workload Monitors (Continued)

Monitor	Parameter	Warning
#GSWR—GBP Changed Pages Written	[id]	DW0450W
#HPPG—Asynchronous Hiperpool Pages Read	[id]	DW0380W
#HPVS—Synchronous Hiperpool Reads	[id]	DW0370W
#MAXL—Maximum Locks Held	[id]	DW0140W
#PFIO—Prefetch I/Os	[id]	DW0300W
#PFPG—Prefetch Pages Read	[id]	DW0310W
#PFRD—Prefetch Reads	[id]	DW0070W
#PFRQ—Prefetch Requests	[id]	DW0290W
#PRLF—Parallel I/O Groups Fallback to Sequential	[id]	DW0360W
#PRLG—Parallel I/O Groups Executed	[id]	DW0340W
#PRLR—Parallel I/O Groups Executed Reduced Degree	[id]	DW0350W
#PRLS—Sysplex Parallel Query Failures	[id]	DW0390W
#PROC—Transactions Processed	[id]	DW0010W
#RDIO—Read I/Os	[id]	DW0060W
#REOP—Reoptimizations	[id]	DW0600W
#SPRC—Stored Procedures Executed	[id]	DW0410W
#SQLA—Administrative SQL Statements	[id]	DW0210W
#SQLC—SQL Statements per Commit	[id]	DW0220W
#SQLD—DDL Statements	[id]	DW0020W
#SQLM—Data Manipulative SQL Statements	[id]	DW0200W
#SUSP—Suspensions	[id]	DW0110W
#TMO—Timeouts	[id]	DW0100W
#UPDP—Update Page Requests	[id]	DW0050W
#WRIT—Write Immediates	[id]	DW0080W

Table 10. DB2 Workload Monitors (Continued)

Monitor	Parameter	Warning
@CPU—Average CPU Used	[id]	DW0180W
@CPUD—Average CPU in DB2	[id]	DW0190W
@ELAP—Average Elapsed Time	[id]	DW0120W
@ELCL—Average Elapsed for Claim Waits	[id]	DW0270W
@ELDR—Average Elapsed for Drain Waits	[id]	DW0260W
@ELGL—Average Elapsed Wait—Global Lock	[id]	DW0480W
@ELGM—Average Elapsed Wait—Notify Message	[id]	DW0470W
@ELIO—Average Elapsed for I/O	[id]	DW0160W
@ELLK—Average Elapsed for Locks	[id]	DW0170W
@ELP3—Average Elapsed Wait—All Class 3	[id]	DW0430W
@ELPD—Average Elapsed in DB2	[id]	DW0150W
@ELPL—Average Elapsed for Page Latch	[id]	DW0280W
@ELPR—Average Elapsed Time for Prefetch Reads	[id]	DW0330W
@ELSP—Average Elapsed Wait—SPROC TCB	[id]	DW0420W

Chapter 4. Using a Trace

This chapter describes how to use the trace facility.

Requesting a Trace

You can issue requests to

- Start a trace easily through data entry panels on which options can be specified and defaults are displayed. Submitting the request invokes the trace data collection service (ATRAC)
- Move quickly from summary trace displays to detail displays of a specific event
- Start a trace from a MAINVIEW AutoOPERATOR EXEC
- Start a series of trace requests automatically when the system starts or at your request
- Log a trace to one or more VSAM data sets for later online recall or batch printing
- Print a trace display to the TS Image log or your BBISPRNT data set

These methods are described in the following sections.

Starting a Trace

A trace can be started by

- Using Option 4 (Current Application Traces) from the Primary Option Menu:
 1. Select Option 4 for a list of current traces.
 2. Type **ST** (Start Trace) on the COMMAND line. The trace data entry setup panel is displayed.
- Defining ATRAC requests in a member of your BBI-SS PAS BBPARM data set (see [“Grouping Requests” on page 11](#))
- Writing an EXEC to issue the SET command for the ATRAC service (a BMC Software MAINVIEW AutoOPERATOR product must be installed)

Use the IMFEXEC IMFC command followed by the service name, optional parameters, and an identifier for the target DB2 system:

```
IMFEXEC IMFC SET REQ=ATRAC SUMTRC1 TYPE=SUMMARY ELAP=5.0 TARGET=db2ssid
```

Displaying a Trace

To display an active trace of completed threads:

1. Select the list of current traces using Option 4.
2. Use the S line command to select one of the current traces. A scrollable list of all traced threads is displayed. From that display you can access all of the more detailed displays as well as those that summarize the information.

Note: If this trace is also being logged, more data might be available by choosing the HISTORY button to read from the log instead of the online buffers.

To display historical trace data from a trace log data set:

1. Select the list of historical trace data sets using Option 5.
2. Use the S line command to select one of the trace data sets. A scrollable list of all traced threads is displayed. From that display you can access all of the more detailed displays as well as those that summarize the information.

Printing a Trace

A trace that has been logged to a VSAM data set can be printed by

- Using Option 5 (History Traces) from the Primary Option Menu:
 1. Select Option 5 for a list of trace log data sets, including both those for current traces as well as earlier history traces that have been saved.
 2. Use the P line command to access a data entry panel to create a print job (under ISPF only). See P (PRINT) on page 169.
- Creating and submitting a batch job, as described in [“Printing a Trace” on page 173](#).

If the trace was not logged, selected screens can be printed by either

- Logging a series of trace displays to your TS Image log.
 1. Type Y in the LOG field of the display.
 2. Navigate through the displays that you want to save. All displays are logged until the LOG field is set back to N.
 3. Use BBSAMP member ILOGJCL to print the Image log data set. Instructions to select only a subset of displays are in the *MAINVIEW Administration Guide*, “Selecting and Printing Image Log Records.”
- Logging selected screen images to your TS BBISPRNT data set.
 1. Press the PF4/16 key after the display is presented.
 2. Use BBSAMP member SLOGJCL to print the BBISPRNT data set.

Stopping a Trace

A trace service can be stopped by

Note: A stopped trace is marked complete and stops collecting trace data, but the data remains available for viewing until the request is purged. A purge both stops data collection and deletes any accumulated data.

- Stopping the trace request with a Z line command

Use the Z line command from the Current Traces application (Option 4) as described in [“Controlling Current Traces \(Option 4\)” on page 159](#).

- Setting a stop time for automatic completion of data collection

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

Note: The TRTIME parameter in DMRBEX00 member BBPARM can be used to set a default trace duration that is primed in the Start Trace data entry panel.

- Purging a request from the list of Current Traces with a P line command

Use the P line command from the Current Traces application (Option 4) as described in [“Controlling Current Traces \(Option 4\)” on page 159](#).

- Purging a service request with a SET request

Issue a PRG request with a SET request from the Service Display panel (Option 1 from the Primary Option Menu), BBPARM (see [“Grouping Requests” on page 11](#)), or an AutoOPERATOR EXEC (AutoOPERATOR must be installed). For example:

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

- Stopping a service request with a SET request

Use the STOP parameter with the SET request. For example:

```
SET
REQ=ATRAC,START=11:00:00,STOP=11:10:00
```

At the end of 10 minutes the request stops, but the data remains available for viewing.

These SET parameters are described in [“SET Request” on page 16](#).

Collecting Trace Data

DB2 traces are activated and terminated transparently to the user as needed to satisfy trace requests. When MVDB2 first establishes a connection to a target DB2 subsystem (either at BBI-SS PAS startup or at DB2 startup), it uses the Instrumentation Facility Interface (IFI) to reserve one OPx destination (where OPx is an internally defined OP1 to OP8 DB2 buffer). The BBI-SS PAS has a DB2 thread, but it is inactive.

Multiple traces can be started with different selection criteria specified with the ATRAC request. A maximum of four detail traces per DB2 subsystem and multiple summary traces (all summary traces share a single OPx destination) can be requested. If four detail traces and 20 summary traces are started for the same DB2 subsystem, five (maximum) OPx destinations are used. DB2 has a maximum allowable number of eight OPx destinations for the entire DB2 subsystem. The MVDB2 trace maximum limits the number of trace destinations that is used for the target DB2 by the BBI-SS PAS.

Note: When a summary trace or one or more Workload Monitor services are started, a DB2 trace is shared by all the summary traces and Workload Monitor services. This trace also collects the data for the Lockout History display.

When the first application trace or workload monitor request for a DB2 subsystem is activated, MVDB2 issues the MODIFY TRACE command to request the IFCID (Instrumentation Facility Component Identifier) 3 records. If a DB2 accounting trace level is already active in DB2, the existing records are simply passed on by DB2 to this additional destination. If no accounting trace levels are active, the IFCID 3 records that are passed to MVDB2 contain the corresponding data fields for the DB2 accounting classes specified by the ACCTG parameter in BBPARM member DMRBEX00. The default is class 1 only. See the *MAINVIEW for DB2 Customization Guide* for further information.

When all application trace or workload monitor requests are stopped, the MODIFY TRACE command is issued again to remove the request for IFCID 3, which quiesces DB2 IFI processing.

At BBI-SS PAS or DB2 shutdown, MVDB2 issues a STOP TRACE(MON) TNO(x) command through the MVS command interface.

Note: An operator can issue a manual DB2 command to stop the application trace used by MVDB2. If this situation occurs, any active ATRAC requests are quiesced. To reactivate tracing, all ATRAC requests must be purged. MVDB2 then attempts to reestablish the application trace when the first new trace or monitor request is entered.

Both summary and detail trace entries are identified by a DB2 accounting record and are only made available for display when this record is received. To view detail trace data for a currently active thread, EXPAND from the DUSER display for that thread to UTRAC (see [“UTRAC—User Detail Trace” on page 310](#)). The trace entries are often referred to as transactions since there can be more than one accounting record per thread.

Trace Authorization

The trace services are distributed by BMC Software with a security access code of A.

The DB2TRACE keyword authorizes a user to start DB2 traces and to specify the types of trace allowed.

The TRALLOC keyword authorizes a user for dynamic allocation of trace log data sets by the BBI-SS PAS. This keyword is specified in the USERID member of the BBPARM data set.

Users can have their own members with their user IDs as the member names, or the default \$USERID member can be used. *Implementing Security for MAINVIEW Products* describes how to use DB2TRACE.

Detail Trace Data Collection

For each detail trace started, a separate DB2 trace is started by the following internal command:

```
-STA TRACE(MON) IFCID(x,x,x...) DEST(OPx)
```

where

IFCID(x)

Is a set of IFCIDs. The type of detail trace specified with the ATRAC request (TYPE=D | SQL | SCAN | IO | LOCK | DDF | DDFVTAM) determines the set of IFCIDs that is collected (see [Appendix B, “IFCID Table \(ATRAC Data Collection\)”](#) on page 339).

- D (detail) collects the most important IFCIDs, including all exception events.
- SQL includes all detail events plus SQL statements.
- SCAN includes all detail events plus scan and SQL events.
- IO includes all detail events plus I/O information.
- LOCK includes all detail events plus lock requests.
- DDF includes all detail events plus all DDF events except those related to VTAM.
- DDFVTAM includes all detail events plus VTAM-related DDF events.

Note: Collecting additional types of events incurs more overhead and requires larger trace buffers in MVDB2.

OPx

Is an internally defined DB2 buffer destination (OP1 to OP8).

These traces are displayed with a type of MON by a DB2 -DIS TRACE(*) command and have a destination of OPx.

Detail Trace Online Data Storage

For each active detail trace, there is a set of data collection buffers. The buffer allocated by DB2 is formatted and passed to a data collector function in the BBI-SS PAS. The data collector inserts the formatted variable length data into the trace display buffer associated with each active detail trace. The size of the buffer is specified by the user as described below.

Figure 49 shows how the trace data is collected and stored in the buffers for display by the DTRAC service.

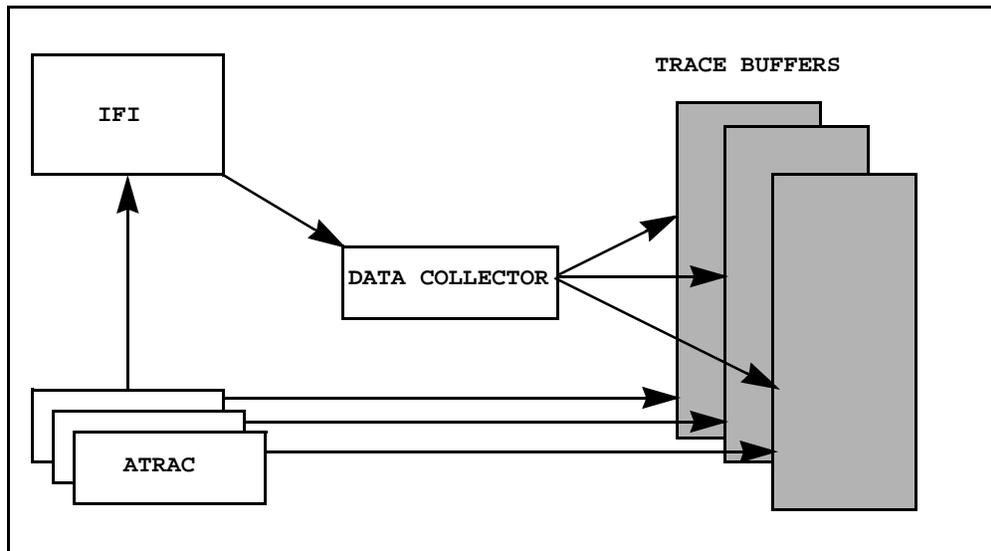


Figure 49. Detail Trace Buffer Storage

There are three kinds of buffers used for a detail trace:

- An internal buffer that is filled by the DB2 Instrumentation facility.

This buffer is managed internally by MVDB2 and DB2 in extended CSA. You cannot specify its characteristics.

- A pool of data collection buffers maintained by MVDB2.

A pool exists for each active detail trace in the BBI-SS PAS extended private area storage. A buffer is allocated at CREATE THREAD per active thread being traced and more might be needed as the thread progresses. You can specify the size and number of these buffers with the following parameters, which are specified in the DMRBEX00 member of the BBI-SS PAS BBPARAM data set (defaults per DB2) or in the data entry panel for the ATRAC request (see Figure 50 on page 141).

Note: ATRAC TRSIZE and TRBUFF are primed with the TRSIZE and TRBUFF values specified in DMRBEX00. If TRSIZE or TRBUFF is defined with an ATRAC request, their values override any value specified for these keywords in DMRBEX00.

TRBUFF=nnn

nnn is the number of buffers to be allocated.

TRSIZE=nnnK

nnn is the size in K of each buffer. If K is not specified, the value of nnn is in bytes. It is rounded to a multiple of 4K during processing.

For example, DMRBEX00 could specify:

```
TARGET=DB2P
TRBUFF=20
TRSIZE=400K
```

Total pool size is $20 * 400K = 8,000K$

- A single buffer per trace containing data allocated in BBI-SS PAS extended private area with a GETMAIN.

Its default size is specified in the BBIISP00 member of the BBI-SS PAS BBPARM data set. It can be overridden with the use of the STORAGE parameter specified with the ATRAC request (valid for a summary or detail trace). Entries are wrapped (default of WRAP=YES; new data overlays oldest data) unless you specify WRAP=NO with the ATRAC request. WRAP can be changed at any time by using the M line command from the Current Traces application (Option 4) to modify the ATRAC request.

- Note:** See [“Starting a Detail Trace” on page 149](#) for detailed recommendations about how to set these values.

Trace Logging

The trace facility allows you to log both summary and detail trace data to external VSAM data sets.

Data sets are assigned to each trace request, which allows the data from ad hoc application testing traces to be managed separately from those set up by database administrators or systems programmers for system-wide continuous surveillance of the total workload or thread exceptions.

To allow flexible space management, each trace can be logged to a single or multiple data sets, either preallocated by the requestor or automatically allocated and managed by the trace facility.

A casual user of the trace can use trace logging very simply by accepting all defaults, while the system administrator has all the options needed for complete automation and control.

Trace logging provides the following flexible reporting capabilities:

- **All data for an active trace can be viewed online**

If the desired data is no longer available in the online buffers, a HISTORY expand button on the trace displays (LTRAC, STRAC, DTRAC) can be used to retrieve the data from the current log data set where it can be viewed and analyzed with all the online trace displays.

- **Historical trace data can be viewed online at any time**

All trace log data sets are tracked in an online trace directory. The History Traces application (Option 5) displays these data sets and allows online recall with a simple line command, whether the trace was written the same day, last night, a year ago, or even on another system. This feature provides these benefits:

- Data from completed traces is saved in the trace logs so that no data is lost during system interruptions.
- The older data from an active trace with multiple log data sets can be accessed through this application.
- When the current log data set for an active trace is accessed through this directory, a CURRENT expand button on the trace displays provides automatic switching to displays of the online buffer data.
- Online administration of the trace logs simplifies the tracking of which traces are valuable enough to keep for later reporting and which should be deleted after review. An additional option allows the submission of a batch job to print any trace.
- Traces can be kept as thread profiles for later comparisons after application or system changes are made that might affect performance. A trace of an application on the development system can be compared to the same trace on production to easily spot access path changes or performance degradation not shown by EXPLAIN.

- **Short-term workload history is always available**

The workload summary displays TSUMx and TSTAT can be used online against the data from any of the trace logs to analyze either workload trends or thread exceptions at a particular time or for a specific plan or user. The accounting data is always available to back up these summaries, and for a detail trace the detail events are there too, already correlated for ease of use.

- **Traces can be printed in batch for offline review**

All trace displays and data levels shown online can also be reproduced as batch reports for hardcopy review. You can choose between a simple application summary report with one line per accounting record, all the data from that accounting record, workload summaries by authorization ID, plan or time, or even the complete detail trace of chronological events with event pop-up displays.

- **All summary trace reports can be printed directly from SMF**

All the displays available for a summary trace are also available as batch reports from the SMF accounting records. If there is no active trace in MAINVIEW for DB2, it is still possible to produce the equivalent reports. These reports can be produced from unloaded SMF data sets, from the current SYS1.MANx data sets, or from a GTF trace.

- **Tracing of very large applications**

The logging facility also enables tracing of long-running applications without loss of data because of online buffer limitations.

ATRAC—DB2 Application Trace

Data collection must be activated by starting the ATRAC service before data can be displayed with the application trace services. There are several ways to activate an ATRAC request as described in [“Requesting a Trace” on page 131](#). The most common way is from the ATRAC online data entry panels. These panels can be accessed by typing **ST** (START TRACE) on the COMMAND line of the list of current traces (Option 4 from the Primary Option Menu).

The online data entry panels present all trace options. Specify the options that you want and press ENTER. The activation of any trace request initiates data collection from the specified subsystem. Multiple trace requests with different selection criteria can run concurrently. Thus, you can tailor your trace data for specific needs.

Starting a Trace

When Start Trace (ST) is requested, the initial data entry panel displays a default request for a summary trace (S option for the TYPE parameter), as shown in [Figure 50 on page 141](#). Changing TYPE to D provides the standard detail trace, including SQL.

You also can start a trace with exception filters, detail trace options, and trace logging options from an EXEC or from a BLKxxxxx member in your BBPARM data set. For example, the following EXEC starts a detail trace that collects SQL, scan, I/O, and lock events in addition to the events collected by the standard detail trace:

```
IMFC SET REQ=ATRAC PLANNAME TARGET=DB2P TYPE=SQL,SCAN,IO,LOCK
STORAGE=4000K WRAP=Y DB2PLAN=planname TITLE=title GROUPSQL=Y
```

In a BBPARM BLKxxxxx member, the same trace can be specified as:

```
REQ=ATRAC PLANNAME TARGET=DB2P TYPE=SQL,SCAN,IO,LOCK
STORAGE=4000K WRAP=Y DB2PLAN=planname TITLE=title GROUPSQL=Y
```

See BBPARM member, BLKDMRKY, for a complete description of all the keywords you can use.

Start DB2 Trace Request Panel

A trace can be started using only this panel. However, you can access additional data entry panels to override default settings to specify

- Exception filters (to reduce the amount of data saved)
- Detail trace options (to trace additional events)
- Trace logging options (to specify additional data set allocation and processing options)

```

BMC SOFTWARE ----- START DB2 TRACE REQUEST ----- PERFORMANCE MGMT
COMMAND ==>                                               TGT==> DB2D

PARM   ==>          (Trace identifier)      START ==>          (hh:mm:ss)
TYPE   ==> S        (S-Summary,D-Detail)    STOP  ==>          (hh:mm:ss/#min)
STORAGE ==> 1000K   (Display buffer size)    WRAP  ==> YES      (Y/N wrap buffer)
LOGTRAC ==> N      (Y/N log trace)          RST   ==> HOT      (HOT,PUR,QIS)
TITLE  ==> DB2 APPLICATION TRACE

Specify Selection Criteria:
DB2PLAN ==>
DB2AUTH ==>
DB2CONN ==>
DB2CORR ==>
DB2LOC  ==>
DB2PKG  ==>
CONNTYPE ==>

Specify additional trace options: (* = processed)
Exception Filters      ==> N (Y/N)
Detail Trace Options   ==> N (Y/N)
Trace Log Data Set Options ==> N (Y/N)

Press ENTER to process; END to cancel

```

Figure 50. Start DB2 Trace Request Panel

PARM **id**

If you want to run multiple trace requests, specify an ID in the PARM field to make the trace unique. However, blank can also be used as an identifier for one trace. The identifier is used to specify which set of trace data is to be displayed with the application trace services.

TYPE **S | D**

S (the default) requests a summary application trace of completed threads. D requests a detail application trace that also collects major events in the life of the thread.

STORAGE **n**

Determines the size of the trace display buffer to contain the trace entries per active trace. The size is specified in K format, where K is the number of 1024 byte blocks; for example, 200K is

200*1024=204800 bytes

This value is primed from the default specified in DMRBEX00. If no value is specified, the value from BBIISP00 is used.

Note: For a detail trace, this value must be at least four times TRSIZE. If the specification is less than four times TRSIZE, the STORAGE value will be adjusted upward.

LOGTRAC **N | Y**

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 [“Specifying Trace Logging Options” on page 156](#)), a single data set is dynamically allocated using the defaults specified in DMRBEX00 for this DB2.

N is the default.

Note: You must be authorized to use dynamic allocation.

TITLE **c...c**

Defines a title for the trace (1 to 24 characters). If you are logging the trace, BMC Software recommends that you specify a more specific title to help identify the contents of this trace at a later time.

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.

Default is the next full minute.

STOP **nnn | hh:mm:ss**

Requests trace stop limit as a time stamp or number of minutes to process. The default is set from TRTIME in DMRBEX00.

Processing ends 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, and W line commands from the Current Traces application.

WRAP **Y | N**

Stores the entries in buffer in a wraparound method. The wrap can be automatic, WRAP=Y (default), or user-controlled, WRAP=N.

RST **HOT | PUR | QIS**

Defines the restart option to be used when a service is quiesced because of an inactive DB2 subsystem or SETBLK=RRR request. Default is HOT.

HOT Restarts the trace automatically without the loss of previous data.

PUR Purges the trace automatically when the target DB2 starts.

QIS Keeps the trace in a quiesced state until it is purged by an authorized user.

Selection Criteria:

A list of operands can be specified in each of the selection criteria fields; for example:

DB2CONN ==> **IMSA,IMSB**

Note: For the selection to match a trace record, selection criteria keywords are connected with an AND operation, and the operands within a keyword are connected with an OR operation.

Note: For a detail trace, you must specify at least one valid plan or authid.

DB2PLAN **name**

Qualifies a workload trace by a one- to eight-character DB2 plan name.

Summary Trace

The maximum number of operands is the total field length (60 characters). The + character can be used as a name qualifier (see “Qualifying Requests” in *Using MAINVIEW*).

Detail Trace

You can specify up to eight plans to be traced. If more than one DB2AUTH operand is specified, only one plan name can be specified.

Note: The + and * characters cannot be used as generic operand characters for detail trace.

DB2AUTH **id**

Qualifies a workload trace by DB2 authorization ID.

Summary Trace

The maximum number of operands is the total field length (60 characters). The + character can be used as a name qualifier (see “Qualifying Requests” in *Using MAINVIEW*).

Detail Trace

The maximum number of operands is eight. If more than one DB2PLAN operand is specified, only one authorization ID can be specified.

Note: The + and * characters cannot be used as generic operand characters for a detail trace. The only exception is the use of a single + character as the operand for DB2AUTH, which traces all DB2 workloads and can cause excessive overhead except in a lightly-loaded test system. Therefore, this option is subject to security restrictions.

DB2CONN **name**

Qualifies a summary workload trace request by a one- to eight-character connection name.

Note: For a detail trace, this parameter does **not** reduce data collection. Non-matching records are filtered out after they are received from the DB2 trace.

The maximum number of operands is the total field length (60 characters). The + character can be used as a name qualifier (see “Qualifying Requests” in *Using MAINVIEW*).

DB2CORR **id**

Qualifies a summary workload trace request by a 1- to 12-character correlation ID.

Note: For a detail trace, this parameter does **not** reduce data collection. Non-matching records are filtered out after they are received from the DB2 trace.

The maximum number of operands is the total field length (60 characters). The + character can be used as a name qualifier (see “Qualifying Requests” in *Using MAINVIEW*).

DB2LOC **name**

Qualifies a summary workload trace request by a 1- to 16-character remote location name. Both server and requester activity with this location are selected (DBAT and DIST threads).

Specify an IP address in quotation marks.

Note: For a detail trace, this parameter does **not** reduce data collection. Non-matching records are filtered out after they are received from the DB2 trace.

The maximum number of operands is the total field length (60 characters). The + character can be used as a name qualifier (see “Qualifying Requests” in *Using MAINVIEW*).

DB2PKG **name**

Qualifies a summary or detail workload trace request by a 1- to 8-character DB2 package name (only when accounting class 7 or 8 is active).

The maximum number of operands is the total field length (60 characters). The + character can be used as a name qualifier for a summary trace (see “Qualifying Requests” in *Using MAINVIEW*).

CONNTYPE **TSO | IMS | CICS | BATCH | CAF | IMSMPP | IMSBMP |
IMSTBMP | IMSCTL | DLI | SYSSERV | APLSERV | UTIL | blank**

Qualifies a summary or detail workload trace by connection type. Blank collects data for all connection types.

Additional Trace Options Processing

You can access additional data entry panels to override default settings to specify exception filters, detail trace options, or trace log data set options by specifying Y for one or more of the additional trace options.

When you select Y for an option, you are presented with an additional menu. Once you are finished with that screen, press the ENTER key to process. If there are more extension screens to be processed, you are presented with the next screen without returning to the Start DB2 Trace Request panel.

When all extension screens are processed, the Start DB2 Trace Request panel displays an asterisk (*) next to each processed option. The request is not submitted until all the options display either N or *. This feature gives you the opportunity to review and change your options before sending the request. For example:

- If you change an * to an N, the items specified on that extension menu are dropped.
- If you change an * to a Y, that extension menu is displayed primed for update with the values previously specified.
- If you change an N to a Y, that extension menu is displayed.

Note: Once a trace is activated, only certain options can be changed. To change the others, the trace must be stopped and reactivated. See [“Modifying a Trace” on page 162](#).

Selecting Trace Data for Retention

The Exception Filters are keywords that retain only the required data in the online trace buffer or the trace log data set (TLDS). They can be used to

- Detect occurrences of specific exception conditions
- Limit the amount of buffer or DASD storage required by retaining only the most interesting threads for analysis

If you specified Y in the Exception Filters field on the Start DB2 Request panel, the data entry panel shown in [Figure 51](#) is displayed.

Note: Data that causes a trace entry to be filtered is highlighted in the STRAC (Summary Trace Entry) display (see [“STRAC—Summary Trace Entry” on page 267](#)).

```

BMC SOFTWARE ----- DB2 TRACE EXCEPTION FILTERS ----- PERFORMANCE MGMT
COMMAND ==>>>                                     TGT -- DB2D

Specify Exception Filters:
ELAP =>          GETPAGE =>          MAXLOCK =>          SQLDDL =>
CPU  =>          PGUPD  =>          LOCKTBL =>          SQLDYN =>
ABORT =>         READIO =>         INCRBIND =>         SQLCTL =>
UIDCOM =>        LOCKSUSP =>        SQLSEL  =>          SQLFETCH =>
GETRIO =>        LOCKESCL =>        SQLUID  =>          SCLTOT =>
RLF  =>          TIMEOUT =>        RIDFAIL =>          CLAIMDR =>
PWAITIO =>       PWAITLK =>        PWAITPF =>         PWAITOT =>
PFREQS =>        PFREADS =>        HPFAILS =>         PRLLGRP =>
PRLLRED =>       PRLLFALB =>
ELAPDB2 =>      CPUDB2  =>
    
```

Figure 51. DB2 Trace Exception Filters Panel

Exception Filter Keyword Descriptions

The keywords and their values are described below. The keyword values are user-defined. A < prefix can be used with a numeric value to define a less-than condition. If a numeric value is not defined as a less-than condition, it is compared to a greater-than or equal-to condition. The specified keywords are ORed; a trace record is retained if any one of the comparison conditions is valid.

For example:

ELAP => 5.5

Collects only records with an elapsed time equal to or greater than 5.5 seconds.

GETPAGE => 1000K

Collects only records with the number of GETPAGE requests equal to or greater than 1,000,000.

GETRIO => <5

Collects only records that have a GETPAGE to READ I/O ratio less than 5.

Note: For trace exceptions requiring AND logic, you can give the trace a special name (in the PARM field) to activate this logic. The name must be in the format N#xxxxxx, where xxxxxx can be one to six alphanumeric characters.

Table 11 is an alphabetical listing of the keywords with a description of each value that can be used.

Table 11. Exception Filter Keyword Descriptions

Exception Filter Keyword	Description
ABORT	Y selects aborted threads.
CPU	CPU transaction time. The time can be either in hours, minutes, and seconds as hh:mm:ss or in seconds as ss (maximum of three decimals).
CPUDB2	CPU time of transaction while within DB2. The time can be either in hours, minutes, and seconds as hh:mm:ss or in seconds as ss (maximum of three decimals).
ELAP	Elapsed time of thread. The time can be either in hours, minutes, and seconds as hh:mm:ss or in seconds as ss (maximum of three decimals).
ELAPDB2	Elapsed time of thread while within DB2. The time can be either in hours, minutes, and seconds as hh:mm:ss or in seconds as ss (maximum of three decimals).
Note: The following keywords must be numeric. They can be specified in K; for example, 100K.	
CLAIMDR	Number of claim / drain failures (QTXACLUN + QTXADRUN).
GETPAGE	Number of GETPAGE requests. (This value must be specified in K if it is greater than 999999.)

Table 11. Exception Filter Keyword Descriptions (Continued)

Exception Filter Keyword	Description
GETRIO	Ratio: Number of GETPAGE requests issued per READ I/O. Note: A < prefix should be used to define this value. The IBM <i>DB2 Administration Guide, Volume III</i> , suggests that a ratio below 1.5 can initiate poor read efficiency.
HPFAILS	Number of hiperpool read or write failures (QBACHRF + QBACHWF).
INCRBIND	Number of incremental BINDs issued.
LOCKESCL	Number of lock escalations.
LOCKSUSP	Number of lock suspensions.
LOCKTBL	Number of LOCK TABLE requests.
MAXLOCK	Maximum number of locks held.
PFREADS	Number of prefetch read I/Os (QBACSIO).
PFREQS	Number of prefetch requests (QBACSEQ).
PGUPD	Number of page update requests.
PRLLFALB	Number of parallel groups that fall back to sequential processing (QXDEG CUR + QXDEGES A + QXDEGBUF + QXDEGENC).
PRLGRP	Number of parallel groups executed (QXTOTGRP).
PRLRED	Number of parallel groups executed at a reduced degree (QXREDGRP).
PWAITIO	Percent of elapsed time for I/O waits (QWACAWTI/QWACASC).
PWAITLK	Percent of elapsed time for locks (QWACAWTL/QWACASC).
PWAITOT	Percent of elapsed time for other waits [(QWACAWTE+QWACALOG)/QWACASC].
PWAITPF	Percent of elapsed time for waiting for prefetch to be completed (QWACAWTR/QWACASC).
READIO	Number of READ I/Os issued.
RIDFAIL	Number of RID pool failures (QXNSMIAP and/or QXMRMIAP).
RLF	Y selects threads that were governed by RLF.
SQLCTL	Number of SQL control statements, such as GRANT or REVOKE.
SQLDDL	Number of SQL Data Definition Language statements.
SQLDYN	Number of SQL PREPARE statements.
SQLFETCH	Number of SQL FETCH statements.
SQLSEL	Number of SQL SELECT statements.
SQLTOT	Total number of SQL statements.

Table 11. Exception Filter Keyword Descriptions (Continued)

Exception Filter Keyword	Description
SQLUID	Number of SQL UPDATE, INSERT, and DELETE statements.
TIMEOUT	Number of timeout/deadlocks (QTXATIM).
UIDCOM	Ratio: Number of SQL UPDATE, INSERT, and DELETE statements issued per COMMIT.

Starting a Detail Trace

To start a detail trace, specify D in the TYPE field on the Start DB2 Trace Request panel shown in [Figure 50 on page 141](#).

A maximum of four detail traces can be activated. An ID must be specified as a parameter to make each request unique. Tracing begins immediately even for currently active threads. If a thread is already executing, the data for events that occurred before the trace started will be missing.

See [“Recommendations when Starting a Detail Trace” on page 153](#) for points you should consider before starting a detail trace.

Note: You must be authorized to make detail trace requests.

Detail Trace Options

To change the default options, access the following extension data entry panel by specifying Y in the Detail Trace Options field on the Start DB2 Trace Request panel shown in [Figure 50 on page 141](#). After changing this panel, press the ENTER key to process the options.

```

BMC SOFTWARE ----- DETAIL TRACE OPTIONS ----- PERFORMANCE MGMT
COMMAND ==>>>                                     TGT -- DB2D

Specify additional events:
  SQL          ==>>> Y (Y/N)
  SCANS        ==>>> N (Y/N)
  I/O          ==>>> N (Y/N)
  LOCKS        ==>>> N (Y/N)
  DDF          ==>>> N (Y/N)
  DDFVTAM      ==>>> N (Y/N)

Specify event compression:
  GROUP SQL    ==>>> Y (Y/N)

Specify data collection buffer options:
  TRSIZE       ==>>> 400K   (Trace buffer size)
  TRBUFF       ==>>> 20    (# of trace buffers)

```

Figure 52. Detail Trace Options Panel

Additional Events:

A default application trace request collects major events in the life of the thread, including all exception events and SQL statements.

A basic detail trace (not including SQL) collects accounting summary (SMF 101) events plus the following events:

- Lock summary
- TERM THREAD
- Utility phases
- PLAN BIND, REBIND, and FREE
- EDM requests
- SORT
- Plan allocation
- TABLESPACE OPEN and CLOSE
- Package allocation
- Authorization failure
- Lock suspension
- Multiple Index Access Path failures
- ABORT
- COMMIT
- CREATE THREAD
- Lock time-out and deadlock

By specifying Y on the Detail Trace Options panel, you can request that the following additional types of data be collected:

- SQL (default = YES)

Traces all SQL statements and produces a *mini-explain* for dynamic SQL. Elapsed time, CPU time, return code, number of pages scanned, and number of rows scanned by each SQL statement are reported.
- SCANS (includes SQL)

Traces all types of scans within the context of SQL statement execution. Number of pages scanned and number of rows scanned by table space or index are reported.
- DDF

Reports all DDF events up to the VTAM boundary. This value includes the RDS/DRDS interface, AUTHID translation, and distributed SQL.

In most circumstances, this data is the most you would set up to trace. At this level you generally have enough information to analyze SQL and table access patterns or to identify the origin of a problem, while the overhead is still acceptable in a test environment.

Adding I/O events also can be valuable when physical data access by table space and index space is a concern.

- I/O

Traces all I/O activity on table spaces and indexes, both synchronous and asynchronous. Elapsed time and pages read or written are reported.

Only in very rare situations do you need to know exactly what is going on at the lock request and VTAM levels to identify a problem. The overhead incurred in tracing the following events can be quite high:

- LOCKS

Traces every request to IRLM. Lock token, request type, and return code are reported.

Note: Even without tracing lock events, a lock summary is available in DTRAC.

- DDFVTAM

Traces VTAM activity resulting from DDF requests. Events such as VTAM macro and send/receive buffers are reported.

See [Appendix B, “IFCID Table \(ATRAC Data Collection\)”](#) on page 339 for a list of all IFCIDs in these groups.

Event Compression:

GROUP SQL Y|N

Identical SQL events are grouped into one to reduce storage usage.

Data Collection Buffer Options:

TRSIZE nnnK

Size of the trace collection buffer to use. You might need to increase it to trace a long-running application.

This number is rounded to a multiple of 4K. This buffer is allocated to individual threads to receive trace data from DB2. At buffer overflow or term-thread time, the content of the buffer is transferred to the display buffer (defined by the STORAGE parameter) and to the trace log data set if logging is requested.

The default is obtained from member DMRBEX00 of the BBPARM data set. It is recommended you start with 400K and do not reduce it below 100K.

Note: Storage constraints dictate that the size of the trace buffers must be balanced with the number of trace buffers. A given thread can use up to two buffers at one time. Thus, if the trace is not logged and the second trace buffer overflows, you might not have the complete trace for the thread traced. (Therefore, logging is recommended.) On the other hand, fewer very large trace buffers can cause you to lose data completely simply because there are not enough trace buffers to go around for all the concurrent threads.

TRBUFF nnn

Number of trace buffers to allocate for a trace request. This number determines how many concurrent threads can be traced.

TRBUFF and TRSIZE together define the total capacity for receiving trace data from DB2. (STORAGE defines the real-time display capacity.)

The number of trace buffers should be at least double the number of concurrent active threads being traced in DB2 plus 20%. Preferably, it should triple that number. The extra capacity is needed to handle buffer overflow and the turnaround delay in unloading data into the display buffer.

The default is obtained from member DMRBEX00 of the BBPARM data set.

For example, to trace a long-running application, qualify the request so that only one thread is traced at a time. Set TRBUFF to 3 and increase TRSIZE to hold more events.

If you specify logging, each filled buffer is written to VSAM. You can use online recall from the trace log (History Trace) to see the complete thread activity. TRSIZE can therefore be kept smaller.

Conversely, if you are tracing online threads, you will probably need to set TRBUFF higher to capture multiple concurrent threads, but the number of events (and TRSIZE) is smaller.

Recommendations when Starting a Detail Trace

This section discusses several points you should consider before starting a detail trace.

Choosing Which Events to Trace

The default detail trace includes many important special events in the life of a thread (for example, Create Thread, Plan/Package Allocation, Sort), as well as all SQL statement events. The majority of application problems can be resolved with this data, so most detail traces should be at the SQL level to limit trace overhead and storage usage.

- Add SCANS or I/O when activity per table space / index space is required.
- Add DDF events for distributed threads.
- Add LOCKS or DDFVTAM only for very special situations.

Both of these trace types add a large number of events and overhead to a trace request. Review the events captured by these two types and make sure that they really give you the information you need before activating them. See [“Analyzing Lock Usage without Tracing LOCK Events” on page 155](#) for special considerations for lock analysis.

Specifying GROUPSQL=Y can reduce storage requirements by grouping identical SQL events, such as a series of FETCHes.

Specifying Selection Criteria

Limit the number of concurrent threads to be traced using DB2AUTH or DB2PLAN. Exception filters reduce the amount of data saved, but do not affect the amount of data collected from DB2.

Reviewing Storage Requirements

To collect detail trace data from DB2, MAINVIEW for DB2 (MVDB2) uses several buffers for different purposes. The MVDB2 administrator sets up defaults per DB2 that are sufficient for most trace requests. However, if you are tracing more events or more concurrent threads, you might need to increase these defaults. Otherwise you might receive various messages that detail data (some events) has been lost. The STORAGE parameter (first panel, needed for both summary and detail traces) determines how much you can view from online storage (Current Traces). TRBUFF and TRSIZE (Detail Trace Options panel) control the detail event capture buffers.

- If the number of concurrent threads to be traced is not limited to one, ensure that TRBUFF is two to three times the number of threads. For example, if you are tracing a specific plan, but three users might be executing it at the same time, set TRBUFF to 8–9.
- If you are tracing long-running threads, or have specified more event types, review the default TRSIZE to consider increasing the buffer size to hold more events. Often in this case you can limit the number of concurrent threads to one and reduce TRBUFF to three to five. (Three buffers might not be enough to trace a single thread when running on a fast CPU and logging many events.)
- A single cylinder trace log data set holds approximately 700K of data. If TRSIZE is greater than 700K, it requires more than a one-cylinder trace log data set to hold a full trace buffer.

- Consider logging the trace, since without logging you are limited to viewing only the data from the last two filled buffers per thread, and only what is currently in the STORAGE buffer. With logging, multiple buffers can be written per thread and combined automatically when recalled online or printed. It is preferable for this type of trace to allocate one large trace log data set (TRCYLS), since some data can be lost if events for one thread span two data sets. You can view data online from one trace log data set at a time, but can print full reports from multiple data sets.

If you have logged a trace, it is preferable to view the trace data from History Traces (the logs) instead of Current Traces for two reasons:

- When the tracing is complete, you can purge the trace request from Current Traces and free up the storage; storage is then allocated only when you are actually viewing the logged trace data.
- The trace data for long-running applications might be more complete on the logs (multiple combined buffers) than in the online STORAGE buffer.

Tracing Long-Running Threads

Sometimes, no data is shown in an active trace for a long-running thread.

The data is being collected, but is usually only shown in LTRAC and STRAC when the thread is completed and the DB2 accounting record is available. While the thread is active, you can view the events with the UTRAC display, which is like the DTRAC display but is accessible from DUSER for that thread.

You also can set up trace logging for a long-running thread, specifying one or more small trace logs.

Each time a trace log fills up, a dummy accounting record is written for any threads being traced that are still incomplete. These entries then show up on LTRAC (with a status of INCMP) and can be selected for viewing. The STRAC display obviously has none of the accounting data, but does have the detail summaries of events (SQL, IO/LOCK, and so forth), and from STRAC you can expand to the DTRAC entries.

If the trace is not stopped, the final detail events and the accounting record information appear in the trace log active when the thread is completed, as before.

Specify log wrap YES or NO, depending on which part of the thread that you want to keep. With YES, the earlier events can be overwritten.

See [Appendix C, “Recommendations for Detail Traces of Long-Running Threads”](#) on page 347 for more information.

Analyzing Lock Usage without Tracing LOCK Events

The first place to look is the Lockout History display that shows you a list of the last 100 timeouts and deadlocks that have occurred. The complete details from these events are available to identify both holder and waiter threads as well as the resources involved.

To analyze locking problems for an application, first look at the accounting record (STRAC) for the counts on maximum page locks, suspensions, lock requests, and timeout/deadlocks. This data is already available with a summary trace and should help you identify which applications are having—or causing—problems. For further information, a detail trace with SQL events is often sufficient. Usually you will want to include SQL so you can more easily determine which statement is causing the problem, but a great deal of information is available with just the basic detail trace.

If you are still searching for the culprit application, you might want to run a basic detail trace with no further events (not even SQL), but covering all the suspected applications. This type of trace causes much less overhead. You could also use exception filters in the trace request to identify threads with lock suspensions, escalations, lock table requests, or those with a high maximum number of locks held.

The following events are available in DTRAC for any detail trace. Analyze this information before deciding to trace LOCK events.

LOCK-SUMMARY (display LEVEL=2)

This event appears near the end of the thread processing. It shows the maximum number of page locks held and the highest lock state for each page set (table/index space) accessed.

LOCK-TMO (display LEVEL=1)

This event is shown for any thread terminated by either a timeout or a deadlock. It shows the page set involved and identifies the first holder of the lock that was in contention, as well as the state of the lock (for example, held exclusive). It is followed by either a DEADLOCK or a TIMEOUT event (display LEVEL=2) that gives complete details.

Note: LOCK-TMO is not available for DB2 4.1.

LOCK-SUSP (display LEVEL=3)

This event is shown for all lock suspensions. It shows the elapsed time suspended, the page set, the type of entity locked (for example, a data page, index tree, and so on), page number if applicable, and lock state.

Another source of information is the DB2 timeout and deadlock messages in the Journal Log or MVS console. If the DB2 messages are being written to the Journal, go to Option L and issue a FIND DSNT37 to find any deadlock (DSNT375) or timeout (DSNT376) messages. They are followed by DSNT501I to identify the resource and lock owner that caused the contention. If you have AutoOperator Solutions installed, you can use the DB2DLOK solution to summarize and analyze the deadlock/timeout messages and LOCKD contention snapshots. Refer to the *MAINVIEW Solutions Guide* for details.

Specifying Trace Logging Options

To specify additional trace logging options, access the following extension data entry panel by specifying Y in the Trace Log Data Set Options field on the Start DB2 Trace Request panel shown in [Figure 50 on page 141](#). After filling out this panel, press the ENTER key to process the options.

```

BMC SOFTWARE ----- TRACE LOG DATA SET OPTIONS ----- PERFORMANCE MGMT
COMMAND ==> TGT -- DB2D

Number of Logs ==> 1          (# data sets; >1 for auto switch when full)
First Log DSN ==>
                    Low level qualifier of DSN must be V01
                    Blank for default: CIR7.DB1D.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 ==> D1      SMS Data Class ==> SMSDATA
                               SMS Management Class ==> SMSMGMT

```

Figure 53. Trace Logging Specification Panel

Number of Logs

Is the number of trace log data sets to be allocated. Specify more than one for continuous traces. This option allows automatic switching when a log data set is full.

First Log DSN

Is the name of the first log data set to be allocated.

If left blank, a default name is constructed as
&TRPREFIX.&DB2ID.&TRACEID.mmmdd.Thhmm.V01 where

- &TRPREFIX is your user ID or the prefix specified in DMRBEX00.
- &DB2ID is the target DB2 subsystem ID.
- &TRACEID is the identifier specified in the PARM field on the first Start DB2 Trace Request panel.
- mmmdd is the current month and day.
- Thhmm is the current time.
- V01 is the required suffix.

If quotation marks are omitted for the log data set name, the specified value is prefixed with TRPREFIX as specified in DMRBEX00. If TRPREFIX is not specified, your user ID is used for the prefix. If quotation marks surround the name, it is allocated exactly as specified.

For example, if there is no TRPREFIX specification in DMRBEX00, you can specify **TEST.V01** to allocate userid.TEST.V01.

You can specify up to an eight-character suffix for the data component (see the Data DSN Suffix description on page 158). However, if you want a name totally different from the cluster data set name, you must preallocate the data set.

Overwrite logs **Y|N**

Indicates the action to be taken when a log data set is about to be used for trace data without having been reset. Y means that existing data can be overwritten; N means that logging should be quiesced.

Note: This field has no effect if the data set has been reset.

Archive PROC

Is the name of the entry in PROCLIB to archive a log data set when it is full, when logging is switched to the next data set, or when the trace is completed normally. (See the sample archive job in BBSAMP member DZTBARC; see [“Archiving a Trace Log Data Set” on page 172.](#))

Log switch time **hh:mm**

Specifies the time an automatic log switch from the current log to the next log will occur. Valid only if Number of Logs > 1.

Note: If another log is not available at that time (status of EMPTY or RESET), the switch cannot be made.

Disposition **OLD|NEW**

Specifies the status of the data sets

OLD indicates all the data sets exist and are valid trace data sets. (See the sample job for allocating a trace log data set in BBSAMP member JXT011; see [“Defining a Trace Log Data Set” on page 172.](#)) Existing data is overlaid if Overwrite Logs = Y.

NEW (default) indicates none of the data sets exist. All the data sets are allocated when the trace request is processed. If any of the data sets cannot be allocated, the trace request fails and the data sets that were successfully allocated are deleted.

Note: If your user authorization specifies TRALLOC=NO, only OLD is accepted.

Volumes

Indicates the volumes to use when allocating a trace log data set. You can specify up to seven volumes. The default value specified in DMRBEX00 with the TRVOLS keyword is SYSDA.

When the number of logs is one, the data set is allocated on the first volume. When the number of logs is greater than one, 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 data center is SMS-controlled, the volume specified may be overridden by your SMS criteria.

SMS-controlled sites do not need to specify volumes. Non-SMS-controlled sites must specify volumes to avoid an IDCAMS-defined cluster error.

Primary CYLS

Specifies the primary allocation in CYLS for trace log data sets. The default value specified in DMRBEX00 with the TRCYL keyword is 3.

Note: Allocating a very large data set (with several hundred cylinders) can cause a delay due to formatting by VSAM. In this case, specifying a preallocated and preformatted log data set is preferable.

Data DSN Suffix

Specifies the suffix to be appended to the cluster DSN to make the DSN of the data component. The default value specified in DMRBEX00 with the TRSUFFIX keyword is D.

SMS Storage Class

Specifies the name of the SMS Storage Class to be used when allocating this trace data set. The default is specified in DMRBEX00 with the TRSMSSCL keyword.

SMS Data Class

Specifies the name of the SMS Data Class to be used when allocating this trace data set. The default is specified in DMRBEX00 with the TRMSDCL keyword.

SMS Management Class

Specifies the name of the SMS Management Class to be used when allocating this trace data set. The default is specified in DMRBEX00 with the TRSMSMCL keyword.

Log Switching Considerations

You can assign a set of logs for a each trace when submitting the trace request. Log switching to the next available data set occurs when

- A log data set is full
- At a time, such as midnight, specified with the trace request
- You request an immediate log switch with the I command on the Current Traces display

If an archive started task was specified on the trace request, that STC is run. It can

- REPRO a copy of the data to tape or another disk data set
- Execute a step to flag the data set for reuse
- Submit a job to print reports

If no data set is available and overwriting logs was specified on the trace request, logging switches with the oldest trace data set.

Replicating a Trace Request

Once you have activated a trace request from the ATRAC data entry panels, you can easily submit another request with similar options. To replicate an existing request:

1. Access the Current Traces application (Option 4).
2. Use the R line command to select an active trace that is similar to the one that you want to activate.
3. Specify a unique identifier in the PARM field.
4. Modify as needed any values that are prefixed with an ===>.
5. Submit the new request.

Controlling Current Traces (Option 4)

You can control active traces by accessing the Current Traces application (Option 4).

```
BMC SOFTWARE ----- CURRENT TRACES ----- PERFORMANCE MGMT
COMMAND ==>>                                     TGT ==>> DB2D
                                           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
SUMMARY  DAILY ACCOUNTING TRACE              CIR11    DB2D    SUM  WKLD  ACTV  ACT
DETAIL   TRACE OF APDT001T                    PWW1     DB2D    DET  WKLD  ACTV
BIGELAP  ELAPSED OVER 10 SEC                   PWW1     DB2D    SUM  WKLD  ACTV
***** END OF REQUESTS *****
```

Figure 54. Current Traces Application

This application is similar to the Active Timer Requests application (see [“Active Timer Requests \(Option 3\)” on page 102](#)), except the list of services shows only current trace requests. This section discusses the uses of this application that apply only to current traces.

Primary Commands

The following primary commands can be typed on the COMMAND line of the Current Traces application:

- The ST command accesses the Start DB2 Trace Request panel and each of the additional ATRAC options panels. Use this command when you want to start a trace. (See [“ATRAC—DB2 Application Trace” on page 140](#).)
- The HT command accesses the History Traces application. Use this command to access and control the current and historical trace logs. (See [“Managing History Traces” on page 164](#).)
- The TYPE command can be used to list only the traces of the specified type. The possible types that can be specified are shown in the TYPE column. For example, to list only the detail traces (including the I/O traces), on the COMMAND line type:

```
TYPE DET
```

Type **TYPE** to return to the list of all the traces.

Line Commands

From this list of current traces you also can use line commands to

- Display the collected trace data
- Show the trace options
- Modify a trace
- Switch log data sets
- Stop a trace
- Purge a trace
- Replicate a trace
- Quiesce logging

Displaying Trace Entries

To access a scrollable list of traced threads held in the online storage buffer, use line command S (SELECT). The LTRAC display for the selected trace is shown. From here, all other trace displays can be accessed with EXPAND. (See [“Application Trace Displays”](#) on page 226 and [“LTRAC—DB2 Trace Entries”](#) on page 231.)

Showing Trace Options

To view the options specified for a trace, use the W (SHOW) line command.

Note: The show request can be initiated from either the Current Traces application (Option 4) or the History Traces application (Option 5).

The Start DB2 Trace Request panel and each of the additional ATRAC options panels are shown for the selected trace. (See [“ATRAC—DB2 Application Trace”](#) on page 140.)

Each of the panels show the options specified when the trace request was submitted. However, the Show Trace Logging Specification panel has additional fields that are obtained by reading the current trace log data set.

```
BMC SOFTWARE ----- SHOW TRACE LOGGING SPECIFICATION ---- PERFORMANCE MGMT
COMMAND ===>                                     TGT -- DB2D

Number of logs:          3
Log DSN:                CIR1.DB2D.SUMMARY.SEP19.T1125.V01

Recording Start:        19SEP02 11:25:00    Percent used: 100    Status: RESET
Recording Stop:         19SEP02 11:25:00    Data lost:    No

Overwrite logs:         Y    (Y/N) (Action when all logs used)
Archive STC:            ARCHJCL1    (Blank for none)
Log switch time:       24:00:00    (HH:MM that a log switch is requested)

Disposition:           NEW    (OLD/NEW) If NEW, specify options below:

Volumes:               BAB003,BAB303,BAB009
Primary CYLS:         3                SMS Storage Class:
Data DSN suffix:      DATA            SMS Data Class:
                                           SMS Management Class:
```

Figure 55. Show Trace Logging Specification Panel

The Log DSN field is changed to be either the DSN of the current log data set if the trace is active or the last data set used if the trace is complete.

The additional fields are

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:	Indicates whether any data was lost while writing to this log data set (YES/NO).
Status:	Status of the log data set. Valid statuses are
EMPTY	The data set contains no trace records.
UPDATE	The data set is being updated.
USED	The data set contains valid trace data.
RESET	The data set contains valid trace data and has been flagged for reuse.
INCOMP	The data set was not successfully closed (or archived) after an update; for example, in a system failure.

Modifying a Trace

Use the M (MODIFY) line command to modify some of the options for an active trace.

The Start DB2 Trace Request panel and each of the additional ATRAC options panels are shown for the selected trace. (See [“ATRAC—DB2 Application Trace”](#) on page 140.)

All values that are prefixed with an `===>` can be modified.

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 command.

[Table 12](#) describes several modifiable options you might want to change after starting a trace where logging is already active:

Table 12. Modifiable Logging Options

Panel Option Name/SET Keyword	Possible Use
Overwrite logs/TRREUSE	Allows you to change from Y to N to prevent overlaying data that has not been 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.
Log switch time/TRSWTIME	Allows you to change the time when a log switch occurs. For instance you might want to add a data set by increasing TRNUMDS and then force a switch to free up the current data set.
Archive STC/TRARCSTC	Allows you to change the name of the archive job, perhaps to archive to a different set of archive data sets.
Number of logs/TRNUMDS	Allows you to increase or decrease the number of log data sets. If TRNUMDS is increased and TRDISP=NEW, the additional data sets are allocated before the modify request is considered successful.
Volumes/TRVOLS, Primary CYLS/TRCYL, SMS Storage Class/TRSMSSCL, SMS Management Class/TRSMSMCL, or SMS Data Class/TRMSDCL	If TRDISP=NEW and you are adding log data sets by increasing TRNUMDS, you may want to change the allocation parameters for these new data sets to cause them to be allocated 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 dynamically allocated (DISP=NEW) are deleted. Logging continues with the original number of log data sets.

Switching Log Data Sets

To switch from the current log data set to the next available one, use line command I (SWITCH).

An archive request for the log data set that was just inactivated is started if one was specified on the trace request. If the switch command is issued and only one log data set is defined, logging either reuses the same data set (TRREUSE=Y) or quiesces (TRREUSE=N).

Note: To issue the I (SWITCH) line command for traces other than your own, you must have the authority to purge any request. This authority is specified with the security resource name PMACC#.

Stopping a Trace

To stop an active trace, use line command Z (STOP).

Note: To issue the Z (STOP) command for traces other than your own, you must have the authority to purge any request. This authority is specified with the security resource name PMACC#.

Purging a Trace

To purge an active trace, use line command P (PURGE).

Note: To issue the P (PURGE) line command for traces other than your own, you must have the authority to purge any request. This authority is specified with the security resource name PMACC#.

Replicating a Trace

To replicate a trace, use line command R (REPLICATE).

The Start DB2 Trace Request panel and each of the additional ATRAC options panels are shown for the selected trace. (See [“ATRAC—DB2 Application Trace”](#) on page 140.)

Each of the panels show the options specified when the original trace request was submitted. All values prefixed with an ==> can be modified.

Quiescing Logging

To quiesce logging for a trace, use line command Q (QUIESCE LOGGING).

Once quiesced, logging cannot be restarted. The trace continues to run, but no data is written to the log. To restart logging, you must purge and reset the trace.

Note: To issue the Q (QUIESCE LOGGING) line command for traces other than your own, you must have the authority to purge any request. This authority is specified with the security resource name PMACC#.

Managing History Traces

The History Traces application allows you to access and control the current and historical trace logs for all DB2 systems managed by a BBI-SS PAS. This application can be accessed by

- Option 5 from the Primary Option Menu
- HT application transfer command from any `COMMAND ===>` line

It provides

- Online recall of trace data
- Review of trace options
- Online administration of the data sets (purge, free, verify, reset, archive)
- Registering of trace log data sets created on other systems
- Printing of trace reports from the log data sets

Trace Directory

The trace directory is a VSAM data set that contains an entry for every trace log data set that is known to the BBI-SS PAS. The DSN of the directory must be specified in the parmlib member BBIISP00 with the keyword `TRDIR=`. There is no default. If specified, it is dynamically allocated at BBI-SS PAS start. Trace logging can occur only when a trace directory is successfully allocated.

Trace log data sets are tracked as long as the data sets exist, but entries can be deleted or added to the directory to allow logs to be restored after archiving or moved between systems.

There is no automatic updating of the directory from events outside the BBI-SS PAS system. There is a batch utility, JXT003, provided in BBSAMP to update your directory for data sets that have been deleted or archived.

Displaying Historical Trace Data

The History Traces application tracks current and historical trace log data sets and allows any of them to be selected and loaded. You are then presented with the standard LTRAC display and can navigate through the various displays in the same way as for a current trace. The message in line 4 specifies ENTRIES IN DATASET instead of ENTRIES IN BUFFER.

In addition, for active or complete traces that have not yet been purged, it is possible to move between the display of active trace data in the buffers to the display of trace history data that has already been written to the current trace log data set.

You can display historical trace data by using a select button on the EXPAND line. This option is available on LTRAC, STRAC and DTRAC, but not on the DTRAC pop-up displays.

- The button is labeled HISTORY if the display is from a current trace with logging. You can view the history trace data set for that trace by selecting the HISTORY button.
- The button is labeled CURRENT if the display is from a trace log data set for a still-active trace or a complete trace that has not yet been purged. You can view the active trace data still in the buffers by selecting the CURRENT button.

Note: In most cases, HISTORY will show more data than CURRENT. But just after a log switch, there can be more data in the online display buffers than is available on this new data set. However, the History Traces application also allows you to go back to read the previous log data set.

Target Specification

The target for the History Traces application can be any target that is controlled by this BBI-SS PAS. If the target of the trace in the selected data set is different from the current application target, LTRAC, STRAC, and DTRAC show the historical target in the HIST TGT field. The standard TGT field continues to show the target value from the History Traces panel.

Using the History Traces Application (Option 5)

The History Traces application displays a menu with one row per log data set in the directory. The initial display is in descending order of date and time but can be sorted by any column. For example, sort by TRACEID if you want to see all the data sets for one trace together. Sample displays are shown in [Figure 56](#) and [Figure 57](#):

```

BMC SOFTWARE ----- HISTORY TRACES ----- PERFORMANCE MGMT
COMMAND ==>>>                                     TGT ==>>> DB2D
                                           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  TGT  STAT  ACTV
02/09/29 22:00  LEOTST01  LEOS DETAIL TRACE                    CIR4    DB2D  INV
02/09/11 21:00  DET1      WORKLOAD DETAIL 1                    CIR2    DB2D  USED  READ
02/09/01 00:00  THRDHIST  THREAD HISTORY                        BABUSERS DB2D  UPDAT WRIT
***** END OF DATA *****

```

Figure 56. History Traces Application (Before Scrolling Right)

Scroll right to see additional data:

```

BMC SOFTWARE ----- HISTORY TRACES ----- PERFORMANCE MGMT
COMMAND ==>>>                                     TGT ==>>> DB2D
                                           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
02/09/29 22:00  DET   CIR4.LL1X.DB2D.LEOTST01.SEP28.T2200.V01  ARCHIV
02/09/11 21:00  DET   CIR21234.WORKLOAD.DETAIL1X.TEST1234.V02  BAB001
02/09/01 00:00  SUM   CIR2.BL1X.DB1D.THRDHIST.SEP01.T0000.V01  BAB303
***** END OF DATA *****

```

Figure 57. History Traces Application (After Scrolling Right)

Primary Commands

The following primary commands can be typed on the COMMAND line:

- SORT by any column. Any of the column data in the display can be sorted by typing the first two characters of the column heading with the SORT command:
 - DA Sorts the list by the date and time that 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.
 - TR Sorts the list by trace identifier.
 - TI Sorts the list by title.
 - US Sorts the list by user ID.
 - TG Sorts the list by target.
 - ST Sorts the list by status of log data set contents.
 - AC Sorts the list by status of log data set activity.
 - TY Sorts the list by type of trace.
 - DS Sorts the list by log data set name.
 - VO Sorts the list by volume serial name.
- LOCATE an entry by the current sort column (similar to ISPF LOCATE member command).
- NEW presents a data entry screen where you can add other trace data sets to the directory manually. For example, you can move them from one system to another. Type the DSN only; the application automatically verifies each log DSN entered.

Figure 58 shows a sample data entry panel that has been updated with four data sets to be added to the directory. The RESPONSE field shows the results of the processing after ENTER is pressed.

```

BMC SOFTWARE ----- CREATE TRACE DSN ENTRIES ----- PERFORMANCE MGMT
COMMAND ==>                                         TGT ==> DB2D
                                                    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.DB2D.LEOTST01.SEP19.T2200.V02           OK
2.  CIR4XXX.NODE2XXX.NODE3XXX.NODE4XXX.V03           WARN - NOT TLDS
3.  CIR4.DUPLICATE.ENTRY.V01                         ERROR - DUPLICATE
4.  CIR4.TEST.DO.NOT.EXIST.V02                       WARN - DOES NOT EXIST
5.
6.
7.
8.
9.
10.

Press ENTER to confirm; END to cancel.

```

Figure 58. Panel for New Primary Command

- STOP to close/deallocate the directory; all commands except START are disabled; no new logging request can be initiated. Currently active trace logging is allowed to continue.

Note: PMAcc=# authorization is required to use this command.

- START causes the directory to be allocated and opened as old. If successful, functions are enabled and new logging requests can be initiated. If not, the application remains in a quiesced state.

Note: PMAcc=# authorization is required to use this command.

- TYPE can be used to list only the traces of the specified type. The possible types that can be specified are shown in the TYPE column. For example, to list only the detail traces (including the I/O traces), on the COMMAND line type:

TYPE DET

Type **TYPE** to return to the list of all the traces.

Line Commands

Line commands apply to a specific entry within the directory.

Note: Certain line commands are restricted based on your authorization. PMAcc=# is required for the following line commands if your user ID does not match the user ID of the trace:

- Delete
- Free
- Reset
- Archive

The possible commands are

- **S (SELECT)** loads the selected log data set and displays the LTRAC screen. From there, you can access all other trace displays.
- **W (SHOW)** displays the selected log data set information. The directory entry is updated if necessary.
- **P (PRINT)** generates the print JCL you can submit to print trace reports from the log data set.

Note: This command is available only with a terminal session under ISPF.

The print job accepts many options to tailor the output to your needs. Only one report can be specified. The following panel is displayed to allow specification of these options. See [“Printing a Trace” on page 173](#) for an explanation of these options and for instructions on how to create a batch job to produce multiple reports.

```

BMC SOFTWARE ----- BATCH TRACE PRINT ----- PERFORMANCE MGMT
COMMAND ==>                                         TIME --- 15:00

Update job ==> N (Y/N - update job statement)      (END to edit JCL)
Title line 1 ==>
Title line 2 ==>

Data Selection:
From date ==>                                     Time ==>
To date ==>                                       Time ==>

PLAN ==>
AUTHID ==>
CONNECT ==>
CORR ==>
LOC ==>
DB2PKG ==>

REPORT SELECTION:
LTRAC ==> NO                                     (YES/NO)
STRAC ==> NO                                     (NO,ALL,SUMMARY,section1,section2..)
DTRAC ==> NO                                     (YES/NO)
POPUP ==> NO                                     (NO/ALL/SQL/event1,event2,...)
TSUM ==>                                         (A/C/L/P/T) SORT ==> (for any TSUMx)
TSTAT ==> NO                                     (SUMMARY/ALL/NO) INTERVAL ==> 1H (for TSUMT only)
DBIO ==>                                         (X/A/C/F/L/P/T/xx) IOSORT ==> (for any DBIOx)
                                                    IOINTVL ==> 10M (for DBIOT only)
  
```

Figure 59. Batch Trace Print Panel

The following optional panel is shown to provide or update the job statement if UPDATE JOB is set to Y:

```
BMC SOFTWARE ----- BATCH TRACE PRINT JOB STATEMENT ----- PERFORMANCE MGMT
COMMAND ==>

      JOB STATEMENT:

==> //CIR2TPRT  JOB (3861), ,CLASS=K,MSGCLASS=R
==> // *
==> // *
==> // *

      SYSOUT CLASS ==> R
```

Figure 60. Batch Trace Print Job Statement

The date and time selection fields are primed with the start and end date-time of the trace. All other fields are primed with the default value when first used. These fields are saved in your profile for later redisplay.

When you press ENTER, the data is validated (cursory validation only) and redisplayed.

The selections made are saved in your profile and used to initialize the fields the next time this panel is requested.

When you exit from this panel, the options specified are inserted into a pattern job stream using the ISPF file tailoring facility. The skeleton JCL can be found in member DZJPTRAC in the BBPROF data set. This member can be tailored to an individual user (UBBPROF data set) or site (SBBPROF data set). The result of this customization is shown in edit mode, allowing you to make any further changes needed.

Note: If you did not use AutoCustomization, the &DLIB variable in this member must be specified.

You can then save this JCL, submit it to the local reader, or CANCEL the edit session.

Note: To execute the job, you must enter **SUBMIT** while in edit mode. This command is not entered automatically for you.

- **D (DELETE)** deletes the entry from the trace directory. If the entry is for a data set that is not cataloged, no confirmation is required. If the data set is cataloged, a confirmation screen similar to the sample in [Figure 61](#) is displayed:

```

BMC SOFTWARE ----- TRACE DIRECTORY PURGE CONFIRMATION ---- PERFORMANCE MGMT
COMMAND ==>                                         TGT ==> DB2D
                                                    TIME -- 09:36:34

LOG DATA SET NAME:  CIR4.LL1X.TEST1.V02
TARGET:              DB2D
USERID:              CIR4
TRACEID:             BIGELAP
VOLUME:              ARCHIV
START DATE-TIME:    02/09/22 22:00
STATUS:              INV

Do you wish to also delete the log data set? ==> N (Y/N)

Press ENTER to confirm; END to cancel

```

Figure 61. Trace Directory Purge Confirmation Panel

- **E (RESET)** flags the log data set for reuse.
- **V (VERIFY)** matches the directory against the log data set and updates the directory with the log data set fields. If the data set is not cataloged, the status is changed to NOCAT. If there is any error reading the header information, the status is changed to INV (invalid).
- **N (NEW)** acts like NEW primary command, except the data entry screen is primed with the selected log DSN.
- **A (ARCHIVE)** starts the archive started task (STC) specified in the trace request (TRARCSTC=) for the specified log data set. If TRARCSTC has not been specified, the request is ignored.
- **F (FREE)** closes and deallocates a log data set that is not in WRITE status. This command can be used to deallocate a log data set when another user is viewing it.

Batch Maintenance Jobs

The trace logging facility includes six sample jobs provided in BBSAMP. The sample jobs to manage the trace directory are described in the *MAINVIEW for DB2 Customization Guide*. The four jobs to manage individual TLDSs are defined here.

Trace Log Data Set Jobs

Use the following members to

- Define a trace log data set
- Archive a trace log data set
- Restore an archived trace log data set
- Print a trace log data set

Defining a Trace Log Data Set

Use BBSAMP member JXT011 to define a trace log data set as an LDS using IDCAMS. This job preallocates a TLDS that can then be referenced when starting the trace. Also, this job formats the TLDS, reducing trace startup time when large log data sets are required. You will need to use the job if you do not have authority for dynamic TLDS allocation by the BBI-SS PAS. (See page [157](#).)

Archiving a Trace Log Data Set

Use BBSAMP member DZTBARC to set up a started task for automatic archiving of a TLDS. It is executed when a data set is full, when logging is switched to another data set, or when the trace is completed. This procedure has two steps:

1. Unload the trace log data set to a GDG data set.
2. Use the PGM=JXTRES option to mark the trace log data set as RESET in header.

You can add a step to print the trace if desired.

You also can use this member as a pattern to create a job to archive or reset a log data set. It can be invoked from the History Traces panel if previously defined for a trace. Otherwise, it must be submitted manually.

Restoring an Archived Trace Log Data Set

Use BBSAMP member DZTBRLD 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. Use the NEW command on the History Traces application (see [“Using the History Traces Application \(Option 5\)”](#) on page [166](#)).

Printing a Trace Log Data Set

This job is defined in [“Printing a Trace”](#) on page [173](#).

Printing a Trace

This section describes the offline printing facility for trace data. This facility is provided by a batch utility job, DZTBTRAC. The primary input source is data collected by MAINVIEW for DB2 online traces and stored on log data sets. Accounting records and I/O trace records from SMF or GTF also can be printed. One or more reports can be printed in one pass of the data.

Note: A job to print a report from one trace log data set can be generated online from the History Traces application. (See P line command on page 169.)

Overview

The trace data shown in the batch reports is in the same format and content as the online displays. These displays include LTRAC, STRAC, DTRAC, DTRAC pop-up displays, TSTAT, and the TSUMx and DBIOx series of displays. Many of these displays can also be combined into one report. For example, a report can consist of both LTRAC and DTRAC data. Selection options, such as plan, authorization ID, or date can be used to narrow the scope of a report.

Types of Reports

This facility provides many useful reports to assist you in analyzing the collected trace data. The types of reports available depend on whether just the DB2 accounting records (summary) or trace events (detail) are present.

Note: Report request syntax and the complete options are described in “Request Keywords” on page 182.

Summary Traces

These reports can be created from both summary and detail traces and SMF/GTF DB2 accounting records.

TSTAT=SUMMARY

One page summary of all records traced

LTRAC=YES

Accounting short trace with one line per accounting record traced

STRAC=SUMMARY, ACCTG, ENV, ELAPSED, SQLCOUNTS,
BPOOL, LOCKS, PRLIO, DDF, PKG

Accounting trace with selected sections per accounting record traced

TSUM=A

Accounting summary by AUTHID

TSUM=C

Accounting summary by connection name

TSUM=L

Accounting summary by location

TSUM=P

Accounting summary by plan

TSUM=R
Accounting summary by correlation ID

TSUM=T
Accounting summary by time

Detail Traces

Reports that can be created from detail traces are

TSTAT=ALL
Summary of all records traced, plus a database summary (if scans were traced), a lock and I/O summary (if locks or I/O were traced), and a sort summary.

STRAC=ALL
Accounting long trace with one report per accounting record, plus an SQL summary, a database summary (if scans were traced), a lock and I/O summary (if locks or I/O were traced), and a sort summary.

STRAC=(SQL,SCAN)
SQL and database trace summary; SORTS and IOLOCK summaries and the SQL statement pop-up displays (SQLPOPUP) can also be requested.

DTRAC=YES
Detail event trace (LEVEL=1 shows all SQL, LEVEL=2 or 3 shows additional events).

DTRAC=YES,POPUP=ALL
Long detail event trace with event pop-up details. POPUP=(event1, event2, event3) prints pop-up details only for the selected events.

POPUP=(event1, event2, event3)
Selected detail event pop-up displays only.

Detail Traces with I/O Events

Reports that can be created from detail traces with I/O events or an SMF file that includes I/O events are

DBIO=X
I/O analysis by database and table space

Note: This report can be summarized by many different summary key combinations, such as plan, database, table space or database, table space, plan. See [“Special Report Summarization Options for DBIO” on page 191](#) for examples.

DBIO=A
I/O analysis by AUTHID

DBIO=C
I/O analysis by connection name

DBIO=F
I/O analysis by buffer pool

DBIO=K

I/O analysis by plan and package (only from a detail trace including I/O and SQL events)

DBIO=L

I/O analysis by location

DBIO=P

I/O analysis by plan

DBIO=S

I/O analysis by plan and package and SQL statement (only from a detail trace including I/O and SQL events)

DBIO=T

I/O analysis by time interval

Primary Input - Trace Log Data Sets (TLDS)

The normal input to this process is the VSAM data set created by a trace request with logging. All TLDSs are tracked in a trace directory and can be accessed through the History Traces application. You can submit a print job for a TLDS from this application (see the description of the P command in [“Request Keywords” on page 182](#)).

You also can submit a batch print job directly, as described in this section.

- 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 the exact names of the trace data sets are not known, you can specify which trace is to be printed with the TRACEID keyword. In this case, you must also specify the directory data set with the TRACEDIR DD statement. It is recommended but not required that the TARGET, DATE, and TIME keywords also be used to further qualify which trace data sets should be selected. With this option, only one TRACEID can be specified for this batch job. It remains in effect across all report requests.

Printing from Archived TLDSs

An archived TLDS is produced by the archive utility DZTBVUNL. 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.

Secondary Input - SMF or GTF

This same batch utility can be used to print summary trace reports from DB2 accounting records written to GTF or SMF, either from an SMF history tape or from the live SMF data sets. All the I/O analysis reports listed under [“Detail Traces with I/O Events” on page 174](#) (except DBIO=K or DBIO=S) can be produced from an SMF or GTF file that includes the I/O trace records (IFCIDs 06-10). Other detail trace events are not extracted from SMF or GTF. Also, you cannot process SMF or GTF files in the same run with TLDSs.

Output Formats

Multiple reports can be produced from a single pass of the input data, each to a separate DD statement.

Single reports also can be made of a combination of LTRAC, STRAC, STRAC summaries, DTRAC, and DTRAC pop-up displays. However, the STRAC summaries (for example, SQL and database) cannot be combined with DTRAC data. They can be requested in the same batch job, but as separate reports.

The output format is the same as the online displays; it is 80 characters wide with the first position reserved for the attribute character. For normal output, the data is printed in columns 2 through 80.

For wide output, the highest level requested is left aligned and lower levels are indented for ease of viewing. STRAC and DTRAC are indented 5 positions and the pop-up displays are indented 40 positions. For example, if DTRAC and pop-up displays are the only reports requested, DTRAC is aligned on the left margin, and pop-up displays are indented 40 positions. If LTRAC, STRAC, DTRAC, and pop-up displays are all requested, LTRAC lines are aligned on the left margin, STRAC is indented 5, DTRAC 10, and pop-up displays 50.

Controls

All control of the input and formatting is done through a series of keywords in the input job stream (or in a PDS member). This control includes format, input source, input selection/exclusion, and display selection.

This program supports a GMWK option in the PARM field, for example:

```
PGM=DZTBPRNT , 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 threads. 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 MVS 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 MVS system. When the GMWK option is used, the job's REGION size might need to be adjusted accordingly.

A general guideline for the size of GMWK is

```
GMWK = 1700 + (72 x number of unique threads summarized)
```

If multiple report requests are executed in a single job step, one summary work area is acquired for each report. If the summary work area size is too large, any region size available can be exceeded very quickly.

STEPLIB DD	Defines the program library containing the DZTBPRNT 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 TRACINxx is defined, TRACEDIR, SMFIN, ARCIN, and GTFIN 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. The TRACEID keyword is required. All trace data sets produced with this trace ID are eligible for processing by reporting. Note: It is encouraged but not required that TARGET, DATE, and TIME keywords further restrict which data sets are to be

accessed; only those TLDSs which meet the target, date, and time criteria specified by one or more of the report requests are allocated.

SMFIN DD	Defines an unloaded SMF data set (or multiple concatenated data sets) containing DB2 accounting records as input for trace data formatting. TRACIN and TRACEDIR must be dummied or NULLFILE. If SMFIN is defined, GTFIN is ignored.
GTFIN DD	Defines a GTF data set (or multiple concatenated data sets) containing DB2 accounting records as input for trace data formatting. TRACIN, TRACEDIR, and SMFIN must be dummied or NULLFILE.
ARCIN DD	Defines an archived TLDS. TRACIN, TRACEDIR, SMFIN, and GTFIN must be dummied or NULLFILE. Note: If none of the five input DD options are defined, trace information is obtained from the currently active SMF data set.
REPTDD1	Defines the ddname for a report request. The report request in the SYSIN stream defines the ddname of the output. There is no restriction on these ddnames other than uniqueness; they cannot duplicate other reserved ddnames. Note: If the ddname specified for a report is missing, a diagnostic is written to SYSPRINT and the report is not produced.
SYSIN DD	Defines the input data set containing the report definitions. Note: All input data is entered through the SYSIN DD statement. If the SYSIN DD statement is missing, DUMMYed, or empty, the default report selection is used. (See “Default Entry” on page 193.)

Individual control statements specify how to read the input data set for each of the requested reports and how to format the output.

Output Format

All reports have common headers in the following format:

```
BMC SOFTWARE                                MAIN TITLE OF REPORT                                PAGE: 1
REPORT XXXXXXXX                            SECONDARY TITLE                                     DATE: 17SEP02
                                                TIME:15:31:44

DSNAME:   SYS5.PRODSYS.DB2D.BLANK.OCT03.T0501.V01
VOLSER:   BAB033

TITLE:    ACCOUNTING TRACE                    TYPE:      DETAIL
START:    19SEP02 05:01:00                    GROUP SQL: N
STOP:     16SEP02 23:58:55                    SCANS:     Y
STATUS:   USED                                I/O:       Y
DATA LOST: NO                                LOCKS:     Y
REQUESTOR: CIR8                              DDF:       Y
TRACEID:                                     DDFVTAM:   Y
TARGET:   DB2D

DB2PLAN:
DB2AUTH:
DB2CONN:
DB2CORR:
DB2LOC:

EXCEPTION FILTERS:
ELAP => GETPAGE => MAXLOCK => SQLDDL =>
CPU   => PGUPD  => LOCKTBL => SQLDYN =>
ABORT => READIO => INCRBIND => SQLCTL =>
UIDCOM => LOCKSUSP => SQLSEL  => SQLFETCH =>
GETRIO => LOCKESCL => SQLUID  => SQLTOT  =>
RLF    => TIMEOUT => RIDFAIL  => CLAIMDR =>
PWAITIO => PWAITLK => PWAITPF => PWAITOT =>
PFREQS => PFREADS => HPPFAILS => PRLGRP  =>
PRLRED => PRLFALB =>

...FIRST DATA LINE (NEW PAGE IF NEWPAGE ^= NO)
.
.
.
```

Figure 63. Report Header

This header is printed as each input data set is processed. If reports other than summary reports are requested, the headings are embedded within the body of the reports. If only summary reports (TSTAT and TSUM) are requested, all heading blocks are shown before the summary reports.

The date and time shown at the top right reflect the time the report is produced. The date and time of the data can be seen both within the reports and from the START and STOP time of trace data recording on this data set (as shown in lines 6 and 7 of this header).

Lines 3 and 4 identify the input data sets, while the remaining lines show the options specified when the trace was made (see ATRAC for descriptions).

For either narrow or wide reports, the heading lines fill the entire width of the report. The values on the right are right-justified with the right margin. The two headings are centered in the report.

Within the body of the report, the values displayed are identical to the screens from the corresponding online trace display, such as LTRAC or STRAC. See [“Application Trace Displays” on page 226](#) for descriptions of these online trace displays. If LTRAC or DTRAC is requested, the column headings are shown at the start of each data stream and at the top of each page as secondary headings.

Controls for Reporting

The control statements to request each of the sets of reports are entered in the input stream under ddname SYSIN. They also can be members of a PDS. This section describes the structure of the request and the keywords used to make the request.

Keywords that apply to all requested reports can be specified following a label of GLOBAL. Keywords that apply to a specific report must be specified following the REPORT label. For example:

```
GLOBAL TITLE1='DAILY REPORT'
```

causes the title, DAILY REPORT, to be printed on the first line of each page of each report. You do not need to specify this keyword again for each individual report requested.

All keywords can be specified as GLOBAL except REPORTID and DDNAME. GLOBAL can be repeated anywhere in the input stream to reset any combination of keywords. Each keyword specified with GLOBAL remains in effect until overridden in another GLOBAL specification. A GLOBAL keyword can also be overridden for a single request by specifying it for that one report.

Structure of a Report Request

Each report request is started with REPORT, followed by a series of keywords connected by commas, which define the options requested for the report. The report request must include the REPORTID keyword, which is the only required keyword. All other keywords have defaults which are assumed if the keyword is not given. The first blank in the series terminates the processing for that report. All of the following text is considered to be comments.

If a value such as a title has embedded blanks, enclose it in quotation marks.

A statement is continued to the next line by ending the line with a comma-blank combination. The remainder of the line is considered to be a comment; processing continues with the first non-blank character on the next line. Continuations can be done only where a comma would normally occur. Keywords and values cannot be continued.

A line starting with an asterisk in the first column is a comment line. It can be embedded within a series of continuations.

An example of two report requests is shown next. The keywords used in these requests are described in the next section.

Sample Report Requests

```
GLOBAL  TIME=1300-1500
*
*      BIND-TEXT and EXPLAIN FROM TSO
*
REPORT  REPORTID=DAILY1 ,LTRAC=YES ,NEWPAGE=TRAN ,
        POPUP= ( BIND-TEXT , EXPLAIN , OPEN ) ,
        CONNECT=TSO ,
        TITLE1='DETAILS OF BIND AND EXPLAIN' ,
        TITLE2='WITH STATS FROM OPEN' ,
        DDN=OUTPUT1 ,WIDTH=WIDE      COMMENTS ABOUT THE REPORT
*
*      FULL EXAMINATION OF CERTAIN SPECIAL TRANSACTIONS
*
REPORT  REPORTID=SPECIALS ,LTRAC=YES ,STRAC=SUMMARY ,DTRAC=YES ,POPUP=
ALL ,
        NEWPAGE= ( TRAN , FIRSTEVENT ) , LEVEL=3 ,
        PLAN= ( PAY+++++ , ACCT1+++ ) ,CONNECT=IMSP ,
        AUTHID= ( USR1 , USR5 )
```

The GLOBAL keyword TIME limits the trace output to 1:00PM to 3:00PM for both reports.

The first report prints the one-line LTRAC entry on a new page for each transaction of the selected TSO threads and the pop-up displays for BIND-TEXT, EXPLAIN, and OPEN after that one-line entry for each transaction. The report is written on ddname OUTPUT1.

The second report prints the one-line LTRAC entry, the STRAC accounting summary, and all DTRAC events and pop-up displays for selected plans from two specific IMS users. The report is written on ddname SPECIALS.

Request Keywords

The requests shown above are a preview of some of the keywords used to request a report. This section describes a complete list of the keywords, their possible values, their defaults, and limitations on use.

If a keyword is entered multiple times, a diagnostic message is issued and the first value entered is used. If mutually exclusive keywords are entered, the relative priority of the keywords is defined within the keywords, and the higher priority is used to resolve the conflict.

For each keyword, the full spelling is shown. Some keywords can be abbreviated for ease of entry.

The select keywords are ANDed to select entries for print. For those keywords that accept a list of values, the values are ORed. The select keywords are defined in [Table 14 on page 184](#).

If no reports are selected, the default report set is LTRAC=YES, TSTAT=SUMMARY. The report selection keywords are defined in [Table 15 on page 187](#).

The groups of keywords are described in [Table 13 on page 183](#).

Identification Options

The following keywords identify a report by its name, title, and source of input:

Table 13. Identification Keywords

Keyword/Operand	Description
REPORTID={name}	<p>Required. Each report must have a unique identification provided by REPORTID. This keyword is the only required keyword. If the DDN keyword is not specified, REPORTID is also used as the ddname of the output data set.</p> <p>The value can be 1–8 characters, with any special characters allowed.</p>
DDN DDNAME=[ddname]	<p>Optional. Defines the ddname that receives the report. Any 1–8 character name that satisfies the rules for ddname is allowed, other than the reserved names TRACINxx, TRACEDIR, SYSIN, and SYSPRINT.</p> <p>If not specified, the default is taken from the REPORTID keyword.</p>
TRACEID=[id BLANK]	<p>Optional. 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.</p> <p>To define a trace ID of blank, specify</p> <p>TRACEID=BLANK</p> <p>Note: The DD statement TRACEDIR must be present before this keyword is processed. If the DD statement is not present, this keyword is ignored.</p>
USERID=[id]	<p>Optional. Defines the ID of the user who started the trace. All TLDS data sets that meet this requirement, plus any TARGET, TIME, and DATE requirements, are dynamically allocated and processed.</p> <p>Note: The DD statement TRACEDIR must be present before this keyword is processed. If the DD statement is not present, this keyword is ignored.</p>
TARGET TGT=[tgtname]	<p>Optional. Defines the target system for a trace that is to be matched in a search through the trace directory. All TLDS data sets that meet this requirement, the TRACEID qualifier, plus any TIME and DATE requirements, are dynamically allocated and processed.</p> <p>If no TARGET is specified, all targets for the specified trace are selected for processing.</p> <p>TARGET is required for DBIOx reports.</p> <p>Note: The DD statement TRACEDIR must be present before this keyword is processed. If the DD statement is not present, this keyword is ignored.</p>

Table 13. Identification Keywords (Continued)

Keyword/Operand	Description
TITLE1=[c.....c]	<p>Optional. Title value is printed centered on the first line of each page of the report. The value can be up to 60 characters.</p> <p>If this keyword is not included, the title is left blank on the report.</p>
TITLE2=[c.....c]	<p>Optional. Secondary title is printed centered on the second line of each page of the report. The value can be up to 60 characters.</p> <p>If this keyword is not included, the secondary title is taken from the title specified when the trace was created. If the input is from SMF or GTF, the default value is blank.</p>

Selection Options

The following keywords define selection criteria used to select only certain threads for display and summarization:

Table 14. Selection Keywords

Keyword/Operand	Description
PLAN=[plan name]	<p>Optional. Plan name can be used to qualify which records are displayed or summarized. Up to 50 plans can be entered, enclosed in parentheses, and separated by commas. Either simple names or qualified names can be entered in any combination.</p> <p>Default is to select all records.</p>
DB2PKG=[package name]	<p>Optional. Package name can be used to qualify which records are displayed or summarized. Up to 50 packages can be entered, enclosed in parentheses, and separated by commas. Either simple names or qualified names can be entered in any combination.</p> <p>Default is to select all records.</p>
AUTHID=[id]	<p>Optional. Authorization ID can be used to qualify which records are displayed or summarized. Up to 50 authorization IDs can be entered, enclosed in parentheses, and separated by commas. Either simple names or qualified names can be entered in any combination.</p> <p>Default is to select all records.</p>
CONNECT=[connection name]	<p>Optional. Connection name can be used to qualify which records are displayed or summarized. Up to 50 connection names can be entered, enclosed in parentheses, and separated by commas. Either simple names or qualified names can be entered in any combination.</p> <p>Default is to select all records.</p>

Table 14. Selection Keywords (Continued)

Keyword/Operand	Description
CORR=[correlation id]	<p>Optional. Correlation ID can be used to qualify which records are displayed or summarized. Up to 50 correlation IDs can be entered, enclosed in parentheses, and separated by commas. Either simple names or qualified names can be entered in any combination.</p> <p>Default is to select all records.</p>
LOC=[location id]	<p>Optional. Location ID can be used to qualify which records are displayed or summarized. Up to 10 location IDs can be entered, enclosed in parentheses, and separated by commas. Either simple names or qualified names can be entered in any combination.</p> <p>Default is to select all records.</p>
DATE=[ddmmmyyyy ddmmmyyyy-ddmmmyyyy]	<p>Optional. Date value is used to select a date range or starting date from the input. The input can be a single date in ddmmmy format, which defines a starting day, or as a range in the form ddmmmyyyy-ddmmmyyyy to define starting and ending dates to process.</p> <p>The asterisk is used to specify current date. To select all entries from yesterday, specify</p> <p>DATE=*_1</p> <p>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).</p> <p>To process only one day, specify</p> <p>17SEP2002-17SEP2002</p> <p>Default is to select all records.</p>

Table 14. Selection Keywords (Continued)

Keyword/Operand	Description
<p>TIME=[hhmm hhmm-hhmm]</p>	<p>Optional. Time value is used to select a starting time or a time range for the input.</p> <p>To select records starting at noon, specify</p> <p>TIME=1200</p> <p>To select records from first shift operations only, specify</p> <p>TIME=0800-1559</p> <p>To select records up to 4:00PM, specify</p> <p>TIME=-1600</p> <p>To select records for a 24-hour period on the same day, specify</p> <p>TIME=0000-2359</p> <p>or</p> <p>TIME=0001-2400</p> <p>Default is to select all records.</p>
<p>DBTS=[(dbname,tsname)]</p>	<p>Optional. Database name and table space name can be used to qualify which I/O event records are displayed and summarized in DBIOx displays. Only one can be entered. Either simple names or qualified names can be entered.</p> <p>Default is to select all I/O event records.</p>
<p>BP=[BPnn]</p>	<p>Optional. Buffer pool ID can be used to qualify which I/O event records are displayed and summarized in the DBIOx displays. Any number of buffer pool IDs can be entered, enclosed in parentheses, and separated by commas.</p> <p>Default is to select all I/O event records.</p>

Report Options

The following keywords define which reports are to be produced:

Table 15. Report Keywords

Keyword/Operand	Description
LTRAC=[YES NO]	<p>Optional. Is used to request the LTRAC one-line entry for each thread. If used in conjunction with STRAC, DTRAC, or POPUP, each thread starts with the LTRAC line followed by the other displays as requested.</p> <p>Possible values are YES and NO.</p> <p>Default is LTRAC=NO.</p>
STRAC=[SUMMARY YES ACCTG ALL NO ENV ELAPSED SQLCOUNTS BPOOL LOCKS PRLLIO DDF PKG PKGPOPUP SPAS SQL SQLPOPUP SCAN IOLOCK SORTS]	<p>Optional. Is used to request the STRAC thread summary display. STRAC=NO suppresses the STRAC displays.</p> <p>STRAC=SUMMARY or YES requests only the first section of the STRAC display. STRAC=ACCTG requests all summary trace sections. These requests can be combined with any of the DTRAC and pop-up requests.</p> <p>STRAC=ALL requests all summary accounting sections plus detail event summaries as well as the thread summary.</p> <p>Note: STRAC=ALL cannot be combined with any DTRAC or pop-up request. (Recall that multiple reports can be produced from one pass of the data. STRAC=ALL can be requested in a second report.)</p> <p>Each of the individual segments of STRAC also can be requested separately. The possible values are ENV, ELAPSED, SQLCOUNTS, BPOOL, LOCKS, PRLLIO, DDF, PKG, SQL, SCAN, IOLOCK, and SORTS. The last four requests cannot be combined with DTRAC or pop-up requests.</p> <p>STRAC=SQL prints the SQL summary section. STRAC=SQLPOPUP prints the pop-up displays of the individual SQL statement statistics.</p> <p>STRAC=PKG prints the Package / DBRM Overview section. STRAC=PKGPOPUP prints the pop-up displays of the individual packages or DBRMs.</p> <p>Default is STRAC=NO.</p>
SORTSQL=[PGM ST CO AE %E AC %C SR PI PD PW PR COP %EP %CP SRP PIP PDP PWP PRP]	<p>Optional. Controls the order of display within the STRAC SQL Summary section. It applies only to this summary and to the corresponding SQL statement pop-up displays. The values and defaults are the same as defined for the STRAC SQL Summary display.</p>

Table 15. Report Keywords (Continued)

Keyword/Operand	Description
SORTSCAN=[<u>DA</u> IS IP IR DS DP DR WS WP WR]	Optional. Controls the order of display within the STRAC Database Summary section. It applies only to this summary. The values and defaults are the same as defined for the STRAC Database Summary display.
SORTIOLOCK=[<u>DP</u> LM LS LT SR SW SE SA AR AP]	Optional. Controls the order of display within the STRAC Database Lock and I/O Summary section. It applies only to this summary. The values and defaults are the same as defined for the STRAC Database Lock and I/O Summary display.
DTRAC=[YES <u>NO</u>]	Optional. Requests printing a one-line entry for each detail trace event that meets the LEVEL criteria. For ease of associating the detail data with a thread, it is recommended that either LTRAC or STRAC also be requested, but this option is not required. Possible values are YES and NO. Default is DTRAC=NO.
LEVEL=[1 <u>2</u> 3]	Optional. Controls which detail entries are to be displayed in the DTRAC and pop-up displays. The possible values are 1, 2, or 3. The meaning of the levels is the same as in the DTRAC display. Note: When POPUP is specified without DTRAC, LEVEL only takes effect with POPUP=ALL. Default value is 2.
POPUP=[ALL YES <u>NO</u> SQL (event1, event2,,, eventn)]	Optional. Specifies which detail pop-up displays are to be displayed. It can be specified with DTRAC or separately. POPUP=NO requests that no pop-up displays be shown. POPUP=SQL requests that all pop-up displays for SQL events be shown. POPUP=ALL or YES requests all possible pop-up displays be shown. (The message, THERE IS NO POPUP FOR THIS EVENT, is not shown.) Any combination of pop-up displays can be requested by listing their names as shown in the EVENT column of the DTRAC display. Multiple entries are enclosed in parentheses and separated by commas. Up to 50 events can be individually requested. Default is POPUP=NO.

Table 15. Report Keywords (Continued)

Keyword/Operand	Description
TSTAT=[SUMMARY ALL YES NO]	<p>Optional. Requests the summary Trace Statistics display. TSTAT=SUMMARY requests only the first 21 lines of the display. TSTAT=ALL or YES requests all lines of the TSTAT display. TSTAT=NO suppresses the summary display.</p> <p>If requested in association with any of the LTRAC, STRAC, DTRAC, or pop-up displays, this display follows all of these other displays.</p> <p>Default is TSTAT=NO.</p>
TSUM=[A C L P R T]	<p>Optional. Requests one of the summary displays. The acceptable values for TSUM= are A, C, L, P, R, and T. If Y is entered, it is interpreted as TSUM=P.</p> <p>If requested in association with any of the LTRAC, STRAC, DTRAC, or pop-up displays, this display follows all of these other displays.</p> <p>Default is to not produce any TSUM report.</p>
INTERVAL INTVL I=[nM nH]	<p>Optional. Is used in the TSUMT display to define the size of the summary interval. The value entered can be any 1–3 digit numeric value followed by M(inutes) or H(ours). If the suffix is omitted, hours is assumed.</p> <p>Default value is 1H.</p>
SORTTSUM=[AU CO PL] S ISD EC AE AC A# AG TE TC T# TG]	<p>Optional. Controls the order of display within the TSUMx reports by sorting on the specified column. It applies only to those reports. The values and defaults are the same as defined for each of the interactive TSUMx displays. For example, SORTTSUM=TC sorts by TOTAL CPU.</p>
GRAPH=[AVG TOT NO]	<p>Optional. Requests the graphic presentation of any of the TSUMx displays, showing the Entry Count (number of threads) followed by either the averages (GRAPH=AVG) or the totals (GRAPH=TOT). GRAPH=NO requests a numerical display of both average and total values.</p> <p>Default is GRAPH=NO.</p>

Table 15. Report Keywords (Continued)

Keyword/Operand	Description
DBIO=[X A C F K L P S T]	<p>Optional. Requests one of the I/O Analysis displays. X selects the DBIO display by DB/TS. The other values select the display with the select code of DBIOx. This keyword determines the summary keys of the report:</p> <ul style="list-style-type: none"> • X - Database and table space • A - AUTHID • C - Connect • F - Buffer pool • K - Plan and package • L - Location • P - Plan • S - Plan and package and SQL statement • T - Time interval <p>See “Special Report Summarization Options for DBIO” on page 191.</p>
IOINTVL IOI=[nM nH]	<p>Optional. Is used in the DBIOT display to define the size of the summary interval. The value entered can be any 1–3 digit numeric value followed by M(inutes) or H(ours). If the suffix is omitted, hours is assumed.</p> <p>Default is 10 minutes.</p>
IOSORT=[IC I% MI AI]	<p>Optional. Controls the order of display within the DBIOx reports by sorting on the specified column. It applies only to those reports. These values allow sorting on any of the data columns, as defined for the interactive displays.</p> <p>Default is to sort by the summary keys.</p>
IODATA=[SYNC ASYNC TOTAL]	<p>Optional. Determines the type of I/O events selected for the DBIOx reports:</p> <p>SYNC Synchronous I/O events ASYNC Asynchronous I/O events TOTAL All I/O events</p> <p>Default is TOTAL.</p>

Special Report Summarization Options for DBIO

The following keywords define the special report summarization options for the DBIO report:

Table 16. Special Summarization Keywords for DBIO

Keyword/Operand	Description
DBIO=[XA XC XF XK XL XP XT]	<p>Optional. DBIO keyword with a two-character operand of Xx requests a special version of the DBIO display that provides reports by DB/TS plus another summary key. This summarization allows you to determine where the activity against the table spaces is originating.</p> <p>Note: This determination is done online with repetitive summarization and selection steps.</p> <p>The following summary key combinations are supported:</p> <ul style="list-style-type: none"> • XA - Database, table space, AUTHID • XC - Database, table space, connect • XF - Database, table space, buffer pool • XK - Database, table space, plan, package • XL - Database, table space, location • XP - Database, table space, plan • XT - Database, table space, time <p>DBIO cannot be requested together with any other trace displays. WIDTH=WIDE is required. Default is to not produce any DBIO report.</p>
DBIO=[AX CX FX KX LX PX TX]	<p>Optional. DBIO keyword with a two-character operand of xX requests a special version of the DBIO display that provides reports by a summary key plus DB/TS. This summarization allows you to determine which table spaces are being accessed from that source.</p> <p>Note: This determination is done online with repetitive summarization and selection steps.</p> <p>The following summary key combinations are supported:</p> <ul style="list-style-type: none"> • AX - AUTHID, database, table space • CX - Connect, database, table space • FX - Buffer pool, database, table space • KX - Plan, package, database, table space • LX - Location, database, table space • PX - Plan, database, table space • TX - Time, database, table space <p>DBIO cannot be requested together with any other trace displays. WIDTH=WIDE is required. Default is to not produce any DBIO report.</p>

Formatting Options

The following keywords define the formatting options for the selected report:

Table 17. Formatting Keywords

Keyword/Operand	Description
NEWPAGE=[TRAN EVENT FIRSTEVENT NO]	<p>Optional. Is used to control page breaks. The possible values are</p> <p>TRAN Page break for each new thread.</p> <p>EVENT Page break for each new event or detail trace entry.</p> <p>FIRSTEVENT Page break for the first event of a thread. This option can be used to separate the DTRAC entries from an STRAC or LTRAC display.</p> <p>NO No page breaks are to be done based on input data.</p> <p>These entries can be entered in combinations, such as NEWPAGE=(TRAN,FIRSTEVENT).</p> <p>Default is NEWPAGE=NO.</p>
WIDTH=[N NARROW W WIDE]	<p>Optional. Defines whether the titles are aligned for 81 character lines (narrow) or 133 character lines (wide). To specify wide output, use WIDTH=W or WIDE; to specify 81 character headings, use WIDTH=N or NARROW.</p> <p>You can specify any LRECL and BLKSIZE on the JCL. RECFM=FBA is specified internally and cannot be overridden. If you do not specify LRECL, either 81 or 133 is used. If you do not specify a BLKSIZE, the default of LRECL is used.</p> <p>Default is WIDTH=WIDE.</p>
LINECNT=[nnn]	<p>Optional. Defines number of lines per page. The minimum number of lines allowed per page is 8, to allow for predefined headings; the maximum number allowed is 999. If LINECNT=0, the headings are printed only on the first page; no further page breaks are taken.</p> <p>Default value is LINECNT=66.</p>

Table 17. Formatting Keywords (Continued)

Keyword/Operand	Description
HEADING=[<u>YES</u> NO]	Optional. If all headings including the first heading should not be printed, use HEADING=NO with LINECNT=0. HEADING=NO suppresses all headings. If HEADING=NO,LINECNT=nn is specified, a new page is requested every nn lines but no headings are printed.
MAXPAGES=[nnnnnn]	Optional. To prevent unexpectedly high volumes of output, MAXPAGES can be specified. This option stops detail report production when the specified number of pages has been reached per report. The summary processing continues; no limit is placed on the number of pages written by the summaries (TSUMx and TSTAT). Any numeric value up to 999,999 can be specified. A value of zero allows any number of pages to be printed. Default value is MAXPAGES=0.

Default Entry

If no report request is entered (SYSIN is empty, DUMMYed, or missing), a default request is constructed as follows:

```
REPORTID=STD1 ,
      TITLE1='TRACE ENTRIES' ,
```

This request uses the default values as described in the preceding tables. Since no report selection is stated, it uses a default selection of LTRAC=YES,TSTAT=SUMMARY.

Return Codes

The return set by a batch process is used by operations, scheduling routines, and others to determine the success of an execution. The return codes set by this function are as follows:

0 - All processing successfully completed.

4 - Warning messages issued. Default values were used to bypass error condition. Probably all output delivered successfully.

8 - Error conditions have been detected. Some output was delivered successfully, but there is a strong possibility that not all requested output was delivered correctly.

12 - Serious error. No proper output delivered.

16 - Internal processing error. Processing terminated, probably through no fault of the user.

For example, if two reports are requested and one of them has errors in the report definition, the return code is 8. If only one is requested and it has errors in the report definition that cause no output to be produced, the return code is 12.

Examples of Output

Sample report statements are provided in BBSAMP as DZJPxxxx members. Additional options are also described in these members.

The reports that you can produce with these sample members are

- DZJPSUM—Accounting Summary Report
provides
 - Trace totals
 - Trace summary by plan, sorted by plan name
- DZJPWKLD—Workload Summary by Time
for a thread summary by 15-minute intervals showing totals in a graphic format.
- DZJPACCL—Accounting Detail—Long
for complete accounting data per thread.
- DZJPACCS—Accounting Detail—Short
for basic accounting data per thread.
- DZJPSQL—SQL Statement Summary
for basic accounting data per thread, followed by
 - An SQL statement summary sorted by percent CPU used
 - The SQL statistics summary pop-up displays per statement
- DZJPEVNT—Thread Detail Events
for a one-line identification of each thread, followed by a chronological list of level 1 and 2 events (critical and SQL events).
- DZJPEXPL—SQL Text and EXPLAIN
for a one-line identification of each thread, followed by detail event pop-up displays showing
 - BIND parameters
 - Full SQL statement text and EXPLAIN data for all threads with dynamic SQL or the execution of a BIND request
- DZJPFALL—Lock and EDM Pool Failures
for a one-line identification of each thread, followed by detail event pop-up displays for any lock or EDM-full failures, including complete deadlock and timeout details.
- DZJPDBIO—I/O Summary by DB/TS
for an I/O report summarized by database and table space.

Examples of the output for these report requests follow.

Accounting Summary Report

Use sample member DZJPSUM to produce the Accounting Summary Report shown in Figure 64. It shows trace totals, followed by a trace summary by plan.

```

BMC SOFTWARE                      ACCOUNTING SUMMARY REPORT                      PAGE: 2
REPORT:SUM                          DATE: 17SEP02
                                      TIME:12:16:56

----- SUMMARY STATISTICS - ALL TRACE ENTRIES-----
-----TERMINATIONS-----ACTIVITY-----
FIRST END..01SEP 14.37.35.21
LAST END...01SEP 14.38.45.37
NUMBER TRANS.....4
NORMAL TERM.....3
-- NEW USER.....0
-- DEALLOC.....3
-- APPL END.....0
-- RESIGNON.....0
-- DBAT INACT.....0
-- IFI READ.....0
ABNORMAL TERM.....1
IN DOUBT TERM.....0
BFR HIT RATIOS:.....VP= 2%,HP=100%

----- KEY INDICATORS -----
TOTAL DDL = 4
SQL: SELECT= 0, FETCH= 4,952
SQL: DYNAMIC(PREPARE)= 1
I/O RSP: SYNC= 62 ms, ASYNC= 133 ms
LOCK SUSPENSIONS = 2

----- ELAPSED TIME ANALYSIS (ACCTG CLASSES 2,3 ONLY)-----
CATEGORY          #EVENTS  AVG/EVENT  ELAPSED  %TOTAL
-----
ELAPSED TIME
  IN DB2          4 00:02:10 00:08:42  84.15
  IN APPLICATION  4 25 s 00:01:38  15.84
  --TOTALS--      4 00:02:35 00:10:20 100.00
WAITS IN DB2 (LOCAL)
  LOCK/LATCH      184 125 ms 23 s 3.70
  I/O WAIT        115 62 ms 7,120 ms 1.14
  OTHER READ      2,757 133 ms 00:06:07 59.15
  OTHER WRITE     0 0 us 0 us 0.00
  UNIT SWITCH     33 375 ms 12 s 1.99
  ARCH. LOG(QIS)  0 0 us 0 us 0.00
  ARCH.READ(TAPE) 0 0 us 0 us 0.00
  DRAIN LOCK      0 0 us 0 us 0.00
  CLAIM RELEASE   0 0 us 0 us 0.00
  PAGELATCH CONT. 0 0 us 0 us 0.00
  SPAS SERVER TCB 0 0 us 0 us 0.00
WAITS IN DB2 (GLOBAL)
  LOCKS           20 210 ms 4,202 ms 0.67
  MSG. PROCESSING 0 0 us 0 us 0.00
  --TOTAL WAITS-- 3,109 133 ms 00:06:53 66.67
*NOT ACCOUNTED   00:01:36 15.40
.....

BMC SOFTWARE                      ACCOUNTING SUMMARY REPORT                      PAGE: 4
REPORT:SUM                          DATE: 17SEP02
                                      TIME:12:16:56

I/O SYSTEM TRACE
PLAN      ENTRY  AVG  AVG  AVG  TOTAL  TOTAL  TOTAL  TOTAL
          COUNT ELAPSED CPU #STMTS GETPGS ELAPSED CPU #STMTS GETPGS
-----
DSNTIA41  11 483 ms 172 ms 11.3 162.3 5,309 ms 1,889 ms 124 1,785
DSNTIB41  1 18 s 5,954 ms 1.0 20.0 18 s 5,954 ms 1 20
DSN8CC0   2 00:01:07 19 ms 12.0 7.0 00:02:13 38 ms 24 14
RXDB2    1 6,086 ms 2,633 ms 245.0 1,160 6,086 ms 2,633 ms 245 1,160
***** END OF SUMMARY ENTRIES *****

```

Figure 64. Accounting Summary Report

Workload Summary by Time

Use sample member DZJPWKLD to produce the Workload Summary by Time Report shown in [Figure 65](#).

This report shows a thread summary by one-minute intervals, but any time span can be specified (default = 15 minutes). Use **GRAPH=AVG** to easily detect application exceptions. Use **GRAPH=TOT** for total workload analysis.

```

BMC SOFTWARE                WORKLOAD SUMMARY BY TIME                PAGE:      2
REPORT:WKLD                  I/O SYSTEM TRACE                DATE: 17SEP02
                                TIME:13:40:03

INTERVAL  #THREADS  TOT ELAPSED  TOT CPU  TOT #STMTS  TOT GETPGS
START      6      00:01:11    6,300 ms    273        1,601
-----|-----|-----|-----|-----|-----|
18:22:00  **          *****    <          <          <
18:23:00
18:24:00
18:25:00  **          *****    <          <          <
18:26:00  *****    *          *****    *****    *****
18:27:00  *****    <          **          ***          *****
18:28:00  *****    ***        *****    *          **
***** END OF SUMMARY ENTRIES *****

```

Figure 65. Workload Summary by Time

Accounting Detail—Long

Use sample member DZJPACCL to produce the Accounting Detail—Long Report shown in Figure 66 and Figure 67 on page 198. It shows complete accounting data per thread.

```

BMC SOFTWARE                ACCOUNTING DETAIL - LONG                PAGE:                2
REPORT:ACCL                  DATE: 17SEP02
                                TIME:12:17:09

STOP.....27JUN 18.26.15.25 PLAN.....RXDB2 TYPE.....ALLIED
START....27JUN 18.26.09.17 AUTHID.....CIR1 CONNECT.....DB2CALL/CAF
ELAPSED.....6,086 ms ORIG PRIM AUTH.....CIR1 CORR ID.....CIR1
TERM.....NORMAL/DEALLOC COMMITS.....0 ROLLBACKS.....1

-----
RUNTIME ANALYSIS   IN DB2       IN APPL.     TOTAL        %IN DB2(=)   TOTAL(*)
-----
ELAPSED TIME      2,520 ms    3,565 ms    6,086 ms     0...25...50...75...100%
CPU TIME          663 ms     1,986 ms    2,649 ms     |=====*****|
DB2 WAIT TIME    1,051 ms                                     |=====*****|
                                |=====*****|
-----
ACTIVITY          -----
TOTAL SQL.....245          I/O RSP: SYNC= 6,754 us, ASYNC= 10 ms
GETPAGES.....1,160
SYNC I/O (PRL= 0) .....21
PREFETCH.....82
UPDATES/COMMIT.....0.0
BFR HIT RATIOS:...VP= 98%,HP= 0%

-----
ENVIRONMENTAL INDICATORS -----
LUWID.....USBOOL01.LUDB2F.A97E4E8174E40001
RLF TABLE ID...NOT ACTIVE

-----
ELAPSED TIME ANALYSIS (ACCTG CLASSES 2,3 ONLY) -----
CATEGORY          #EVENTS  AVG/EVENT  ELAPSED  %TOTAL
-----
ELAPSED TIME
  IN DB2          2,520 ms  41.41     *****
  IN APPLICATION  3,565 ms  58.58     *****
  --TOTALS--      6,086 ms 100.00     *****
WAITS IN DB2
  LOCK/LATCH      38      250 us    9,517 us  0.15     <
  I/O WAIT        42      6,754 us  284 ms    4.66     <
  OTHER READ      72      10 ms     752 ms    12.35    **
  OTHER WRITE     0        0 us      0 us      0.00
  UNIT SWITCH     2      2,889 us  5,779 us  0.09     <
  ARCH. LOG(QIS)  0        0 us      0 us      0.00
  ARCH.READ(TAPE) 0        0 us      0 us      0.00
  DRAIN LOCK      0        0 us      0 us      0.00
  CLAIM RELEASE   0        0 us      0 us      0.00
  PAGELATCH CONT. 0        0 us      0 us      0.00
  --TOTAL WAITS-- 154     6,824 us 1,051 ms 17.27    ***
*NOT ACCOUNTED   93 us    0.00

-----
SQL STATEMENT EXECUTION COUNTS -----
SELECT.....0      LOCK TABLE.....0      CREATE.....0
INSERT.....0      GRANT/REVOKE.....0     DROP.....0
UPDATE.....0      SET CURR.SQLID.....0    ALTER.....0
DELETE.....0      SET HOST VAR. ....0
PREPARE.....13     SET CURR.DEGREE.....0
DESCRIBE.....0
OPEN.....13        CONNECT TYPE 1.....0    COMMENT ON.....0
FETCH.....206     CONNECT TYPE 2.....0    LABEL ON.....0
CLOSE.....13       SET CONNECTION.....0
** DML.....245    ** DCL.....0           ** DDL.....0

```

Figure 66. Accounting Detail—Long—Part I

```

- - - - - BUFFER POOL ACTIVITY - - - - -
ACTIVITY          TOTAL      BPO
-----
GETPAGES.....    1,160    1,160
SYNC READS.....      21      21
GETPAGES/READIO... 55.2    55.2
COND. GP FAILURES. 0         0

SEQ. PREFETCH REQS 82        82
LIST PREFETCH REQS 0         0
DYNAMIC PREFETCHES 0         0
ASYNC PAGES READ.. 0        421
PAGES/PREFETCH REQ 14.1     14.1

PAGE UPDATES..... 0         0
IMMEDIATE WRITES.. 0         0

HP SYNC READS.... 0         0
HP SYNC READ FAIL. 0         0
HP ASYNC PAGES READ 0         0
HP WRITES.....    0         0
HP WRITE FAILURES. 0         0

```

```

- - - - - LOCK ACTIVITY - - - - -
TIMEOUT.....0      MAX PAGE LOCKS.....21
DEADLOCK.....0

SUSPEND-LOCK.....0      LOCK REQUEST.....639
SUSPEND-LATCH.....13    UNLOCK REQUEST.....350
SUSPEND-OTHER.....0     QUERY REQUEST.....0
                           CHANGE REQUEST.....13
                           OTHER REQUEST.....0

ESCALATION(SHR).....0
ESCALATION(EXCL).....0

DRAIN REQUEST.....0     DRAIN FAILURE.....0
CLAIM REQUEST.....9     CLAIM FAILURE.....0

```

- - - - - PACKAGE / DBRM OVERVIEW (ACCTG CLASSES 7,8 ONLY) - - - - -

PACKAGE/ DBRM	NO. SQL	CPU TIME	WAIT TIM	ELAPSED	%TOTAL ELAP.	
RXSEL1M	5	40 ms	181 ms	610 ms	10.02	0 . . .25 . . .50 . . .75 . .100
RXSEL2M	104	208 ms	742 ms	1,351 ms	22.20	**
RXSEL3M	24	51 ms	37 ms	100 ms	1.64	****
RXSEL4M	8	31 ms	386 us	35 ms	0.56	<
RXSEL5M	9	32 ms	2,549 us	37 ms	0.60	<
RXSEL6M	10	35 ms	257 us	43 ms	0.70	<
RXSEL7M	11	34 ms	26 ms	39 ms	0.63	<
RXSEL8M	12	35 ms	1,595 us	70 ms	1.14	<
RXSEL9M	13	36 ms	2,585 us	47 ms	0.76	<
RXSELAM	14	38 ms	318 us	42 ms	0.68	<
RXSELBM	15	40 ms	2,468 us	45 ms	0.74	<
RXSELCM	16	40 ms	1,884 us	45 ms	0.74	<
RXSELDM	17	43 ms	7,401 us	56 ms	0.92	<

Figure 67. Accounting Detail—Long—Part II

Accounting Detail—Short

Use sample member DZJPACCS to produce the Accounting Detail—Short Report shown in Figure 68. It shows basic accounting data per thread.

```
BMC SOFTWARE                ACCOUNTING DETAIL - SHORT                PAGE:                2
REPORT:ACCS                  DATE: 17SEP02
                               TIME:12:17:16

STOP.....27JUN 18.26.15.25 PLAN.....RXDB2 TYPE.....ALLIED
START.....27JUN 18.26.09.17 AUTHID.....CIR1 CONNECT.....DB2CALL/CAF
ELAPSED.....6,086 ms ORIG PRIM AUTH.....CIR1 CORR ID.....CIR1
TERM.....NORMAL/DEALLOC COMMITS.....0 ROLLBACKS.....1
-----
RUNTIME ANALYSIS  IN DB2      IN APPL.    TOTAL      %IN DB2(=)  TOTAL(*)
-----
ELAPSED TIME      2,520 ms    3,565 ms   6,086 ms   0 .. 25 .. 50 .. 75 .. 100%
CPU TIME          663 ms     1,986 ms   2,649 ms   |=====*****|
DB2 WAIT TIME     1,051 ms                                     |=====|
- - - - - ACTIVITY - - - - -                    - - - - - KEY INDICATORS - - - - -
TOTAL SQL.....245      I/O RSP: SYNC= 6,754 us, ASYNC= 10 ms
GETPAGES.....1,160
SYNC I/O (PRL= 0) .....21
PREFETCH.....82
UPDATES/COMMIT.....0.0
BFR HIT RATIOS:...VP= 98%,HP= 0%
```

Figure 68. Accounting Detail—Short

SQL Statement Summary

Use sample member DZJPSQL to produce the SQL Statement Summary Report shown in Figure 69. It shows basic accounting data per thread, followed by:

- An SQL statement summary sorted by percent CPU used
- The SQL statistics summary pop-up displays per statement

```

BMC SOFTWARE                                SQL STATEMENT SUMMARY                                PAGE:      2
REPORT:SQL                                  DATE: 17SEP02
                                             TIME:12:17:23

STOP.....27JUN 18.22.37.08 PLAN.....DSN8CC0 TYPE.....ALLIED
START.....27JUN 18.21.26.40 AUTHID.....T305 CONNECT.....CICS41B1/CICS
ELAPSED.....00:01:11 ORIG PRIM AUTH.....T305 CORR ID.....GT00D8CS
TERM.....NORMAL/DEALLOC COMMITS.....0 ROLLBACKS.....1
-----
RUNTIME ANALYSIS  IN DB2      IN APPL.      TOTAL      %IN DB2(=)  TOTAL(*)
-----
ELAPSED TIME      00:01:11      98 ms      00:01:11      |=====|
CPU TIME          17 ms      35 ms      52 ms      |<=====|
DB2 WAIT TIME     00:01:10
-----
- - - - - ACTIVITY - - - - - KEY INDICATORS - - - - -
TOTAL SQL.....12      TIMEOUT
GETPAGES.....7      LOCK SUSPENSIONS = 1
SYNC I/O (PRLL= 0) .....0
PREFETCH.....0
UPDATES/COMMIT.....0.0
BFR HIT RATIOS:...VP=100%,HP= 0%

- - - - - SQL SUMMARY (DETAIL TRACE ONLY) - - - - -

  STMT      AVG.      %      AVG.      %      SORT      -- PAGES SCANNED --
  TYPE      STMT      COUNT  ELAPSED  ELAP  CPU      CPU  RECS  INDX DATA WORK  REF
-----
FETCH      962      5      2,136 us  46.6  410 us  36.6  0      1  1  0  0
PGM:DSN8CC1      5      46.6      36.6      0      1  1  0  0

SELECT     814      1      9,664 us  42.2  1,363 us  24.3  0      1  0  0  0
PGM:DSN8CC0      1      42.2      24.3      0      1  0  0  0

SELECT     931      1      1,074 us  4.7   697 us  12.4  0      1  0  0  0
SELECT     1021     1      689 us   3.0   690 us  12.3  0      1  1  0  0
SELECT     670      1      540 us   2.4   541 us  9.7   0      1  0  0  0
CLOSE     973      1      131 us   0.6   129 us  2.3   0      0  0  0  0
OPEN     956      1      130 us   0.6   128 us  2.3   0      0  0  0  0
INSERT    802      1      0 us     0.0    0 us   0.0   0      0  0  0  0
PGM:DSN8CC1      6      11.2     39.0   0      3  1  0  0

** TOTALS ***      12      0      5  2  0  0

-----
STATEMENT: 962 FETCH      CURSOR      NUMBER OF EXECUTIONS: 5
PLAN:      DSN8CC0      ELAPSED: AVERAGE 2,136 us TOTAL 11 ms
PROGRAM:   DSN8CC1      CPU:      AVERAGE 410 us TOTAL 2,050 us
-----
AVERAGES -----
INDEX  SEQ-DATA
-----
ROWS PROCESSED ALL TYPES      12.0      0.8
ROWS PROCESSED CORRECT TYPE   12.0      0.8
ROWS QUALIFIED BY DM (STAGE 1) 0.8      0.0
ROWS QUALIFIED BY RDS (STAGE 2) 0.8      0.0
ROWS INSERTED                  0.0      0.0
ROWS UPDATED                    0.0      0.0
ROWS DELETED                    0.0      0.0
PAGES SCANNED                   0.2      0.2
REFERENTIAL INTEGRITY PROCESSING:
PAGES SCANNED                   0.0      0.0
ROWS DELETED/SET NULL          0.0      0.0
-----

```

Figure 69. SQL Statement Summary

Thread Detail Events

Use sample member DZJPEVNT to produce the Thread Detail Events Report shown in [Figure 70](#). It shows a one-line identification of each thread, followed by a chronological list of detail events. Level 3 events such as scans and I/O can also be included.

19SEP02		I/O SYSTEM TRACE		THREAD DETAIL EVENTS				PAGE: 2	
END TIME	PLAN	AUTHID	CONNECT	ELAPSED	CPU	# STMTS	GETPAGE	REASON	DATE: 17SEP02
EVENT		AT	ELAPSED	CPU	DETAIL	TIME: 12:17:28			
18:22:37	DSN8CC0	T305	CICS41B1	00:01:11	52 ms	12	7	OK	
CREATE-THD		0.000	38 ms	1,602 us					
PLAN-ALLOC		0.037			ISOLATION=CS ACQ=USE		REL=COMMIT		
PKG-ALLOC		0.041			*DSN8CC0 ISO=CS ACQ=USE		REL=COMIT		
SELECT	814	0.041	9,664 us	1,363 us	*RC(100)		X PS(1)		
PKG-ALLOC		0.079			*DSN8CC0 ISO=CS ACQ=USE		REL=COMIT		
SELECT	670A	0.079	540 us	541 us	*RC(100)		X PS(1)		
SELECT	931A	0.082	1,074 us	697 us	*RC(100)		X PS(1)		
OPEN	956A	0.084	130 us	128 us	*RC(0) C=VO2				
FETCH	(5)962A	0.093	11 ms	2,050 us	*RC(100) C=VO2		D/X PS(2)		
CLOSE	973A	0.116	131 us	129 us	*RC(0) C=VO2				
SELECT	1021A	0.124	689 us	690 us	*RC(0)		D/X PS(2)		
INSERT	802A	0.128		0 us	*RC(0)				
LOCK-TMO-DET		70.375			*DB=dsm8d71P OB=DSN8S71C NUMBER=1				
LOCK-TMO		70.376			*DB=dsm8d71P OB=DSN8S71C TYP=ACE				
ABORT		70.701	13 ms	842 us					
LOCK-SUMMARY		70.713			*MAXPG(0) ESCL(0) TS(1)				
COMMIT-LSN		70.713			*LOCK-AVOID=N PAGESETS=0				
TERM-THD		70.714		0 us					

19SEP02		I/O SYSTEM TRACE		THREAD DETAIL EVENTS				PAGE: 3	
END TIME	PLAN	AUTHID	CONNECT	ELAPSED	CPU	# STMTS	GETPAGE	REASON	DATE: 17SEP02
EVENT		AT	ELAPSED	CPU	DETAIL	TIME: 12:17:28			
18:25:51	DSN8CC0	T305	CICS41B1	00:01:03	47 ms	12	7	OK	
CREATE-THD		0.000	4,634 us	1,469 us					
PLAN-ALLOC		0.004			ISOLATION=CS ACQ=USE		REL=COMMIT		
PKG-ALLOC		0.008			*DSN8CC0 ISO=CS ACQ=USE		REL=COMIT		
SELECT	814	0.009	10 ms	1,450 us	*RC(100)		X PS(1)		
PKG-ALLOC		0.025			*DSN8CC0 ISO=CS ACQ=USE		REL=COMIT		
SELECT	670A	0.026	558 us	559 us	*RC(100)		X PS(1)		
SELECT	931A	0.032	1,331 us	839 us	*RC(100)		X PS(1)		
OPEN	956A	0.035	137 us	134 us	*RC(0) C=VO2				
FETCH	(5)962A	0.037	2,857 us	1,960 us	*RC(100) C=VO2		D/X PS(2)		
CLOSE	973A	0.048	119 us	119 us	*RC(0) C=VO2				
SELECT	1021A	0.050	712 us	712 us	*RC(0)		D/X PS(2)		
INSERT	802A	0.053		0 us	*RC(0)				
LOCK-TMO-DET		62.631			*DB=dsm8d71P OB=DSN8S71C NUMBER=1				
LOCK-TMO		62.655			*DB=dsm8d71P OB=DSN8S71C TYP=ACE				
ABORT		62.811	13 ms	814 us					
LOCK-SUMMARY		62.823			*MAXPG(0) ESCL(0) TS(1)				
COMMIT-LSN		62.823			*LOCK-AVOID=N PAGESETS=0				
TERM-THD		62.824		0 us					

Figure 70. Thread Detail Events

Lock and EDM Pool Failures

Use sample member DZJPFAIL to produce the Lock and EDM Pool Failures Report shown in [Figure 72](#). It shows a one-line identification of each thread, followed by detail event pop-up displays for any lock or EDM-full failures, including complete deadlock and timeout details.

19SEP02		DB2 APPLICATION TRACE		CPU		#	STMTS	GETPAGE	REASON
END TIME	PLAN	AUTHID	CONNECT	ELAPSED	CPU				
11:16:15	RXDB2	BOLBPL3	DB2CALL	16 s	208 ms	5	53	OK	
	EVENT	AT	ELAPSED	CPU	DETAIL				
	TIMEOUT	15.360				*DB=DSN8D71P OB=DSN8S71C NUMBER=1			
<pre> LOCK TYPE: DATA PAGE RESOURCE NAME: DB=DSN8D71P OB=DSN8S71C RESOURCE #: X'00001200' HASH VALUE: X'01041300' FUNCTION: LOCK STATE: X DURATION: manual ZPARAM INTERVAL: 10 INTERVAL COUNT: 1 REQUESTING WU: 01790057-06D25738 </pre>									
-----LOCK HOLDERS / PRIORITY WAITERS-----									
H/W	PLAN	CORRID/LUWID	CONNECT	DURATION	STATE	MEMBER	OWNER	WU	
HOLDER	RXDB2	BOLBPL2	DB2CALL	COMMIT	X	DB2G	01790054-	06D25458	
		USBO0L01LUDB2GABC2CBA6EB8F0001							

Figure 72. Lock and EDM Pool Failures

I/O Analysis by DB/TS

Use sample member DZJPDBIO to produce the I/O Analysis by DB/TS Report shown in [Figure 73](#). It shows an I/O report summarized by database and table space. The sample also shows how to produce reports with a third summary key, such as database, table space, plan or plan, database, table space.

BMC SOFTWARE		I/O ANALYSIS BY DB/TS		PAGE: 1		
REPORT:DBIO				DATE: 17SEP02		
				TIME:12:17:48		
DATA	TABLE	I/O	I/O	MAX	AVG	
BASE	SPACE	COUNT	%	IOWAIT	IOWAIT	
				--ms--	--ms--	0 . . . 20 . . . 40 . . . 60 . . . 80
DSNDB01	DBD01	4	5.6	89	34	*****
DSNDB01	DSNSCT02	1	1.4	28	28	*****
DSNDB01	DSNSPT01	1	1.4	17	17	****
DSNDB01	SCT02	2	2.8	38	31	*****
DSNDB01	SPT01	4	5.6	351	95	*****
DSNDB06	DSNAPH01	29	40.8	1028	82	*****
DSNDB06	DSNDSX01	2	2.8	27	27	*****
DSNDB06	DSNDTX01	1	1.4	40	40	*****
DSNDB06	SYSDBASE	1	1.4	26	26	*****

Figure 73. I/O Analysis by DB/TS

Solving Problems

This section analyzes several problem symptoms you might encounter when using a trace. Each symptom is listed, followed by an analysis of the problem and a suggested solution.

Symptoms:

- A trace request shows a status of QIS instead of ACTV.
- Message DZ310II TRACE QUIESCED is written to the Journal Log.
- A message IM47nnx with the reason for quiescing is written.

Analysis/Solutions:

There are several reasons a trace could be quiesced:

- The target DB2 is no longer active:
 - All current trace requests (and monitors) have a status of QIS.

Solution:

You can check if the target DB2 is inactive by looking at the DB2 messages in the Journal Log (Option L, or PF5), or simply by requesting one of the online displays such as DB2ST. If the RST (restart) option for the trace is HOT, the trace is reactivated automatically when DB2 restarts.

- TRACE LIMIT EXCEEDED

A detail trace was requested, but the maximum of four for that DB2 are already active.

Solution:

One of the four detail traces must be stopped (not necessarily purged) before another can be started.

- DB2 TRACE FAILURE

A detail trace was requested, but the start trace request to DB2 failed.

Solution:

Check the Journal Log for additional DB2 messages to determine and correct the error.

- TRACE LOGGING QUIESCED

Logging was requested, but logging is not active because the Trace Directory is not available.

Solution:

Check the Journal Log at the time the BBI-SS PAS was started. Analyze the additional messages about the failure to allocate the Trace Directory. Correct the problem and restart the BBI-SS PAS to activate logging.

- **TLDS ALLOCATION FAILED**

Logging was requested, but the log data set allocation failed.

Solution:

Check the Journal Log at the time the trace was started for additional messages about the allocation failure. Correct the error and resubmit the trace request.

- **GETMAIN RETURN AREA FAILURE**

A GETMAIN for buffer storage failed because the BBI-SS PAS region size was exceeded.

Solution:

Reduce the size of STORAGE, TRSIZE, or TRBUFF to reduce the total amount of storage requested, or stop or purge other Current Traces to free up their storage allocations. Remember that a very large buffer GETMAIN (for example, STORAGE=8000K) might fail because of space fragmentation.

Symptom:

- A trace request fails with the short message:

BUFFERS EXCEED LIMIT

Analysis:

The specifications for buffer sizes exceeded the allowed limit (TRLIM) for a single trace.

Solution:

Reduce the size of STORAGE, TRSIZE or TRBUFF to reduce the total amount of storage requested. The value for TRLIM is specified in BBPARM member DMRBEX00.

Symptom:

- Extended CSA usage is too high, and several buffers contain DB2 trace data (identifier RMID=26).

Analysis:

When MAINVIEW for DB2 issues a DB2 Start Trace request, DB2 GETMAINs storage in ECSA and allocates it to the BBI-SS PAS. The storage is only freed when DB2 terminates. The storage is reused when that OPx destination is reused for another trace request.

Solution:

Ensure that you have not specified too high a value for IFIBUFF. The default value is 32K. A maximum of 8 buffers of IFIBUFF size may be held by DB2.

Symptoms:

- DB2 issues the following message:
`DSNW133I DSNWVSRV TRACE DATA LOST, OPx NOT ACCESSIBLE, RC=8`
followed later by
`DSNW123I DSNWVSRV TRACE RECORDING HAS BEEN RESUMED ON OPx`
- When viewing the trace displays (STRAC, DTRAC) some of the detail events are missing, and the following message might be displayed near the top of the screen:
`DZ3114W SOME DETAIL DATA LOST - BUFFER INCOMPLETE`

Analysis:

MAINVIEW for DB2 cannot transfer the trace data passed from the DB2 IFI quickly enough. This situation might be because of dispatching priority or the volume of events.

Solution:

1. The BBI-SS PAS must be at a higher dispatching priority than DB2. Check the priority level of the BBI-SS PAS.
2. This trace produces so many events that the DB2 IFI buffer is filling up too quickly.

- Remove some of the event types traced (especially LOCKS, DDFVTAM).

Or:

- Temporarily increase the size of the IFI buffer before starting this trace (proper authorization is required). This situation can be done with an undocumented parameter IFIBUFF in DMRBEX00 for the target DB2.
 - Define a new member DMRBEX01 in BBPARM with IFIBUFF=200K to 400K.
 - Issue the BBI control command RESET PARM DMRBEX01.
 - Start the trace.
 - Issue the BBI control command RESET PARM DMRBEX00 to return to the default 32K for other trace requests.

Symptom:

- When viewing a detail trace (STRAC or DTRAC displays), one of the following messages is displayed:

```
DZ3114W  SOME DTL TRACE DATA LOST - NO BUFFER
DZ3114W  SOME DTL TRACE DATA LOST - BUFFER OVERFLOW
DZ3114W  SOME DTL TRACE DATA LOST - BUFFER INCOMPLETE
```

Analysis / Solutions:

When collecting detail trace data, an insufficient number or size of buffers was available to collect all of the event data being passed from DB2.

- NO BUFFER

No buffer was available to collect the trace events for one or more threads. Only the accounting record is available for viewing for this thread (or threads).

Solution:

- Increase the number of buffers to three times the expected number of concurrent threads.

Or:

- Restrict the number of concurrent threads that could be traced with the trace selection criteria DB2AUTH or DB2PLAN.

- BUFFER OVERFLOW

At least once while a thread was being traced, the current buffer filled up and no additional buffer was available to continue. Tracing continues when a buffer does become available, but detail events in the middle or end of that thread are missing.

Solution:

Increase TRBUFF or TRSIZE, or reduce the number of events to be traced. This problem is often caused by tracing LOCKS or DDFVTAM events, which can be overwhelming in number. If you need to trace these events without logging, restrict the number of concurrent threads to one with selection criteria, specify TRBUFF=3, and increase TRSIZE.

If you specify logging, ensure that you have three to five buffers per concurrent thread and keep the size as usual. Three buffers might not be enough to trace a single thread when running on a fast CPU and logging many events. In this case, the I/O to write a buffer and free it up for reuse might not be fast enough. If you are tracing multiple threads (for example, 5 possible threads * 3 = 15 buffers), the buffer usage and I/Os occur at different times for each thread; this situation increases the chances of finding a free buffer and 3 probably will be sufficient.

Note: See the suggestions for [“Analyzing Lock Usage without Tracing LOCK Events”](#) on page 155.

- **BUFFER INCOMPLETE**

Although sufficient buffer storage was available, at least some detail events are missing for one or more threads.

- The trace was started or stopped in the middle of thread processing—the first or last events are missing. If stopped before thread completion, only a dummy accounting record without statistics is available.

Solution:

Start/stop the trace when no threads are processing, or ignore the incomplete threads.

- The data from DB2 was arriving faster than it could be processed.

Solution:

Check the Journal Log for message DSNW133I to verify the problem (dispatching priority or size of IFIBUFF) and refer to that symptom description.

- When viewing a long-running application from Current Traces (the online STORAGE buffer), the first events for some threads are missing because only the last two buffers per thread can be saved online.

Solution:

View this trace from History Traces (the trace log data sets), where all buffers can be saved and combined to show the complete thread data.

- When viewing a thread that spans multiple trace log data sets, only the last log data set contains DB2 accounting statistics. Detail trace data (DTRAC, UTRAC, and detail trace summaries in STRAC and TSTAT) is incomplete in each log data set.

However, accounting data in the final log is complete and represents the entire thread. The detail trace data in each log can be added together for total results.

Solution:

When tracing applications that can span multiple buffers, allocating one large trace log data set is preferable to several small ones.

Symptom:

- No data is shown in an active trace for a long-running thread.

Analysis / Solution:

The data is being collected, but is usually only shown in LTRAC/STRAC when the thread is completed and the DB2 accounting record is available. While the thread is active, you can view the events with the UTRAC display, which is like DTRAC, but it is accessible from DUSER for that thread.

You must set up trace logging to effectively trace long-running threads. This setting allows access to the DTRAC data while the thread is running. By accessing the trace data from the TLDS you can see each buffer of detail trace events as it is filled and written to the trace log.

See [Appendix C, “Recommendations for Detail Traces of Long-Running Threads”](#) on page 347 for more information.

Symptom:

- No data is shown in an active trace for a long-running thread.

Analysis / Solution:

Trace records are being discarded, identified by either of the following messages:

```
IM7910W dddd MAX TRACE LOG RECORDS QUEUED, DISCARDING
DZ0100W dddd MAX TRACE RECORDS QUEUED, DISCARDING
```

See [Appendix D, “Discarded Trace Records”](#) on page 351 for complete analysis and solution information.

Chapter 5. Application Trace

This chapter describes the application trace services.

Introduction

Application trace comprises the data collection and data display services shown in [Table 18](#). These services track the processing of specific threads through DB2 and display the time stamps, resource usage, and other important workload statistics for each thread (DB2 accounting record) traced. The services use selected Instrumentation Facility Component IDs (IFCID) obtained through the DB2 Instrumentation Facility Interface (IFI).

Table 18. Application Trace Services

Service	Title	Page	Area
ATRAC	DB2 APPLICATION TRACE	140	Data Collection
LTRAC	DB2 TRACE ENTRIES	231	Trace Displays
TSTAT	TRACE STATISTICS	235	
TSUMA	TRACE SUMMARY BY AUTHID	255	
TSUMC	TRACE SUMMARY BY CONNECT	257	
TSUML	TRACE SUMMARY BY LOCATION	259	
TSUMP	TRACE SUMMARY BY PLAN	261	
TSUMR	TRACE SUMMARY BY CORRID	263	
TSUMT	TRACE SUMMARY BY TIME	265	
DBIO	I/O ANALYSIS BY DB/TS	317	
DBIOA	I/O ANALYSIS BY AUTHID	319	
DBIOF	I/O ANALYSIS BY BPOOL	321	
DBIOC	I/O ANALYSIS BY CONNECT	323	
DBIOL	I/O ANALYSIS BY LOCATION	325	
DBIOP	I/O ANALYSIS BY PLAN	327	
DBIOK	I/O ANALYSIS BY PKG/PGM	329	
DBIOS	I/O ANALYSIS BY SQL STMT	331	
DBIOT	I/O ANALYSIS BY TIME	333	
STRAC	SUMMARY TRACE ENTRY	267	
DTRAC	DETAIL TRACE ENTRY	287	
UTRAC	USER DETAIL TRACE	310	

The ATRAC service (DB2 APPLICATION TRACE) is a timer-driven service that can be activated multiple times (with different selection criteria and trace types) to trace selectable workloads. The display services show the data collected by an ATRAC request.

Note: Data collection for a trace must be activated by the ATRAC service before the data can be displayed by the application trace display services. The appropriate DB2 traces are activated through the Instrumentation Facility Interface (IFI).

A trace entry is made in an internal buffer for each DB2 accounting record selected with the ATRAC service request as described in [“Collecting Trace Data” on page 134](#). These entries are sometimes referred to as transactions, since this terminology is used generally by online systems such as IMS and CICS.

Application Trace Considerations

This section summarizes how to use the summary and detail application traces. It provides overhead considerations, itemizes the data available for display at each detail trace display level, and explains how this information can be used by data management personnel.

“Using a Trace” on page 131 describes how trace data is collected and how to request trace data collection, display, and print.

Data Collection

The many trace data collection levels provide flexibility to collect just that information needed to perform a specific task without incurring overhead for data that is not needed. SUMMARY and DETAIL are relatively inexpensive. Each additional type of event, SQL | SCAN | IO | LOCK | DDF | DDFVTAM, adds more overhead but gives more information. One or more of these groups can be added to a DETAIL trace. Security profiles control the level of trace each user is allowed to specify.

Trace overhead is directly proportional to the number of events traced. Keeping a detail trace active for a longer time period to ensure capturing several occurrences is not expensive if only a few executions of the traced plan are expected. However, tracing a long-running batch job or many threads can be very expensive if a detail trace is chosen with several additional types of events.

The following events are overhead considerations for each trace level. Each type of event specified includes additional data to that collected by a summary and detail trace.

Trace Type	Data Collected
SUMMARY	Accounting level data Minimal overhead, since DB2 accounting traces are usually active.
DETAIL	Adds major events Relatively low overhead because of selective performance tracing. DETAIL includes the same accounting data as SUMMARY.
SQL	Adds SQL statements to DETAIL Most useful level for application tuning. This group is included with DETAIL by default.
SCAN	Adds scans to DETAIL More overhead because of the potentially large number of scans, but it gives information on index usage and data access paths otherwise not available.
IO	Adds I/O to DETAIL More overhead because of the additional events traced (more storage is used to hold the large number of events). However, this information is valuable to show the status of the table organization by evaluating GETPAGE to READ I/O ratios.
LOCK	Adds lock requests to DETAIL Potentially, the greatest amount of overhead because of the large number of additional events traced (more storage is used to hold these events). It should be used only if locking is a problem. Note: The GROUPSQL option can be used to combine identical SQL statements processed in sequence to reduce buffer storage requirements for long-running batch jobs. For example, this option could combine many FETCH statements into one line with summary counts.
DDF	Adds all DDF events except VTAM-related DDF events to DETAIL More overhead because of additional events traced.
DDFVTAM	Adds VTAM-related DDF events to DETAIL More overhead because of additional events traced.

Display Level Options

There are many levels of trace displays available. Each display presents summarized and integrated information from the data collection level active for that trace request as shown in the display level summary below. In this summary, the data collection levels where specific data displays become available are shown in parentheses. For example, (S) indicates that the data is already collected by a summary trace request. (D) indicates a detail trace request; it includes data identified with (S).

- LTRAC - (S) Scrollable list of trace entries
- TSTAT - Trace statistics on all or selected trace entries
 - (S) Trace status
 - (S) Summary of key average measurements
 - (D,SCAN) Database scan summary
 - (D,LOCK) Database lock summary
 - (D,IO) Database I/O summary
 - (D) Sort summary
- TSUMA - Trace summary by AUTHID
 - (S) Accounting data
- TSUMC - Trace summary by connection name
 - (S) Accounting data
- TSUMP - Trace summary by plan
 - (S) Accounting data
- TSUMT - Trace summary by time
 - (S) Accounting data
- TSUML - Trace summary by location
 - (S) Accounting data
- STRAC - Information about one trace entry
 - (S) Accounting data
 - (D) SQL statement summary by program
 - (D,SCAN) Database scan summary
 - (D,LOCK) Database lock summary
 - (D,IO) Database I/O summary
 - (D) Sort summary
- DTRAC - Events for one trace entry
 - (D) LEVEL=1 - SQL
 - (D) LEVEL=2 - SQL + DB2 requests
 - (D) LEVEL=3 - SQL + DB2 requests + DB2 processing
- DTRAC,PGM=
 - Events for one program (DBRM) within one trace entry
- Pop-up displays - One event
 - (D) Detail of one event

Usage Examples

This section describes a few of the possible uses of application traces. Its purpose is to help you discover how to use a trace to solve unique problems.

Application trace allows

- Application developers to test not only application correctness but performance as well
- Database administrators to review SQL before accepting it for production use
- Database administrators to analyze I/O by page set (table spaces and index spaces)
- Periodic performance reviews of specific application groups
- Investigation of a specific plan suspected of poor performance (or identified in previous summary analysis)
- Analysis of index usage and database access paths (scans) and I/O and lock request patterns as necessary
- Traces of QMF and ad hoc SQL usage to find users that need training in SQL concepts to improve performance
- Ad hoc analysis of workload history for a DB2 system
- Checks of the performance characteristics of a new application that is accessing production databases
- Ongoing exception traces per workload type to be set up to detect bad applications that
 - Do not meet performance criteria or service levels
 - Affect total system performance

The next sections describe application trace techniques that site personnel can use.

(Application Developer) Test Application Performance

Application developers can be given the authority to run detail traces only on their test or development DB2 system where trace overhead is not critical. All types of tracing allowed can be specified for each user, SUMMARY, DETAIL, or ALL, with each additional type causing progressively more overhead.

Sample Trace Request Options

Option	Use
PARM=RBTEST3	Identify this test run with user initials and sequence number
TYPE=DETAIL	Relatively low overhead (panel default includes SQL)
START=	Leave blank to start immediately
STOP=30	Leave default trace duration of 30 minutes
WRAP=YES	Keep the latest occurrences
DB2AUTH=ABG01	Select own DB2 work by AUTHID
STORAGE=1000K	Trace display buffer space is in BBI-SS PAS extended private area
LOGTRAC=Y	Log to a single dynamically allocated data set
TITLE='TEST 3'	User-specified title to identify log data set

A detail trace answers a great many questions with relatively low system overhead. It selectively traces the key events in the life of a query or thread, including all SQL. For example, sorts invoked, elapsed and CPU times, and the row statistics showing activity per SQL statement can identify problem areas quickly. It also includes EXPLAIN data for dynamic SQL, QMF queries, and binds of static plans. In addition, multiple index access path processing can be analyzed both when it is successful and when it fails.

Application developers now have an easy way of testing different versions of SQL and comparing the results. All the necessary information for every test iteration can be gathered in one trace showing SQL text, EXPLAIN data, and actual execution performance. The data can be reviewed online during the testing, recalled online from the log at a later time, or printed for more thorough analysis. A series of tests can be made over several days (for example, identified as TEST1, TEST2, and so on) and recalled online or printed for performance comparisons.

More data can be collected with the higher levels of detail trace (TYPE=D,SQL | SCAN | IO | LOCK | DDF | DDFVTAM):

- SCAN is needed occasionally to pick up the scans and show specific table and index usage.
- IO may be requested less frequently to trace the I/O patterns. However, this area is the most subject to change between test and production since the data access and buffering varies greatly with table size and the amount of concurrent activity.
- LOCK is needed only to check out locking patterns.
- DDF is needed to trace distributed SQL, either as requestor or as server, in this location.
- DDFVTAM is needed to analyze the VTAM-related activity caused by distributed SQL.

A summary trace can be run after the SQL statements are checked. This trace provides elapsed and CPU times that are not artificially increased by the DB2 performance trace overhead.

When the occurrences that need to be evaluated are collected, the trace (and its overhead) can be stopped with a Z line command. The data from stopped traces can be browsed until the request is purged, or WRAP can be changed to NO with a modify trace request. This request prevents previously collected data from being overwritten until it can be analyzed. Tracing can then be restarted with a modify trace request to change WRAP to YES. However, tracing overhead continues during this whole period.

When multiple programs are part of one plan, activity by program can be analyzed with the STRAC display. It presents an SQL summary by program for the total plan, with percent of total calculations of elapsed and CPU times per SQL statement and program. This immediately points out where the most time is being spent. Also, in the event traces (shown in the DTRAC displays), an identifier, which is appended to each SQL statement number if it is in a different program than the previous SQL. This shows the logical flow between programs. By expanding from one statement in the SQL summary to DTRAC, you can view just the detail events from that one program (DBRM).

Since this trace was logged, any of the online displays can be printed for offline analysis. You can submit a print job for this log directly from the HISTORY TRACES option or by tailoring and submitting a batch job.

(DBA) Review SQL before Production Use

The following trace gives the DBA a simple way to check out the performance characteristics of any new plan:

Sample Trace Request Options

Option	Use
TYPE=D,SQL,SCAN	Medium overhead
START=	Leave blank to start immediately
STOP=	Leave blank to stop manually
WRAP=YES	Keep the latest occurrences in the buffer
DB2PLAN=XYZAB	Select the new plan
STORAGE=1000K	Trace display buffer space is in BBI-SS PAS extended private area
LOGTRAC=Y	Log to a dynamically allocated data set

By tracing scan information integrated with the SQL statements, critical performance indicators can be easily identified, such as sorting, index usage, scan patterns, work (DSNDB07) scans, and so on. Events and resources used can be seen directly as they actually happened. Bad SQL statements can be identified and fixed before they are put into production.

For large plans with many SQL statements, the SQL summary section of STRAC can be selected and sorted by resource usage to easily detect the worst offenders. From this section, it is possible to select a statement to view row statistics, or a program to view only the detail events for that single program within a plan.

Table space usage can be analyzed for the whole program by selecting the database summary section of STRAC, where you can view data, work (sort), and index usage of sort by any column to identify high usage. TSTAT offers the same display but for all traced threads.

To see I/O usage by table space, also include IO in the trace TYPE options and then browse the STRAC or TSTAT Database Lock and I/O Summary section. Use the DTRAC detail event display to correlate scan and I/O data to specific SQL statements.

An additional valuable analysis tool can be gained by also tracing the BIND of the plan. Specify DB2PLAN=XYZAB, BINDCT++, and start the trace before the BIND. This information provides a record of the text of each static SQL statement and its related EXPLAIN data. It is not necessary to specify the EXPLAIN option on the BIND. Dynamic SQL text and EXPLAIN data are included in the plan execution trace, giving a complete picture.

(DBA) Review Application Performance Periodically

The following trace can be used to review the summary data of all the traced threads with the TSTAT display to determine if performance meets your expectations:

Sample Trace Request Options

Option	Use
TYPE=SUMMARY	Low overhead
START=11:00:00	Time period with activity
STOP=11:30:00	Just long enough
WRAP=NO	Fill up the buffer and stop
DB2PLAN=SALES+	Pick out all the sales applications
DB2CONN=IMSP	Only those executing from IMS production
STORAGE=100K	Buffer space for approximately 160 accounting records

The average values for elapsed time, CPU, number of SQL statements executed, and number of GETPAGEs should be enough to tell you if the standards for this type of workload are being met. For example, the number of SQL statements expected from an IMS or CICS transaction might be subject to site restrictions. Also, an unusually high number of GETPAGEs could indicate poor access paths.

Review whether the maximums of these values vary greatly from the averages, which can indicate occasional problems or a specific plan that is performing poorly. In this case, use the LTRAC scrollable display to look for the bad performers and select the STRAC accounting information for further detail. Before looking at STRAC details, you may want to use the trace summaries (TSUMA, TSUMC, TSUMP, TSUMT, TSUML) to summarize, sort, and select the LTRAC entries for ad hoc analysis. For example, select TSUMA to summarize by AUTHID and sort those entries to find the highest CPU user, and then select that line to return to an LTRAC list of only the entries for that user. These entries then could be summarized again by plan, connection name, or time. This process can be used iteratively to detect entries where further detailed analysis of STRAC accounting information is worthwhile.

Also consider the buffer pool indicators on the TSTAT display (average page updates and the ratio of GETPAGEs per READ I/O). This ratio should generally be approximately 2:1 for transaction workloads and higher for batch. Since these values are also broken out by buffer pool, unexpected use of the 32K pool is revealed.

(DBA) Investigate Problem Plans

If a specific plan is suspected of poor performance or identified in previous summary trace analysis, a detail trace can be set up for the next time that plan is expected to be run. Logging allows all the detail events to be traced, even for long-running batch jobs, without loss of data due to online buffer sizes. After the trace is complete, select this log data set from the History Traces application (Option 5), or select it as a current trace (Option 4), and use the HISTORY EXPAND button to view the logged data. The same analysis techniques can then be used as described previously in the DBA SQL review.

Sample Trace Request Options

Option	Use
TYPE=D,SQL,IO,SCAN	More overhead
START=	Leave blank to start immediately
STOP=20	Stop after 20 minutes
WRAP=YES	Keep the latest occurrences in the buffer
DB2PLAN=BIGGUY	Select the problem plan
DB2CONN=BATCH	Select batch only
STORAGE=500K	Trace display buffer space is in BBI-SS PAS extended private area
LOGTRAC=Y	Log the trace
TRCYL=20	Allocate a larger log to hold the long-running batch jobs

(DBA) Analyze Index Usage and Database Access Paths

The following trace can be useful for evaluating the effect of changes made to the tables to improve performance, for example, after a REORG, when a new index is added, or RUNSTATS is updated. When one or more plans are rebound, their new performance characteristics can be checked out with the trace. A detail trace plus scan events is needed to see the index usage. Additional I/O events would be necessary to analyze READ I/O.

Sample Trace Request Options

Option	Use
TYPE=D,SCAN	Medium overhead
START=	Leave blank to start immediately
STOP=60	Stop after 60 minutes
WRAP=NO	Fill up the buffer and stop
DB2PLAN=ABC,ADE	Select specific plans
STORAGE=500K	Trace display buffer space is in BBI-SS PAS extended private area

By logging a trace both before and after a REORG, the performance statistics of each can be compared, either by recalling both online in split screen mode, or by printing selected reports.

(DBA) Trace QMF and Ad Hoc SQL Usage

The following trace request provides the SQL statement text, EXPLAIN data, and the row statistics of the QMF queries. Only long-running queries are kept for later analysis.

Sample Trace Request Options

Option	Use
TYPE=DETAIL	Relatively low overhead
START=09:00:00	Cover main morning activity
STOP=11:30:00	Stop at lunch time
WRAP=YES	Keep the latest occurrences in the buffer
DB2PLAN=QMF310	Select QMF
DB2CONN=TSO	Select TSO access
STORAGE=1000K	Trace Display buffer space is in BBI-SS PAS extended private area
ELAP=12.5	Keep only those with elapsed time >=12.5 seconds
LOGTRAC=Y	Logging
TITLE='LONG QMF QUERIES'	Trace title

(DBA) Analysis of Short-Term Workload History

It is recommended that a summary trace for the total system be run continuously to capture accounting data for all threads, queries, and batch jobs executed within the latest time period of the user's choice. This request should be defined to start automatically. A default THRDHIST summary trace is included in BLKDMRW, but additional options can be specified. For example, specify logging to a series of seven permanently allocated data sets and a switch time of midnight. Automatic archiving can be set up to save the data past the one-week period covered.

The trace data is kept in BBI-SS PAS extended private storage so a STORAGE buffer size of one to four megabytes or higher is viable. One megabyte holds approximately 1,700 records. The system transaction rate determines the time period covered. For this type of trace, specify WRAP=YES so that the most current data is always available. With logging, earlier data can always be retrieved.

TYPE=SUMMARY	Low overhead
START=	Start immediately
STOP=	Run continuously
WRAP=YES	Keep the latest entries
STORAGE=4000K	Keep approximately 7,000 records
LOGTRAC=Y	Logging
TRNUMDS=7	Log data sets
TRSWTIME=24:00:00	Switch data sets at midnight
TRARCSTC=ARCJCLS1	Archive log data set when full
TRDISP=OLD	All data sets preallocated
TRDSN='DB2C.WEEKLY.SUM.V01'	First log data set DSN
TITLE='THREAD HISTORY'	Trace title
PARAM=THRDHIST	Trace ID

The most current data is available by selecting Option 6, GRAPH, or the current trace THRDHIST from Option 4, TRACES. Use the HISTORY EXPAND button to see the activity of the whole day. Select any of the six previous days' history trace from Option 5, HISTORY TRACES.

To analyze the workload, select the appropriate trace summary by AUTHID, connection name, plan, location, or time from LTRAC. The summary displays show averages and totals of CPU, elapsed time, number of statements, and GETPAGEs. Sort by any of these columns (descending order) to find the highest resource users. Select any summary entry to display a subset of individual list entries with LTRAC.

The TSUMT summary by time uses a default value of 10-minute intervals, but this value can be changed to any desired minute or hour interval. Selecting one of these entries provides an LTRAC list for only that period. A desired period also can be specified directly in the parameter field of LTRAC, TSTAT, or TSUMx.

To identify specific workload-related problems that occurred sometime earlier, first use the TSUMT summary by time to narrow down the scope of the search, and then the other summaries, selections, and sorting capabilities can help you identify the few records that require further analysis.

Once you have identified a problem thread, use the P line command against that log data set (Option 5) to generate and submit a job to print reports. For example, specify DB2AUTH to select only one user, and specify these options to print:

```
LTRAC=Y  
STRAC=SUMMARY  
TSTAT=Y  
TSUM=P
```

(DBA) Analyze I/O by Page Set

It is occasionally useful to analyze I/O usage by database and table space/index space, either for a problem application or for the total DB2 system. This analysis can point out DASD contention or poor application data access paths.

The need for I/O analysis is most easily detected from accounting records, either from current summary traces or from historical data in Performance Reporter to do trending. Excessive I/O times show up best with either Accounting Class 2 (In-DB2 elapsed time) or Class 3 (I/O wait elapsed time and number of events). This trace data then allows analysis down to the page set level.

Sample Trace Request Options

Option	Use
PARM=SYSIO	Trace identifier
TYPE=D,IO	Medium overhead
START=10:30:00	Cover peak period
STOP=30	Stop after 30 minutes
DB2AUTH=+	Trace all threads, including async I/O
LOGTRAC=Y	Log to a dynamically allocated data set
TITLE='SYSTEM I/O ANALYSIS'	Give trace a descriptive title

The collected I/O data can then be analyzed, either online or in printed reports. It is summarized by page set for the total DB2 system in the TSTAT display and for a single thread in the STRAC display. Each of these displays has a similar section, DATABASE LOCK AND I/O SUMMARY, that shows the number of synchronous reads and writes and the elapsed wait time, as well as the count of asynchronous reads and number of pages read.

The best way to analyze the I/O workload is to use the series of DBIOx displays, available with an expand button from LTRAC or TSTAT on an I/O trace. The first display (DBIO) summarizes the I/O events by database and table space. You can view synchronous I/O, asynchronous prefetch I/O, or total I/O. From here, you can use the expand buttons, line selection, and sort parameters to focus on the area of most interest, whether a particular table space, an application, or a specific time period.

The **total** elapsed time identifies the impact of I/O to each page set as a component of application response time. An unusually high **average** elapsed time can point out possible poor DASD response time. In this case, check the DBTS display to see whether a large number of extents could be causing the problem, indicating the need for a REORG. If that is not the case, you might want to notify your MVS DASD analyst of a potential DASD contention problem.

At any time you can return to LTRAC and select a single thread, for example, one with a high elapsed time, and look at the I/O per page set for that one execution, either summarized in STRAC or as individual events in DTRAC.

If you identify an application problem, you can start a different trace that includes SQL, so that you can relate the I/O events to specific SQL statements. From this type of I/O trace, there are two additional DBIOx displays that summarize the I/O events by plan and package/program, or even by SQL statement.

However, be aware that if you qualify a trace by plan, a DB2 limitation means that you will not be able to see the prefetch reads, only the synchronous reads and writes done under the

application thread. To see asynchronous I/O, you can qualify by one or more authids as long as you add SYSOPR to the list.

(DBA) Analyze Lock Contention

The first place to look is the Lockout History display that shows you a list of the last 100 timeouts and deadlocks that have occurred. The complete details from these events are available to identify both holder and waiter threads as well as the resources involved.

To analyze locking problems for an application, first look at the accounting record (STRAC) for the counts on maximum page locks, suspensions, lock requests, and timeout/deadlocks. This data is already available with a summary trace and should help you identify which applications are having—or causing—problems. For further information, a detail trace with SQL events is often sufficient. You usually will want to include SQL so you can easily determine which statement is causing the problem, but a great deal of information is available with just the basic detail trace.

If you are still searching for the culprit application, you might want to run a basic detail trace with no further events (not even SQL), but covering all the suspected applications. This type of trace causes much less overhead. You could also use exception filters in the trace request to identify threads with lock suspensions, escalations, lock table requests, or those with a high maximum number of locks held.

The following events are available in DTRAC for any detail trace. Analyze this information before deciding to trace LOCK events.

LOCK-SUMMARY (display LEVEL=2)

This event appears near the end of the thread processing. It shows the maximum number of page locks held and the highest lock state for each page set (table/index space) accessed.

LOCK-TMO (display LEVEL=1)

This event is shown for any thread terminated by either a timeout or a deadlock. It shows the page set involved and identifies the first holder of the lock that was in contention, as well as the state of the lock (for example, held exclusive). It is followed by either a DEADLOCK or a TIMEOUT event (display LEVEL=2) that gives complete details.

Note: LOCK-TMO is not available for DB2 4.1.

LOCK-SUSP (display LEVEL=3)

This event is shown for all lock suspensions. It shows the elapsed time suspended, the page set, the type of entity locked (for example, a data page, index tree, and so on), page number if applicable, and lock state.

Another source of information is the DB2 timeout and deadlock messages in the Journal Log or MVS console. If the DB2 messages are being written to the Journal, go to Option L and issue a FIND DSNT37 to find any deadlock (DSNT375) or timeout (DSNT376) messages. They are followed by DSNT501I to identify the resource and lock owner that caused the contention. If you have AutoOperator Solutions installed, you can use the DB2DLOK solution to summarize and analyze the deadlock/timeout messages and LOCKD contention snapshots. Refer to the *MAINVIEW Solutions Guide* for details.

Note: A detail trace including LOCKS should be run only for a selected thread because of the high volume of lock events.

(System Programmer) Check New Production Application Performance

Sample Trace Request Options

Option	Use
TYPE=SUMMARY	Low overhead
START=	Leave blank to start immediately
STOP=	Leave blank to stop manually
WRAP=NO	Fill up the buffer and stop
DB2PLAN=XYZAB	Select the new plan
STORAGE=100K	Trace display buffer space is in BBI-SS PAS extended private area

Authority to run traces in production systems, especially detail traces, should be restricted to a few DBAs or systems programmers. This restriction limits the amount of overhead that could be suddenly put on a production system, thus reducing performance problems. Someone needs the authority, because application performance can vary drastically between test and production mainly because of the potential differences in table sizes.

Each new application should be checked during its first days in production. This check is done by running a summary trace and reviewing the averages shown in TSTAT and TSUMx. If these averages (or unusually high maximums) indicate a problem, a detail trace can be run for a short period to gather more information on a few plan executions.

A good procedure is to run a summary trace in the test system just before cutover so that you have benchmark values to compare to your production results. Summary trace records can be logged and printed for later analysis if preferred.

One important feature about trace is that it can be run at any time. The application developer does not need to be notified and a plan REBIND that could potentially affect performance does not need to be done.

(System Programmer) Set Up Ongoing Exception Traces per Workload Type

Sample Trace Request Options

Option	Use
TYPE=SUMMARY	Low overhead
START=	Leave blank to start immediately
STOP=	Leave blank to run continuously
WRAP=YES	Keep the latest occurrences
LOGTRAC=YES	Log the records for batch analysis
DB2CONN=CICS+	Select all CICS transactions
STORAGE=300K	Space for approximately 500 records
ELAP=2.5	Keep if elapsed time \geq 2.5 seconds
ABORT=Y	Keep if aborted
UIDCOM=10	Keep if UPDATES+INSERTs+DELETES \geq 10
GETRIO<1.5	Keep if GETS per READIO $<$ 1.5
GETPG=500	Keep if GETPAGEs \geq 500
MAXLOCK=20	Keep if maximum held locks \geq 20
SQLTOT=25	Keep if number of SQL statements \geq 25

Exception traces per workload type (IMS, CICS, TSO, BATCH) can be set up to run continually. The Exception Filters vary by workload type. The filters are processed with OR logic so that any record with at least one of the specified conditions can be retained and logged.

These requests should be run the first few days under observation to see whether the filters are set correctly to select only real exceptions that require later analysis. After the exception filter values are tuned, these requests should be added to the block of requests that are started automatically when the BBI-SS PAS starts. (See BLKDMRW in BBPARM.) When the target DB2 is active, the traces are activated automatically.

When questions arise during the day about application performance, these exception records can be browsed for information. The LTRAC display shows each occurrence in a scrollable list with the time stamp when it was completed. The STRAC display for any one of these occurrences can be viewed by cursor selection. This display provides most of the DB2 accounting information. The value that caused a filter to be activated is shown in the key indicators section.

The records on the log can be used to create various summary reports. The offline printouts can be analyzed daily to isolate problem applications before performance degrades too far (for example, because of the need for a REORG).

Application Trace Displays

All trace displays described in this section are available for both current traces where the data is still in online buffers, and history traces that have been saved in the trace log data sets. The first display shown (LTRAC) provides access to all other trace displays through EXPAND or line selection.

A current application trace can be viewed by selecting an active or complete trace (if still active, only completed threads are shown):

1. Select the list of current traces using Option 4.
2. Use the S line command to select the LTRAC display of trace entries in the online buffers for one trace.

A historical application trace can be viewed by

1. Selecting the History Traces application (Option 5).
2. Using the S line command to select the LTRAC display of trace entries in a trace log data set.

A currently active thread that is being traced can be viewed by EXPANDING from the DUSER display to view the trace events (UTRAC display).

- Position the cursor on UTRAC in the EXPAND line of the DUSER display or on any line in the body of the display and press ENTER to view all the traced events of the current active thread for a specified user (see [“UTRAC—User Detail Trace” on page 310](#)).

If a trace is active for that thread, the DUSER resource analyzer display shows an EXPAND FOR DETAIL TRACE message.

Trace Display Summary

The trace displays consist of the following information:

- LTRAC provides a scrollable list of trace entries. Each entry corresponds to a completed DB2 transaction or thread (DB2 accounting record).
- TSTAT provides :

- A summary of all or selected records in the trace buffer and trace status.

The average, maximum, minimum, and total for the key measurements of CPU, elapsed time, number of statements, and GETPAGES are summarized. This information gives a good indication of whether additional checking is necessary.

- Database and sort summary for all or selected records (detail trace only).

With a detail trace, a database summary can indicate unexpected table space scans or index usage. The summary shows the number of scans and number of pages scanned per database object which is broken down by type (index, data, or work). Synchronous reads and writes and lock suspensions are also shown if traced.

Since DB2 sorting can cause unexpected overhead, a sort summary provides information on the number of sorts, number of records sorted, and the sort elapsed time and record size without the added overhead.

- TSUMA provides a scrollable list of all or selected trace entries summarized by AUTHID.
- TSUMC provides a scrollable list of all or selected trace entries summarized by connection name.
- TSUMP provides a scrollable list of all or selected trace entries summarized by plan.
- TSUMT provides a scrollable list of all or selected trace entries summarized by time.
- TSUML provides a scrollable list of all or selected trace entries summarized by location.
- TSUMR provides a scrollable list of all or selected trace entries summarized by DB2 correlation ID.
- DBIOx provides a scrollable list of I/O activity and measurements from a detail I/O trace, summarized by
 - DB/TS (DBIO)
 - AUTHID (DBIOA)
 - Buffer pool (DBIOF)
 - Connection (DBIOC)
 - Time (DBIOT)
 - Location (DBIOL)
 - Plan (DBIOP)
 - Plan and package (DBIOK) (only with SQL trace)
 - Plan, package, and SQL statement (DBIOS) (only with SQL trace)
- STRAC provides summary information for one thread that includes
 - A display of information from the accounting record, including elapsed time and buffer pool usage analysis sections.
 - DDF activity summary.
The DDF summary displays statistics for each remote location associated with the thread.
 - SQL statements per program for one thread (detail trace only).
At the thread level, the detail trace provides an SQL statement summary per unique program. Information on elapsed CPU times, sorts, and scans (index, data, and work) per call statement identify statements or programs that require further analysis.
Note: Select the SQL expand option to be able to sort the statements by resource usage.
 - Database summary for the single thread (detail trace only).
The database summary provides the same information as with the TSTAT display only for the single thread. This section can be viewed separately (SCANS) and sorted by these resource values to make analysis of large plans simpler.
 - Database lock and I/O summary for the single thread (detail trace only).
The database lock and I/O summary provides the same information as with the TSTAT display only for the single thread. This section can be viewed separately (IO/LOCK) and sorted by these resource values to make analysis of large plans simpler.
 - Sort summary (detail trace only).

- DTRAC and UTRAC provide :
 - A scrollable list of trace events (detail trace only) that can be viewed at three levels:
 - LEVEL=1
User requests (SQL only)
 - LEVEL=2
Level 1 plus DB2 requests, such as CREATE THREAD (default)
 - LEVEL=3
Levels 1 and 2 plus DB2 processing, such as scans and sorts
 - Note:** A parameter of PGM=xxx limits the display to events from one program.
 - Pop-up displays that expand event detail (detail trace only).
Each event line contains elapsed and CPU times plus additional information to aid in problem determination. The additional information, such as row statistics per statement or scan, can be viewed with a pop-up display for that event.

Navigating between Trace Displays

You can use the following techniques to move from one display to another:

- EXPAND

This feature provides access to the next level of detail. Any display with an EXPAND selection bar can be expanded. For trace displays, you can use it to move from:

 - LTRAC (DB2 Trace Entries) to TOTALS (TSTAT Trace Statistics), AUTHID, CONNECT, PLAN, TIME, or LOCATION (TSUMx Trace Summaries) by cursor selection of the corresponding EXPAND bar button to see a summary of the traced threads.
 - TSUMx to LTRAC by cursor selection of one of the summary lines to see a subset of the traced threads.
 - LTRAC to STRAC (Summary Trace Entry) for a single entry by cursor selection on an LTRAC entry to see the accounting data (and detail data summaries) for one thread.
 - STRAC to a specific section of the STRAC display by cursor selection of the second line of the EXPAND bar to see these sections:
 - SQL Summary (sort available)
 - Database Summary (sort available)
 - Database Lock and I/O Summary
 - Sort Summary
 - STRAC to DTRAC by cursor selection of the DETAIL EXPAND bar button to see the detail chronological events.
 - STRAC to DTRAC for one program by cursor position within the SQL section of the STRAC or STRAC(SQL) display to see only the events for one program (DBRM).
 - DTRAC or UTRAC to the pop-up display for any event marked with an asterisk by cursor selection on the marked DTRAC entry to see all the details from the IFCID for that event.

There are three DTRAC and UTRAC display levels available (LEVEL = 1 | 2 | 3) for an active detail trace request. Each level shows additional events. Overtyping the value in the LEVEL=n parameter field to change levels.

- PF7/8

Use PF7 and PF8 to scroll up and down in any of the following scrollable displays:

LTRAC	List of trace entries
TSTAT	Trace status and trace summaries
TSUMA	Trace summary by AUTHID
TSUMC	Trace summary by connection name
TSUMP	Trace summary by plan
TSUMT	Trace summary by time
TSUML	Trace summary by location
TSUMR	Trace summary by correlation ID
STRAC	Accounting data and detail summaries for one transaction/thread
DTRAC	List of events
Pop-ups	Any display longer than the window size

- PF10/11

Use PF10 and PF11 to move to previous or next entries of a similar kind including

STRAC	One trace entry (thread) to the next
DTRAC	One trace entry (thread) to the next
Pop-ups	One pop-up display to the next within a DTRAC or UTRAC event list

[Figure 74 on page 230](#) shows graphically how you can navigate from one trace display to another.

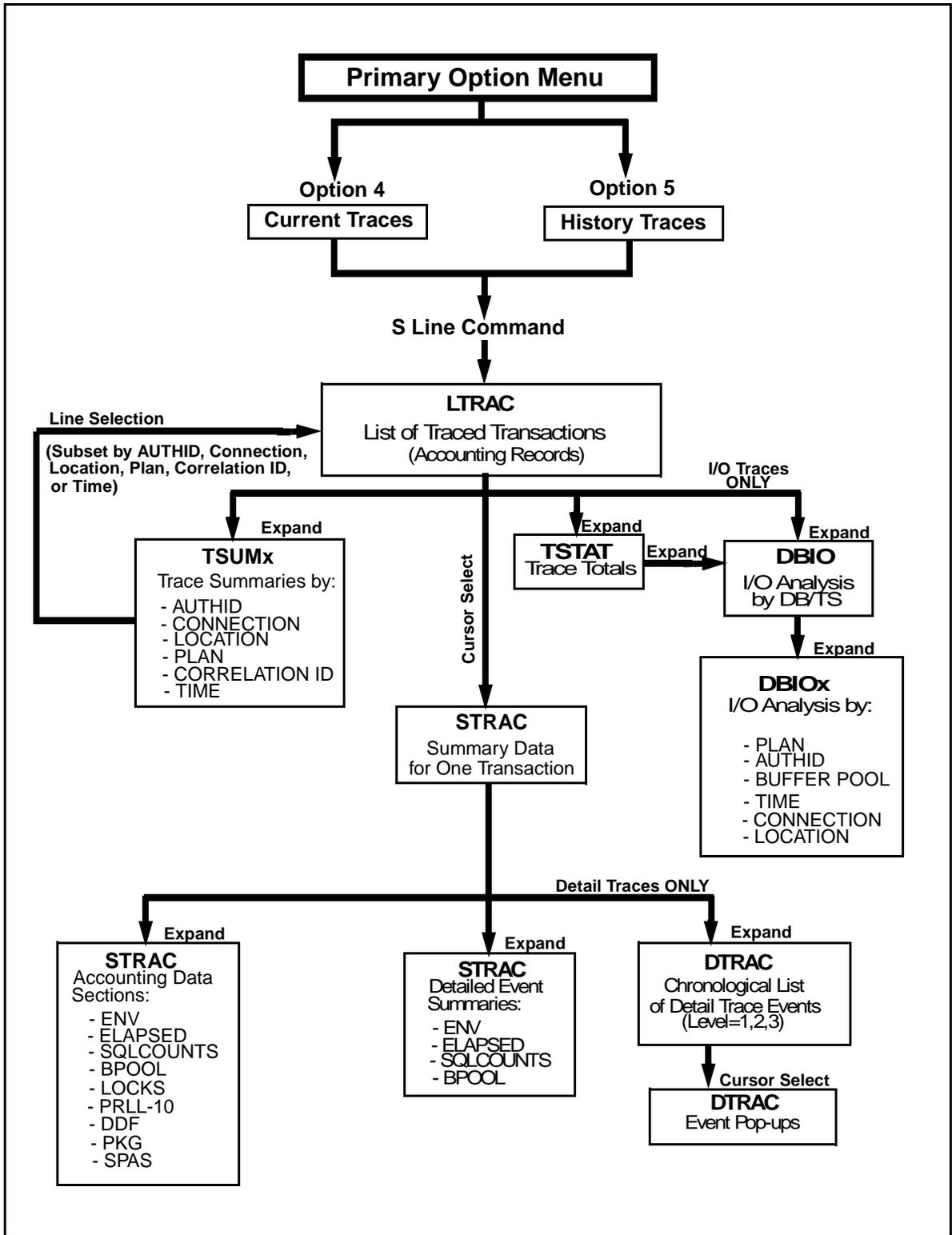


Figure 74. Trace Display Service Access

Viewing a List of Completed Threads

To view a list of completed threads (LTRAC display), use the S line command to select a trace from either the list of Current Traces (Option 4) or the list of History Traces (Option 5).

LTRAC—DB2 Trace Entries

The DB2 Trace Entries panel is a scrollable list of trace entries currently in the trace buffer.

```

BMC Software ----- DB2 TRACE ENTRIES ----- RX AVAILABLE
SERV ==> LTRAC          INPUT  14:11:09 INTVL=> 3 LOG=> N TGT==> DB2D
PARM ==> PBCR02          ROW 1 OF 24 SCROLL=> CSR
EXPAND: MON(WKLD), TOTALS, I/O-DB/TS, HISTORY      ENTRIES IN DATASET 1 - 132
          AUTH, CONNECT, PLAN, TIME, LOC, CORR, LINESEL(STRAC)
19SEP02          PBCRCP - SQL/SCAN/IO
END TIME      PLAN  AUTHID  CONNECT  ELAPSED  CPU    # STMTS  GETPAGE  REASON
-----
09:17:52.76  DSNTIA21  CIR8X   BATCH    13 s     268 ms    4      459 OK TRM
09:18:10.33  DSNTIA21  CIR8X   BATCH    11 s     220 ms   12      168 OK TRM
09:18:32.78  DSNTIA21  CIR8X   BATCH   8,768 ms  218 ms   12      162 OK TRM
09:18:55.13  DSNTIA21  CIR8X   BATCH   9,225 ms  214 ms   12      162 OK TRM
09:19:19.80  DSNTIA21  CIR8X   BATCH    11 s     216 ms   12      162 OK TRM
09:19:44.59  DSNTIA21  CIR8X   BATCH    11 s     216 ms   12      162 OK TRM
09:20:09.28  DSNTIA21  CIR8X   BATCH    11 s     217 ms   12      162 OK TRM
09:20:34.83  DSNTIA21  CIR8X   BATCH    11 s     215 ms   12      162 OK TRM
09:21:00.54  DSNTIA21  CIR8X   BATCH    12 s     218 ms   12      162 OK TRM
09:21:24.18  DSNTIA21  CIR8X   BATCH    10 s     215 ms   12      162 OK TRM
09:21:47.62  DSNTIA21  CIR8X   BATCH    10 s     217 ms   12      162 OK TRM
09:22:05.21  DSNTIB21  CIR8X   BATCH   1,117 ms  112 ms   49       59 OK TRM
09:22:16.03  DSNUTIL   CIR8X   UTILITY  2,907 ms  163 ms    0       64 OK TRM
09:22:17.93  DSNUTIL   CIR8X   UTILITY  1,886 ms  107 ms    0       61 OK TRM
09:22:36.33  DSNTIA21  CIR8X   BATCH    10 s     204 ms    4      357 OK TRM
09:22:43.14  DSNTIB21  CIR8X   BATCH   1,981 ms   73 ms   49       32 OK TRM
09:22:59.79  DSNTIB21  CIR8X   BATCH   1,439 ms   69 ms   49       30 OK TRM

```

Figure 75. DB2 Trace Entries Panel

Select Code:

LTRAC

Parameter:

The following parameters can be specified:

trace id

Is a unique ID identifying the trace. A blank can be an identifier. Therefore, this parameter is positional and a comma delimits the next parameter. For example, if there is no identifier, a comma must precede any other parameter. However, if there is an ID, it must be in the first position.

,A | AUTHID=xxxxxxx

Selects a subset of the trace entries by AUTHID. Specify one AUTHID, or a generic group of AUTHIDs by replacing character positions with a + (one position) or an * (multiple positions).

,C | CONNECT=xxxxxxx

Selects a subset of the trace entries by connection name. Specify one connect type (TSO, BATCH, DB2CALL, insid, cicsjobname), or a generic group of connections by replacing character positions with a + (one position) or an * (multiple positions).

,P | PLAN=xxxxxxx

Selects a subset of the trace entries by plan. Specify one plan, or a generic group of plans by replacing character positions with a + (one position) or an * (multiple positions).

,L | LOC=xxxxxxx

Selects a subset of the trace entries by location. Specify one location, or a generic group of locations by replacing character positions with a + (one position) or an * (multiple positions).

,R | CORRID=xxxxxxxxxxx

Selects a subset of the trace entries by correlation ID. Specify one correlation ID, or a generic group of correlation IDs by replacing character positions with a + (one position) or an * (multiple positions).

,T | TIME=hhmm[-hhmm]

Selects a subset of the trace entries by a start time or time period, where hhmm indicates hours and minutes.

Midnight wrap is supported where the start time is higher than the end time; for example, TIME=2000-3000. The end time stamp of an accounting record is used to assign that record a time period.

,D | DAY=nn[-nn]

Selects a subset of the trace entries by a single day or range of days, where nn can be a relative number from the date of the first accounting record in the trace buffer (first date = 1, up to a maximum of 99).

If a time period is selected without a DAY specification, the default value is the day of the most current record in the buffer.

If there is data for only one day in the trace buffer, the format of the time stamp is hh:mm:ss. If there is data for more than one day, the format is dd-hh:mm, where dd is the relative day number from the date of the first accounting record in the trace buffer.

Each accounting record traced is assigned to a time period based on its end time stamp. Therefore, the processing done for that unit of work is assigned to one interval, but it may have partially occurred during one or more previous time intervals depending on its elapsed time.

Note: Each keyword can be specified only once. If more than one selection keyword is specified, the result is ANDed.

Description:

Provides a scrollable list of all the active entries for the selected trace. There is an entry for each DB2 accounting record. A record is written for each DB2 thread and is available to the trace facility when the thread terminates. For more information, see the IBM publication, *DB2 Administration Guide*.

Note: If the target for a historical trace is not equal to the current TGT field, it is displayed in a HIST TGT field.

An asterisk (*) is used in this display to indicate the following circumstances:

- An asterisk preceding the PLAN column indicates that this entry is a parallel query or utility subtask.
- An asterisk preceding the CONNECT column indicates that this entry is a Database Access Thread (DBAT).

Scrolling:

CSR in the SCROLL field indicates that the display is scrollable. Active entries are copied to a separate storage area in the BBI-SS PAS extended private area when this service is first invoked. Thus, you can scroll the data and it does not change. This scrollable buffer is refreshed whenever ENTER is pressed in the LTRAC service and no line is selected by cursor placement.

If the number of entries do not fit on one screen, the list can be scrolled as described in “Scrolling a Display” in *Using MAINVIEW*.

Service Message:

A message in the parameter field of the service shows the sequence number of the first trace entry displayed and the total number of entries that can be displayed in a scrollable list. A message just below it shows the sequence number of the first and last trace entries currently available in the buffer. When displaying a history trace, this value is the number of trace entries in that data set.

Note: These sequence numbers are internally assigned, in sequence, to each trace entry from the start of tracing. If the entries have wrapped in the buffer (WRAP=YES) and have overlaid earlier entries, the first sequence number in the buffer is no longer 1.

Expand:

The LTRAC display can be EXPANDED to the following displays:

MON(WKLD)

Active Timer Requests display of all active monitors in the DB2 workload (WKLD) area.

TOTALS

DB2 Trace Statistics display (TSTAT) for this trace.

I/O-DB/TS

Display of I/O analysis by database and table space (DBIO) for this trace (available for an I/O detail trace only).

HISTORY

Data from the current trace log data set for this trace (if you are viewing a current trace with logging, this provides access to data no longer in the online buffer). It is only shown when logging is active.

CURRENT

Active trace data still in the buffers (if you are viewing a trace log data set for a still-active trace or a complete trace that has not yet been purged).

AUTH

Trace Summary by AUTHID display (TSUMA) for this trace.

CONNECT

Trace Summary by Connect display (TSUMC) for this trace.

PLAN

Trace Summary by Plan display (TSUMP) for this trace.

TIME

Trace Summary by Time (TSUMT) display for this trace (default of one-hour intervals).

LOC

Trace Summary by Location display (TSUML) for this trace.

CORR

Trace Summary by Correlation ID display (TSUMR) for this trace.

LINESEL(STRAC)

Detailed display of information about a specific entry (STRAC) can be selected from this list by positioning the cursor anywhere in the line for that entry and pressing ENTER.

Viewing Summary Data for All Trace Entries

To view summary data for all trace entries, expand from LTRAC to the TSTAT display.

TSTAT—Trace Statistics

The Trace Statistics panel displays summarized statistics for the trace and all or selected thread entries in the trace buffer.

Note: Summaries of detail events can be produced for detail traces, but only when specifically requested with a parameter. Because of the amount of processing this can require, consider using the workload selection parameters first to limit the amount of data. The headings for detail summaries are displayed with no data if a detail trace does not select the events that make up the section (EVENTS NOT TRACED) or if there is no data to collect (NO EVENTS CAPTURED).

The following figures show representative displays of each TSTAT section:

```

BMC Software ----- TRACE STATISTICS ----- RX AVAILABLE
SERV ==> TSTAT          INPUT  19:31:17 INTVL=> 5 LOG=> N TGT==> DB2HHH
PARM ==> THRDHIST                      ROW 1 OF 222 SCROLL=> CSR
      DZ3135W - USE ,DTL FOR DETAIL DATA                      HIST TGT--- DSNT
      ACCOUNTING: ELAPSED, SQLCOUNTS, BPOOL, LOCKS, PRL, SPAS, DDF
      SUMMARIES: SCANS, IO/LOCK, SORTS, I/O-DB/TS
----- SUMMARY STATISTICS - ALL TRACE ENTRIES-----
-----TERMINATIONS----- -----ACTIVITY-----
FIRST END..22MAY 11.07.26.38          TOTAL  AVERAGE  MAXIMUM  MINIMUM
LAST END...22MAY 12.04.39.68          -----
NUMBER TRANS.....191          ELAPSED  02:05:18    39 s    00:26:40    539 us
COMMIT/ROLLBK....188/....3          ELP-DB2  00:05:17  1,662 ms  00:01:13     0 us
NORMAL TERM.....189          CPU      35 s      183 ms   2,332 ms    0 us
-- NEW USER.....2          CPU-DB2   23 s      121 ms   2,079 ms    0 us
-- DEALLOC.....137          WAITS    00:04:14  1,330 ms  00:01:13     0 us
-- APPL END.....0          SQL      3,926      20       513         0
-- RESIGNON.....0          GETPAGES 17,280     90       1,857        0
-- DBAT INACT.....50          SYNC RDS  424        2         70         0
-- IFI READ.....0          PFCH PGS  846         4        252         0
ABNORMAL TERM.....1          UPD/COMT  247         1         24         0
IN DOUBT TERM.....0          BFR HIT RATIOS:.....VP= 93%,HP= 0%
----- KEY INDICATORS -----
TIMEOUTS =          5
BUFFER INCOMPLETE =          1
TOTAL DDL =          5
GRANTS / REVOKES =          7
SQL: SELECT=          209, FETCH= 2,248
SQL: INS=          155, UPD=          219, DEL=          87
SQL: DYNAMIC(PREPARE)=          247
I/O RSP: SYNC=          19 ms, ASYNC=          106 ms
LOCK SUSPENSIONS =          24
RID LIST PROCESSING USED =          314

```

Figure 76. Summary Statistics for all Trace Buffer Entries (Base Section)

```

- - - - - ELAPSED TIME ANALYSIS (ACCTG CLASSES 2,3 ONLY)- - - - -
CATEGORY          #EVENTS  AVG/EVENT  ELAPSED  %TOTAL
-----
ELAPSED TIME
  IN DB2          12      20 s    00:03:58  38.07  |*****
  IN APPLICATION  12      32 s    00:06:27  61.92  |*****
  --TOTALS--     12      52 s    00:10:24 100.00  |*****
WAITS IN DB2 (LOCAL)
  LOCK/LATCH     11    3,148 ms   35 s     5.54  |*
  I/O WAIT       160     17 ms   2,652 ms  0.42  |<
  LOG WRITE I/O   2    5,151 us   10 ms     0.00  |
  OTHER READ     15     42 ms   632 ms    0.10  |<
  OTHER WRITE     0         0 us     0 us     0.00  |
UNIT SWITCH EVENTS
  . COMMIT/ROLLBK 34     72 ms   2,438 ms  0.39  |<
  . OPEN/CLOSE    90    1,632 ms  00:02:27 23.53  |****
  . SYSLGRNG     35     38 ms   1,347 ms  0.21  |<
  . DATASPACE MGR 89    467 ms    42 s     6.65  |*
  . OTHER        37     26 ms   950 ms    0.15  |<
  ARCH. LOG(QIS)  0         0 us     0 us     0.00  |
  ARCH.READ(TAPE) 0         0 us     0 us     0.00  |
  DRAIN LOCK      0         0 us     0 us     0.00  |
  CLAIM RELEASE   0         0 us     0 us     0.00  |
  PAGELATCH CONT. 0         0 us     0 us     0.00  |
  SPAS SERVER TCB 0         0 us     0 us     0.00  |
WAITS IN DB2 (GLOBAL)
  LOCKS          0         0 us     0 us     0.00  |
  MSG. PROCESSING 0         0 us     0 us     0.00  |
  --TOTAL WAITS-- 220    1,050 ms  00:03:51 37.02  |*****
*NOT ACCOUNTED   1,464 ms  0.23  |<
***** END OF DATA *****

```

Figure 77. TSTAT Elapsed Time Analysis (ELAPSED) Section

```

- - - - - SQL STATEMENT EXECUTION COUNTS - - - - -
TOTAL  AVERAGE  TOTAL  TOTAL
SELECT.....209    1.0  LOCK TABLE.....0  CREATE.....4
INSERT.....155    0.8  GRANT/REVOKE.....7  DROP.....1
UPDATE.....219    1.1  SET CURR.SQLID.....7  ALTER.....0
DELETE.....87     0.4  SET HOST VAR. ....12
PREPARE.....247    1.2  SET CURR.DEGREE.....0  COMMENT ON.....0
DESCRIBE.....18    0.0  SET CURR. RULES.....0  LABEL ON.....0
OPEN.....352     1.8  CONNECT TYPE 1.....0  CREATE TEMP.....0
FETCH.....2,248   11.7  CONNECT TYPE 2.....0  RENAME TBL.....0
CLOSE.....343     1.7  SET CONNECTION.....0  RELEASE.....0
ASSOCIATE LOCATOR.....0  CALL.....0
ALLOCATE CURSOR.....0
** DML.....3,878   20.3  ** DCL.....26  ** DDL.....5
** REOPT.....0    0.0
- - - - - DYNAMIC SQL CACHE TOTALS - - - - -
STMT FOUND.....0  KPDYN-PREP.AVOID.....0  STMT DISCRD.....0
STMT NOT FOUND.....0  KEEPDMY_IMPL.PREP.....0  STMT PURGED.....0
***** END OF DATA *****

```

Figure 78. TSTAT SQL Statement Execution Counts (SQLCOUNTS) Section

- - - - - BUFFER POOL ACTIVITY - - - - -						
ACTIVITY	----- TOTAL -----		----- BP0 -----		----- BP2 -----	
	TOTAL	AVERAGE	TOTAL	AVERAGE	TOTAL	AVERAGE
GETPAGES	11,767	147.0	11,630	145.3	137	1.7
SYNC READS	84	1.0	81	1.0	3	0.0
GETPAGES/READIO	140.0		143.5		45.6	
COND GP FAILURES	0	0.0	0	0.0	0	0.0
SEQ PREFETCH REQS	1,383	17.2	1,372	17.1	11	0.1
LIST PREFETCH REQS	0	0.0	0	0.0	0	0.0
DYNAMIC PREFETCHS	0	0.0	0	0.0	0	0.0
ASYNCH PAGES READ	10,583	132.2	10,562	132.0	21	0.2
PAGES/PREFETCH REQ	7.6		7.6		1.9	
PAGE UPDATES	0	0.0	0	0.0	0	0.0
IMMEDIATE WRITES	0	0.0	0	0.0	0	0.0
HP SYNC READS	168	2.1	168	2.1	0	0.0
HP SYNC READ FAILS	10	0.1	10	0.1	0	0.0
HP ASYNCH PAGES READ	250	3.1	250	3.1	0	0.0
HP WRITES	249	3.1	249	3.1	0	0.0
HP WRITE FAILURES	0	0.0	0	0.0	0	0.0
- - - GLOBAL BUFFER POOLS (DATA SHARING ONLY) - - -						
ACTIVITY	----- TOTAL -----		----- BP0 -----		----- BP1 -----	
CF READS (BUFFER CROSS INVALIDATION)						
-DATA RETURNED....	13	0.0	11	0.0	2	0.0
-R/W INTEREST.....	6	0.0	6	0.0	0	0.0
CF READS (DATA NOT IN BUFFER POOL)						
-DATA RETURNED....	62	0.3	62	0.3	0	0.0
-R/W INTEREST.....	200	1.0	200	1.0	0	0.0
-NO R/W INTEREST..	5	0.0	5	0.0	0	0.0
CF-WRITE (CHANGED)	160	0.8	127	0.6	18	0.0
CF-WRITE (CLEAN)	0	0.0	0	0.0	0	0.0
NBR UNREG PAGES...	50	0.2	50	0.2	0	0.0
NBR EXPLICIT XI...	0	0.0	0	0.0	0	0.0
NBR WRITES 2ND BP.	0	0.0	0	0.0	0	0.0
***** END OF DATA *****						

Figure 79. TSTAT Buffer Pool Activity (BPOOL) Section

```

----- LOCK ACTIVITY -----
              TOTAL  AVERAGE              TOTAL  AVERAGE
TIMEOUT.....2      0.0  MAX PAGE/ROW LOCKS.....109    1.3
DEADLOCK.....0      0.0
SUSPEND-LOCK.....2      0.0  LOCK REQUEST.....548    6.8
SUSPEND-LATCH.....1      0.0  UNLOCK REQUEST.....434    5.4
SUSPEND-OTHER.....0      0.0  QUERY REQUEST.....0      0.0
                                CHANGE REQUEST.....47    0.5
                                OTHER REQUEST.....0      0.0
ESCALATION(SHR).....0      0.0
ESCALATION(EXCL).....0      0.0
DRAIN REQUEST.....0      0.0  DRAIN FAILURE.....0      0.0
CLAIM REQUEST.....132    1.6  CLAIM FAILURE.....0      0.0
----- GLOBAL LOCK ACTIVITY -----
LOCK REQUEST.....10     0.1  YES LOCK REQUEST.....234    2.9
LOCK CHANGE REQST.....0     0.0  YES CHANGE REQUEST.....10    0.1
UNLOCK REQUEST.....0     0.0  YES UNLOCK REQUEST.....162    2.0
IRLM GLBL SUSPEND.....0     0.0  YES GLOBAL SUSPEND.....0      0.0
FALSE CONTENTION.....2     0.0
INCOMPAT. RETAINED.....0     0.0  NOTIFY MESSAGES SENT.....0      0.0
***** END OF DATA *****

```

Figure 80. TSTAT Lock Activity (LOCKS) Section

```

----- PARALLELISM -----
              TOTAL  AVERAGE              TOTAL
MAXIMUM DEGREE (MAX=3) .....42    0.01  FALLBACK - NO BUFFER.....0
GROUPS EXECUTED.....21    0.00  FALLBACK - NO ESA SORT.....0
-- PLANNED DEGREE.....21    0.00  FALLBACK - AMBIG. CURSOR.....0
-- REDUCED DEGREE.....0     0.00
PARALLEL TASKS.....59    0.01  FALLBACK - NO ENCLAVE.....0
                                FALLBACK - RLF LIMITED.....0
----- SYSPLEX -----
COORDINATOR TASKS.....0     0.00  FALLBACK - NO COORDN.....0
ASSISTING TASKS.....40    0.01  FALLBACK - ISOL RR/RS.....0
MAXIMUM MEMBERS.....1     0.00  REDUCED - VP SHORTAGE.....0
INTENDED PRLI GROUPS.....11    0.00
QUERY REFORMULATED (ENV).....0     0.00
QUERY REFORMULATED (BP).....0     0.00

```

Figure 81. TSTAT Parallelism (PRLI) Section

```

----- STORED PROCEDURES -----
TOTAL      AVERAGE      TOTAL
SPAS CPU TIME.....1,190 ms    595 ms    SQL CALLS.....2
SPAS IN-DB2 CPU TIME....879 ms    440 ms
SPAS WAITING ON TCB.....0 us      0 us
                                WAITS ON TCB.....0
                                CALLS ABENDED.....0
                                CALLS REJECTED.....0
                                CALLS TIMED OUT.....0
    
```

Figure 82. TSTAT Routines (RTN) Section

```

----- DDF SUMMARY -----
CURRENT LOCATION: DB2F
                    (ALLIED DIST REQUESTER)
TOTALS  AVERAGES  FROM  TO
REMOTE LOCATION: DB1F  SQL STATEMENTS  N/A    2
REMOTE PROD-ID: DSN03010  ROWS  0    N/A
DB AGENT CPU..... 32 ms    32 ms  BYTES  1,658  1,345
ELAPSED LOCAL.....00:03:53  00:03:53  TRANSACTIONS  N/A    1
ELAPSED REMOTE.....00:03:53  00:03:53  MESSAGES  1    2
CONVERSATIONS QUEUED.....0    0.00  CONVERSATIONS  N/A    1
BLOCK FETCH%.....0    COMMITS  N/A    0
MAX CONVERSATIONS.....1    1.00  ABORTS  N/A    0
UNSUCCESSFUL CONV'S.....0    0.00  BLOCK FETCH  0    N/A

TWO PHASE COMMIT (2PH):
                                2PH PREPARE  0    0
                                2PH LAST AGENT  0    0
                                2PH COMMITS  0    0
                                2PH BACKOUTS  0    0
-- INDOUBT..... 0    2PH FORGET RSP  0    0
-- COMMIT..... 0    2PH REQ COMMIT  0    0
-- ROLLBACK..... 0    2PH BACKOUT RSP  0    0
REMOTE COORDINATOR
-----

```

Figure 83. TSTAT DDF Summary (DDF) Section

```

----- DATABASE SUMMARY (DETAIL TRACE ONLY) -----
----- INDX -----  ----- DATA -----  ----- WORK+ -----
DATABASE  PAGESET  OBID  #SCAN #PAGE #ROWS  #SCAN #PAGE #ROWS  #SCAN #PAGE #ROWS
-----
DSNDB06  SYSPLAN  ALL   21   68  485   20   13   14    0    0    0
DSNDB01  SCT02    ALL   18   36   18   15    3    9    0    0    0
DSNDB06  SYSDBASE ALL   13   28   13    7  109 2125   0    0    0
DSNDB07  DSN4K01  3     0    0    0    0    0    0    2    0   33
**** TOTALS ****      52  132  516   42  125 2148   2    0   33
    
```

Figure 84. TSTAT Database Summary Section

```

- - - - - DATABASE LOCK AND I/O SUMMARY (DETAIL TRACE ONLY) - - - - -
          -----LOCKS----- SYNC. I/O ----- ASYNC I/O
DATABASE PAGESET  MAX.SUSP.  TM/OUT  READ WRITE  ELAPSED  AVG.ELAP  READ  PAGES
-----
DSNDB01  DSNBCT02    0  0      0      1  0    19 ms   19 ms   0  0
DSNDB01  SCT02       2  0      0      1  0    24 ms   24 ms   0  0
**** TOTALS ****    2  0      0      2  0    43 ms   22 ms   0  0
    
```

Figure 85. TSTAT Database Lock and I/O Summary Section

```

- - - - - SORT SUMMARY (DETAIL TRACE ONLY) - - - - -
          SORT          SORT          RECORD
          ELAPSED      RECORDS      SIZE
-----
NUMBER OF SORTS.....1  AVERAGE  2,753 ms   33        84
AVG # WORK FILES....2.0  MAXIMUM   2,753 ms   33        84
                          MINIMUM   2,753 ms   33        84
                          TOTAL     2,753 ms   33        N/A
    
```

Figure 86. TSTAT Sort Summary Section

Select Code:

TSTAT

Parameter:

The following parameters can be specified:

trace id

Is a unique ID identifying the trace.

The TSTAT trace ID must match the trace ID of the ATRAC request. A blank can be used if the ATRAC ID is also blank.

This parameter is positional and a comma delimits the next parameter. For example, if there is no identifier, a comma must precede any other parameter. However, if there is an ID, it must be in the first position.

,DTL

Selects the data for the Database Summary, the Database Lock and I/O Summary, and the Sort Summary sections when viewing a history trace.

CAUTION:

This parameter requires a substantial amount of additional I/O.

,A | AUTHID=xxxxxxx

Selects a subset of the trace entries by AUTHID. Specify one AUTHID, or a generic group of AUTHIDs by replacing character positions with a + (one position) or an * (multiple positions).

,C | CONNECT=xxxxxxx

Selects a subset of the trace entries by connection name. Specify one connect type (TSO, BATCH, DB2CALL, imsid, cicsjobname), or a generic group of connections by replacing character positions with a + (one position) or an * (multiple positions).

,P | PLAN=xxxxxxx

Selects a subset of the trace entries by plan. Specify one plan, or a generic group of plans by replacing character positions with a + (one position) or an * (multiple positions).

,L | LOC=xxxxxxx

Selects a subset of the trace entries by location. Specify one location, or a generic group of locations by replacing character positions with a + (one position) or an * (multiple positions).

,R | CORRID=xxxxxxxxxxx

Selects a subset of the trace entries by correlation ID. Specify one correlation ID, or a generic group of correlation IDs by replacing character positions with a + (one position) or an * (multiple positions).

,T | TIME=hhmm[-hhmm]

Selects a subset of the trace entries by a start time or time period; hhmm indicates hours and minutes.

Midnight wrap is supported where the start time is higher than the end time; for example, TIME=2000-3000. The end time stamp of an accounting record is used to assign it a time period.

Note: If you request TSTAT for a trace log data set without specifying either a time qualification or the DTL parameter, only the summary statistics of the display are produced. This method enables you to control the amount of resources used to produce the TSTAT display.

The entire TSTAT display is produced when

- A time qualification or the DTL parameter is specified for an historical trace log data set
- The display is requested for an active trace, regardless of time qualification

,D | DAY=nn[-nn]

Selects a subset of the trace entries by a day or range of days; nn can be a relative number from the date of the first accounting record in the trace buffer (first date = 1, up to a maximum of 99). If a time period is selected without a DAY specification, it uses the default value of the day of the most current record in the buffer.

If there is data for only one day in the trace buffer, the format of the time stamp is hh:mm:ss. If there is data for more than one day, the format is dd-hh:mm, where dd is the relative day number from the date of the first accounting record in the trace buffer.

Each accounting record traced is assigned to a time period based on its end time stamp. Therefore, the processing done for that unit of work is assigned to one interval, but it may have partially occurred during one or more previous time intervals depending on its elapsed time.

Note: Each keyword can be specified only once. If more than one selection keyword is specified, the result is ANDed.

Description:

The TSTAT display shows overall statistics and status of the trace.

The SCROLL field contains CSR and additional data can be seen by scrolling down with PF8/20. N/A in the SCROLL field indicates a summary trace.

The summaries are displayed in the following sequence:

- Base Section:
 - Trace status (SUMMARY STATISTICS - ALL TRACE ENTRIES)
 - Key indicators of performance problems
- Accounting Sections:
 - Elapsed time data if accounting class 2 or 3 is active (ELAPSED TIME ANALYSIS)
 - Statistics for the individual types of SQL statements executed (SQL STATEMENT EXECUTION COUNTS)
 - Buffer pool usage (BUFFER POOL ACTIVITY)
 - Lock usage (LOCK ACTIVITY)
 - Parallel CPU and I/O activity (PARALLELISM)
 - Routine statistics if stored procedure calls have been issued (ROUTINES)
 - DDF statistics if there is DDF activity for the displayed thread (DDF SUMMARY)
- Detail Trace Summary Sections:
 - Database summary for all records (DATABASE SUMMARY)
 - Synchronous reads and writes and lock suspensions (DATABASE LOCK AND I/O SUMMARY)
 - Summary of number of sorts, records sorted, sort elapsed time, and record size (SORT SUMMARY)

Note: The headings for detail trace summaries are shown with no data if the display is for a summary trace or if the ,DTL parameter is not specified for a detail trace.

Service Message:

A message in the parameter field shows the sequence number of the first row of statistics displayed and the total number of rows that can be displayed by this scrollable service.

Expand:

The TSTAT display can be EXPANDED to the following displays when the trace is being logged:

MON(WKLD)

Active Timer Requests display of all active monitors in the DB2 workload (WKLD) area.

HISTORY

Data from the current trace log data set for this trace (if you are viewing a current trace with logging, this provides access to data no longer in the online buffer). It is only shown when logging is active.

CURRENT

Active trace data still in the buffers (if you are viewing a trace log data set for a still-active trace or a complete trace that has not yet been purged).

ACCOUNTING:

The following sections format data from the DB2 accounting record.

ELAPSED

TSTAT Elapsed Time Analysis display section (accounting classes 2 and 3 only)

SQLCOUNTS

TSTAT SQL Statement Execution Counts display section

BPOOL

TSTAT Buffer Pool Usage Analysis display section

LOCKS

TSTAT Lock Activity display section

PRL

TSTAT Parallelism display section

RTN

TSTAT Routines display section (only if stored procedure calls have been issued)

DDF

TSTAT DDF Summary display section (available only if there is DDF activity for the displayed thread)

SUMMARIES:

The following sections format data summarized from detail trace events and are available only if these events are traced.

SCANS

TSTAT Database Summary display section

IO/LOCK

TSTAT Lock and I/O Summary display section

SORTS

TSTAT Sort Summary display section

I/O-DB/TS

Display of I/O analysis by database and table space (DBIO) for the specified trace. (Available for an I/O detail trace only.)

Key Indicators:

The most important key indicators of failures or degradation are displayed in the following order of importance:

- These indicators show the cause of degradation and are highlighted:
 - **TIMEOUT (or DEADLOCK) = nnnnnn**

Indicates the number of units of work that failed because either a timeout condition or a deadlock condition was detected.

TIMEOUT means that a unit of work was suspended for a length of time longer than permitted by installation options.

DEADLOCK means that two units of work attempted to access the same resource and prevented each other from completing each process normally.

Action: N/A

Field: QTXATIM, QTXADEA
 - **STORED PROC. FAILED = nnnnnn**

Indicates the number of times a stored procedure call failed. Possible reasons for failure are as follows:

 - The stored procedure call terminated abnormally.
 - The stored procedure call was rejected.
 - The stored procedure call was timed out while it was waiting to be scheduled.

Action: N/A

Field: QXCALLAB, QXCALLRJ, QXCALLTO
 - **RID FAILURE - STORAGE**

Indicates the number of times RID list processing failed for the units of work in this trace because not enough storage was available.

Action: Review the storage allocations specified when DB2 was installed.

Field: QXNSMIAP
 - **RID FAILURE - NUMBER OF RIDS**

Indicates the number of times RID list processing failed for the units of work in this trace because one of the internal limits was exceeded.

The internal limits include the physical limit of the number of RIDs a RID list can contain and internal thresholds for the retrieval and manipulation of RIDs.

Action: N/A

Field: QXMRMIAP
 - **CLAIM FAILURE**

Indicates the number of times CLAIM processing failed for the units of work in this trace.

Action: N/A

Field: QTXACLUN

– **DRAIN FAILURE**

Indicates the number of times DRAIN processing failed for the units of work in this trace.

Action: N/A

Field: QTXADRUN

– **PARALLEL CPU FALLBACK - nnnnnn**

Indicates the number of times parallel CPU processing was disabled for the units of work in this trace.

Action: N/A

Field: QXDEGENC, QXRLFDPA

– **PARALLEL I/O FALLBACK - nnnnnn**

Indicates the number of times parallel I/O processing was turned off and sequential mode was used for the units of work in this trace.

Action: N/A

Field: QXDEGBUF, QXDEGESA, QXDEGCUR

– **PARALLEL I/O REDUCED DEGREE - nnnnnn**

Indicates the number of times Parallel I/O processing was reduced from the planned degree to a lesser degree because of insufficient storage or insufficient buffers in the buffer pool.

Action: If this number is not zero, consider increasing the size of the buffer pool or specifying a different buffer pool for the table space.

Field: QXREDGRP

– **INCREMENTAL BINDS = nnnnnn**

Indicates the number of incremental binds performed by the units of work in this trace.

This message indicates that the plan/package had become invalid for some reason, such as an ALTER on an index or table.

Action: Nothing needs to be done for this plan, but you might want to explicitly bind any plans whose tables/indexes are being altered. Incremental binds can have a significant impact in an online transaction system.

Field: QXINCRB

– **SEE RTN FOR MORE CPU/ELAPSED**

Indicates that the total elapsed time may be less than the CPU time or DB2 wait time if stored procedures, user-defined functions, or triggers are present.

Action: See the Routines (RTN) section for more information on stored procedures, user-defined functions, and triggers when any of them are present.

Field: N/A

– **TOTAL DDL = nnnnnn**

Indicates the number of Data Definition Language (DDL) statements performed by the units of work in this trace.

DDL statements, such as CREATE TABLE, can have a significant impact on system performance. To perform DDL operations, exclusive locks need to be obtained against the DB2 catalog.

Action: In an online transaction system, avoid designing transactions that use DDL operations.

Field: QXCRTAB, QXCRINX, and so on

– **BUFFER INCOMPLETE**

Indicates at least one of the threads spans multiple trace log data sets. Accounting statistics data is available for those threads only in the last log, and detail trace data is incomplete in each log.

However, accounting data in the final log is complete and represents the entire thread. The detail trace data in each log can be added together for total results.

Action: Allocate a larger trace log data set.

Field: N/A

- The following indicators are informational in nature and are not highlighted:

– **GRANTS/REVOKES = nnnnnn**

Indicates the number of GRANT and REVOKE SQL statements issued by the units of work in this trace.

Action: N/A

Field: QXGRANT, QXREVOK

– **LOCK TABLE = nnnnnn**

Indicates the number of LOCK TABLE SQL statements issued by the units of work in this trace.

Action: Use LOCK TABLE carefully. It means that this unit of work owns exclusive control of the table, allowing no concurrent access.

Field: QXLOCK

– **LOCK ESCALATIONS = nnnnnn**

Indicates the number of times the total locks per table have exceeded the installation limit for the units of work in this trace. When this limit is exceeded, DB2 promotes the current page locks to a single table space lock of the same type.

Action: Lock escalation usually indicates that the application has encountered an exceptional condition. If this situation occurs frequently, the design of the application should be reviewed.

Field: QTXALES, QTXALEX

– **PARALLEL I/O CONDITIONAL GETPAGE FAILURE**

Indicates that a conditional GETPAGE request was not satisfied in a buffer pool. This condition can occur only for parallel I/O operations.

When this condition occurs, it indicates that a prefetch operation failed to retrieve a page before the application required it.

Action: N/A

Field: QBACNGT

– **SQL: SELECT=nnnnnn, FETCH=nnnnnn**

Is a summary of the number of SQL SELECT and FETCH statements issued by the units of work in this trace.

In a DDF environment, the number of FETCH statements might not truly reflect the number of FETCHes issued by the application due to internal DDF processing.

Action: N/A

Field: QXSELECT, QXFETCH

– **SQL: INS=nnnnnn, UPD=nnnnnn, DEL=nnnnnn**

Is a summary of the number of SQL INSERT, UPDATE, and DELETE SQL statements issued by the units of work in this trace.

Action: N/A

Field: QXINSRT, QXUPDTE, QXDELET

– **SQL: DYNAMIC(PREPARE)=nnnnnn**

Is a summary of the number of PREPARE SQL statements issued by the units of work in this trace. Each PREPARE statement is equivalent to one dynamic SQL statement.

In a DDF environment, the number of PREPARE statements might not truly reflect the number of dynamic SQL statements issued by the application due to internal DDF processing.

Action: N/A

Field: QXPREP

– **I/O RSP: SYNC= time, ASYNC= time**

Indicates the average I/O response times the units of work in this trace experienced for synchronous and asynchronous requests.

Action: N/A

Field: For synchronous requests:
QWACARNE, QWACAWTI

For asynchronous requests:
QWACARNR, QWACARNW, QWACAWTR, QWACAWTW

– **LOCK SUSPENSIONS = nnnnnn**

Indicates the number of times a unit of work was suspended due to a lock or latch contention with another unit of work.

This number should be small, ideally zero.

Action: N/A

Field: QTXASLOC, QTXASLAT, QTXASOTH

– **PARALLELISM, MAINTASKS = nnnnnnn, SUBTASKS = nnnnnnn**

Indicates that this trace contains units of work that are the primary, or originating, unit of work in a group supporting a query or utility using parallel tasks. MAINTASKS shows the total number of main tasks created to support queries or utilities using parallel tasks in this trace. SUBTASKS shows the total number of subtasks created to support queries or utilities using parallel subtasks in this trace.

Action: N/A

Field: QWACPACE, QWACPCNT

– **SYSPLEX PARALLELISM - COORDINATOR = nnnnnn**

Indicates that queries are being processed across more than one DB2, where this DB2 was the coordinator (DB2 version 5 and later only).

Action: N/A

Field: QWDA

– **SYSPLEX PARALLELISM - ASSISTANT = nnnnnn**

Indicates that queries are being processed across more than one DB2, where this DB2 was an assistant (DB2 version 5 and later only).

Action: N/A

Field: QWDA

– **NUMBER OF DISTRIBUTED LOCATIONS = nnnnnn**

Indicates the number of separate DDF locations accessed by the units of work in this trace.

Action: N/A

Field: N/A

– **RID LIST PROCESSING USED = nnnnnn**

Indicates the number of times RID list processing was used for the units of work in this trace.

During RID list processing, DB2 produces a list of candidate record IDs from an index. The resulting RID list can be used to efficiently retrieve the qualifying rows.

Action: N/A

Field: QXMIAP

Viewing Workload History Summaries

To view workload history summaries, expand from LTRAC to one of the TSUMx displays.

TSUMx—Trace Summary Displays

If you need a global view of DB2 activity to do a detailed analysis of past workload-related problems, you can request online summary displays of workload history. These online workload history summaries are collected by summary or detail traces (by total system or selected workloads). Trace entries can be summarized by

- Authorization ID (TSUMA service)
- Connect type (TSUMC service)
- Plan (TSUMP service)
- Location (TSUML service)
- Correlation ID (TSUMR service)
- Time (TSUMT service - selectable interval of minutes or hours)

These history summaries can be cursor-selected from the EXPAND line of the LTRAC display service. They can be displayed either in numerical format or in graphical format (see [Figure 87](#) and [Figure 88 on page 251](#)).

The requests can be ad hoc. You can use the trace summary services as you need them to analyze DB2 activity over time, by application, or by user instead of waiting for batch reports.

Service Messages

All trace summary services issue two service messages. One indicates the range of summary lines available for display and the other indicates the amount of entries in the trace buffer. These messages are displayed in front of the SCROLL field. The first message shows the sequence number of the first trace buffer entry displayed and the total number of entries that can be displayed. A message just below it shows the sequence number of the first and last entries currently available in the trace buffer.

Note: Sequence numbers are assigned internally to each trace entry when tracing starts. If the entries wrapped in the buffer (WRAP=YES) and overlaid earlier entries, the first sequence number in the buffer is no longer 1.

Scrolling

CSR in the SCROLL field indicates the display is scrollable. The display is refreshed whenever ENTER is pressed and no line is selected by cursor placement.

If the number of entries do not fit on one screen, the list can be scrolled as described in “Scrolling a Display” in *Using MAINVIEW*.

Using EXPAND

These services can be EXPANDED to the following displays:

LINESEL(LTRAC)

Detailed display of information about a specific summary key (LTRAC display with only the trace entries summarized for the selected summary key).

Position the cursor anywhere in a summary line for a summary key entry and press ENTER. PF3 (END) from that display returns to this list.

For example, in [Figure 89 on page 255](#), if you use the Tab key to move to the first line and then press ENTER, all LTRAC entries with an authorization ID of CIR8 are shown.

HISTORY

Data from the current trace log data set for this trace (if you are viewing a current trace with logging, this display provides access to data no longer in the online buffer). It is only shown when logging is active.

CURRENT

Active trace data still in the buffers (if you are viewing a trace log data set for a still-active trace or a complete trace that has not yet been purged).

Displaying Graphics

The default trace summary displays show numerical data for each of the key values from any trace. They display both average and total values.

To see this same data displayed graphically, use the GRAPH parameter:

```
,GRAPH=xxx
```

where xxx can be any of the following values:

AVG

Displays the Entry Count (number of threads) and all average values graphically.

TOT

Displays the Entry Count (number of threads) and all total values graphically.

NO

Default. Displays all values numerically.

Note: For the same trace request, the latest value of GRAPH you used is preserved as the default until you overtype it. Requesting Option 6, GRAPH, from the Primary Option Menu sets it to GRAPH=AVG.

Samples of the TSUMT display with average and total values presented graphically are shown in [Figure 87](#) and [Figure 88](#).

- The values are plotted as percentages of the maximum value measured.
- The maximum is shown in the column header.
- Values over 90% of the maximum are red (or highlighted).
- Values over 70% of the maximum are yellow.
- Values less than 70% are green.
- Values less than 10% but non-zero show < in the first graph position.

GRAPH=AVG is displayed as follows:

```

BMC Software ----- TRACE SUMMARY BY TIME -----PERFORMANCE MGMT
SERV ==> TSUMT          INPUT 15:38:38 INTVL=> 3 LOG=> N TGT==> DB2D
PARM ==> THRDHIST,SORT=ISD,I=1H,GRAPH=AVG          ROW 1 OF 2 SCROLL=> CSR
EXPAND: LINESEL(LTRAC), HISTORY          ENTRIES IN BUFFER 1 - 53
19SEP02          THREAD HISTORY          19SEP02 - 17SEP02
INTERVAL      #THREADS  AVG ELAPSED      AVG CPU      AVG #STMTS      AVG GETPGS
START                38      00:05:12          464 ms          34.9           67.3
-----|-----|-----|-----|-----|-----|
19:00:00 ***** < ***** ** *****
18:00:00 **** ** * *** *****
17:00:00 * * < ***** ****
16:00:00 ***** < < * **
15:00:00 **** * ** *****
14:00:00 ***** ***** ***** ** *****
    
```

Figure 87. Sample Trace Summary Display with GRAPH=AVG

GRAPH=TOT is displayed as follows:

```

BMC Software ----- TRACE SUMMARY BY TIME -----PERFORMANCE MGMT
SERV ==> TSUMT          INPUT 15:38:38 INTVL=> 3 LOG=> N TGT==> DB2D
PARM ==> THRDHIST,SORT=IS,I=1H,GRAPH=TOT          ROW 1 OF 2 SCROLL=> CSR
EXPAND: LINESEL(LTRAC), HISTORY          ENTRIES IN BUFFER 1 - 53
19SEP02          THREAD HISTORY          19SEP02 - 17SEP02
INTERVAL      #THREADS  TOT ELAPSED      TOT CPU      TOT #STMTS      TOT GETPGS
START                38      03:17:59          17 s           616           2,560
-----|-----|-----|-----|-----|-----|
14:00:00 ***** ***** ***** ***** *****
15:00:00 **** * ** *****
16:00:00 ***** < ***** ** **
17:00:00 * * ***** ***** ****
18:00:00 **** ** *** ***** *****
19:00:00 ***** < * ***** *****
    
```

Figure 88. Sample Trace Summary Display with GRAPH=TOT

Option 6, GRAPH, from the Primary Option Menu provides direct access to a graphical presentation of the Trace Summary by Time (TSUMT) display as shown in [Figure 87](#). It shows recent thread history summarized by 10-minute intervals, sorted in descending sequence. When accessed directly from the Primary Option Menu, this display has the following default parameters:

```

SERV ==> TSUMT
PARM ==> THRDHIST,SORT=ISD,INTVL=10M,GRAPH=AVG
    
```

Note: The default trace identifier requested is THRDHIST, a continuous summary trace defined in the sample block BLKDMRW in the BBPARM data set. This block is predefined in AutoCustomization for auto-start. However, you can change the default options of this trace in BLKDMRW if desired.

Sorting the Display

The trace summary displays show a list of scrollable, summarized trace entries sorted by summary key (first display column) for the selected trace summary (AUTHID for TSUMA, CONN for TSUMC, PLAN for TSUMP, LOCATION for TSUML, CORR for TSUMR, TIME for TSUMT). Any of the column data in the display can be sorted by typing the first two characters of the column heading with the SORT parameter as:

```
,SORT=cc
```

where cc can be any of the following two characters:

AU | CO | PL | LO | CR | IS

Sorts the list alphabetically by authorization ID (AUTHID column in TSUMA service), connection name (CONNECT column in TSUMC service), plan name (PLAN column in TSUMP service), location name (LOCATION column in TSUML service), correlation ID (CORR column in TSUMR service), or by ascending time (INTERVAL START column in TSUMT service).

EC

Sorts the list in a numerically descending order by entry count (ENTRY COUNT column).

AE

Sorts the list in a numerically descending order by average elapsed time (AVG ELAPSED column).

AC

Sorts the list in a numerically descending order by average CPU time (AVG CPU column).

A#

Sorts the list in a numerically descending order by average number of statements (AVG #STMTS column).

AG

Sorts the list in a numerically descending order by average number of GETPAGEs (AVG GETPGS column).

TE

Sorts the list in a numerically descending order by total elapsed time (TOTAL ELAPSED column).

TC

Sorts the list in a numerically descending order by total CPU time (TOTAL CPU column).

T#

Sorts the list in a numerically descending order by total number of statements (TOTAL #STMTS column).

TG

Sorts the list in a numerically descending order by total number of GETPAGEs (TOTAL GETPGS column).

ISD

Interval Start Descending. Displays the most current measurements at the top (TSUMT only).

Note: You also can sort on each column by moving (with the Tab key) to the column header and pressing ENTER.

Selecting a Subset of Trace Entries

The following selection keywords can be typed directly in the parameter field:

,A | AUTHID=xxxxxxx

Selects a subset of the trace entries by authorization ID. Specify one authorization ID, or a generic group of authorization IDs by replacing character positions with a + (one position) or an * (multiple positions).

,C | CONNECT=xxxxxxx

Selects a subset of the trace entries by connect type. Specify one connect type (TSO, BATCH, DB2CALL, imsid, cicsjobname) or a generic group of connections by replacing character positions with a + (one position) or an * (multiple positions).

,P | PLAN=xxxxxxx

Selects a subset of the trace entries by plan. Specify one plan or a generic group of plans by replacing character positions with a + (one position) or an * (multiple positions).

,L | LOC=xxxxxxx

Selects a subset of the trace entries by location. Specify one location, or a generic group of locations by replacing character positions with a + (one position) or an * (multiple positions).

,R | CORRID=xxxxxxxxxxx

Selects a subset of the trace entries by correlation ID. Specify one correlation ID, or a generic group of correlation IDs by replacing character positions with a + (one position) or an * (multiple positions).

,T | TIME=hhmm[-hhmm]

Selects a subset of the trace entries by a start time or time period, where hhmm indicates hours and minutes.

Midnight wrap is supported, where the start time is higher than the end time; for example, TIME=2000-3000. The end time stamp of an accounting record is used to assign it a time period.

,D | DAY=nn[-nn]

Selects a subset of the trace entries by a day or range of days, where nn can be a relative number from the date of the first accounting record in the trace buffer (first date = 1, up to a maximum of 99). If a time period is selected without a DAY specification, it uses the default value of the day of the most current record in the buffer.

Note: Each keyword can be specified only once. If more than one keyword is specified, the result is ANDed.

The parameter field is filled in automatically with any of these keywords when a series of summarizations and selections are made; for example:

- From LTRAC, select PLAN (TSUMP - Trace Summary by Plan) to see all trace entries.
- From TSUMP, sort by average CPU (SORT=AC) and cursor select (expand) the line for the plan with the highest average CPU. The display returns to LTRAC but shows only the trace entries for that one plan. The parameter field is filled in with PLAN=xxxxxxx.
- From this LTRAC subset, select AUTH (TSUMA - Trace Summary by AUTHID) to see a summary of all trace entries for this plan only. The parameter field is still filled in with PLAN=xxxxxxx.

TSUMA—Trace Summary by Authorization ID (AUTHID)

The Trace Summary by AUTHID panel is a scrollable list of trace entries summarized and sorted by authorization ID (AUTHID column). Both totals and averages of key workload indicators are shown.

```

BMC Software -----TRACE SUMMARY BY AUTHID ----- RX AVAILABLE
SERV ==> TSUMA          INPUT  14:22:27 INTVL=> 3 LOG=> N TGT==> DB2D
PARM ==> PBCR02,SORT=AU,GRAPH=NO                               ROW 1 OF 5 SCROLL=> CSR
EXPAND: LINESEL(LTRAC), HISTORY                               ENTRIES IN DATASET 1 - 132
19SEP02                PBCRCP - SQL/SCAN/IO                19SEP02 - 17SEP02

```

AUTHID	ENTRY COUNT	AVG ELAPSED	AVG CPU	AVG #STMTS	AVG GETPGS	TOTAL ELAPSED	TOTAL CPU	TOTAL #STMTS	TOTAL GETPGS
CIR8	2	5,516 ms	307 ms	3.0	70.0	11 s	615 ms	6	140
D8CS	22	6,380 ms	18 ms	7.5	10.0	00:02:20	398 ms	165	220
NHJ1	26	54 s	214 ms	29.5	102.2	00:23:39	5,581 ms	768	2,659
NHJ2	2	2,930 ms	430 ms	100.5	108.0	5,860 ms	860 ms	201	216
WRD2	1	02:56:33	11 s	0.0	0.0	02:56:33	11 s	0	0

```

*** END OF SUMMARY ENTRIES ***

```

Figure 89. Trace Summary by Authorization ID

Select Code:

TSUMA

Parameter:

The following parameters can be specified:

trace id

Is a unique ID identifying the trace. A blank can be an identifier. This parameter is the first positional parameter; a comma delimits the next parameter. If there is no identifier, a comma must precede any other parameter.

,GRAPH=NO | AVG | TOT

Displays a graphic presentation of the Entry Count (number of threads) followed by either the averages (AVG) or the totals (TOT). NO requests a numerical display of both average and total values. Default is NO.

,SORT=AU | EC | AE | AC | A# | AG | TE | TC | T# | TG

Sorts the list of summarized trace entries. Initially, the list is sorted alphabetically by authorization ID (default) and ,SORT=AU is displayed in the PARM field (the comma is a required positional parameter for SORT). SORT specifies the first two characters of a display column as described in [“Sorting the Display” on page 252](#).

[“Selecting a Subset of Trace Entries” on page 253](#) provides more information about the following parameters that applies to all the trace summary services:

,A | AUTHID=xxxxxxx

Selects the specified authorization ID only.

,C | CONNECT=xxxxxxx

Selects the specified connection name only.

,P | PLAN=xxxxxxx

Selects the specified plan name only.

,L | LOC=xxxxxxx

Selects the specified location name only.

TSUMA

- ,R | CORRID=xxxxxxxxxxxx
Selects the specified correlation ID only.
- ,T | TIME=hhmm[-hhmm]
Selects the specified time only.
- ,D | DAY=nn[-nn]
Selects the specified day only.

Summary Key:

AUTHID is the first column of this display. The summary key used for the default sort of summarized trace entries is shown in the first column. The summary key for the Tsuma service is authorization ID.

Description:

Summarizes the traced threads by authorization ID. The display is a scrollable list of summary lines for each unique authorization ID found in the trace entries.

TSUMC—Trace Summary by Connection Name (CONNECT)

The Trace Summary by Connect panel is a scrollable list of trace entries summarized and sorted by connection name (CONNECT column). Both totals and averages of key workload indicators are shown.

```

BMC Software -----TRACE SUMMARY BY CONNECT ----- RX AVAILABLE
SERV ==> TSUMC          INPUT 14:24:47 INTVL=> 3 LOG=> N TGT==> DB2D
PARM ==> PBCR02,SORT=CO,GRAPH=NO                      ROW 1 OF 5 SCROLL=> CSR
EXPAND: LINESEL(LTRAC), HISTORY                      ENTRIES IN DATASET 1 - 132
19SEP02                PBCRCP - SQL/SCAN/IO          19SEP02 - 17SEP02
CONNECT  ENTRY    AVG    AVG    AVG    AVG    TOTAL    TOTAL    TOTAL    TOTAL
          COUNT  ELAPSED  CPU    #STMTS GETPGS  ELAPSED  CPU    #STMTS GETPGS
-----
BATCH      23 00:01:00 205 ms 29.0 104.4 00:23:15 4,730 ms 667 2,403
CICS3112   22 6,380 ms 18 ms 7.5 10.0 00:02:20 398 ms 165 220
DB2CALL    1 02:56:33 11 s 0.0 0.0 02:56:33 11 s 0 0
TSO         5 5,611 ms 390 ms 61.6 93.6 28 s 1,953 ms 308 468
UTILITY    2 6,740 ms 186 ms 0.0 72.0 13 s 372 ms 0 144
          *** END OF SUMMARY ENTRIES ***
    
```

Figure 90. Trace Summary by Connection Name

Select Code:

TSUMC

Parameter:

The following parameters can be specified:

trace id

Is a unique ID identifying the trace. A blank can be an identifier. This parameter is the first positional parameter; a comma delimits the next parameter. If there is no identifier, a comma must precede any other parameter.

,GRAPH=NO | AVG | TOT

Displays a graphic presentation of the Entry Count (number of threads) followed by either the averages (AVG) or the totals (TOT). NO requests a numerical display of both average and total values. Default is NO.

,SORT=CO | EC | AE | AC | A# | AG | TE | TC | T# | TG

Sorts the list of summarized trace entries. Initially, the list is sorted alphabetically by connection name (default) and ,SORT=CO is displayed in the PARM field (the comma is a required positional parameter for SORT). SORT specifies the first two characters of a display column as described in [“Sorting the Display” on page 252](#).

[“Selecting a Subset of Trace Entries” on page 253](#) provides more information about the following parameters that applies to all the trace summary services:

,A | AUTHID=xxxxxxxx

Selects the specified authorization ID only.

,C | CONNECT=xxxxxxxx

Selects the specified connection name only.

,P | PLAN=xxxxxxxx

Selects the specified plan name only.

,L | LOC=xxxxxxxx

Selects the specified location name only.

- ,R | CORRID=xxxxxxxxxxxx
Selects the specified correlation ID only.
- ,T | TIME=hhmm[-hhmm]
Selects the specified time only.
- ,D | DAY=nn[-nn]
Selects the specified day only.

Summary Key:

CONNECT is the first column of this display. The summary key used for the default sort of summarized trace entries is shown in the first column. The summary key for the TSUMC service is connection name (default) as

- TSO
- BATCH
- DB2CALL (Call Attach Facility)
- IMS Subsystem ID
- CICS jobname

Description:

Summarizes the traced threads by connection name. The display is a scrollable list of summary lines for each unique connection name found in the trace entries.

TSUML—Trace Summary by Location Name (LOCATION)

The Trace Summary by Location panel is a scrollable list of trace entries summarized and sorted by the first eight characters in the location name (LOCATION column). Both totals and averages of key workload indicators are shown.

```

BMC Software ----- TRACE SUMMARY BY LOC ----- RX AVAILABLE
SERV ==> TSUML          INPUT 14:25:20 INTVL=> 3 LOG=> N TGT==> DB2D
PARM ==> PBCR02,SORT=LO,GRAPH=NO                      ROW 1 OF 1 SCROLL=> CSR
EXPAND: LINESEL(LTRAC), HISTORY                      ENTRIES IN DATASET 1 - 132
19SEP02                PBCRCP - SQL/SCAN/IO          19SEP02 - 17SEP02

```

LOCATION	ENTRY COUNT	AVG ELAPSED	AVG CPU	AVG #STMTS	AVG GETPGS	TOTAL ELAPSED	TOTAL CPU	TOTAL #STMTS	TOTAL GETPGS
NEW_YORK	23	00:01:00	205 ms	29.0	104.4	00:23:15	4,730 ms	667	2,403
DALLAS	22	6,380 ms	18 ms	7.5	10.0	00:02:20	398 ms	165	220
CHICAGO	1	02:56:33	11 s	0.0	0.0	02:56:33	11 s	0	0
LOS_ANGE+	5	5,611 ms	390 ms	61.6	93.6	28 s	1,953 ms	308	468
SEATTLE	2	6,740 ms	186 ms	0.0	72.0	13 s	372 ms	0	144

```

*** END OF SUMMARY ENTRIES ***

```

Figure 91. Trace Summary by Location Name

Select Code:

TSUML

Parameter:

The following parameters can be specified:

trace id

Is a unique ID identifying the trace. A blank can be an identifier. This parameter is the first positional parameter; a comma delimits the next parameter. If there is no identifier, a comma must precede any other parameter.

,GRAPH=NO | AVG | TOT

Displays a graphic presentation of the Entry Count (number of threads) followed by either the averages (AVG) or the totals (TOT). NO requests a numerical display of both average and total values. Default is NO.

,SORT=LO | EC | AE | AC | A# | AG | TE | TC | T# | TG

Sorts the list of summarized trace entries. Initially, the list is sorted alphabetically by location name (default) and ,SORT=LO is displayed in the PARM field (the comma is a required positional parameter for SORT). SORT specifies the first two characters of a display column as described in [“Sorting the Display” on page 252](#).

[“Selecting a Subset of Trace Entries” on page 253](#) provides more information about the following parameters that applies to all the trace summary services:

,A | AUTHID=xxxxxxx

Selects the specified authorization ID only.

,C | CONNECT=xxxxxxx

Selects the specified connection name only.

,P | PLAN=xxxxxxx

Selects the specified plan name only.

,T | TIME=hhmm[-hhmm]

Selects the specified time only.

TSUML

,D | DAY=nn[-nn]
Selects the specified day only.

,L | LOC=xxxxxxx
Selects the specified location name only.

,R | CORRID=xxxxxxxxxxx
Selects the specified correlation ID only.

Summary Key:

LOCATION is the first column of this display. The summary key used for the default sort of summarized trace entries is shown in the first column. The summary key for the TSUML service is the first eight characters of location name.

Description:

Summarizes the traced threads by location name. The display is a scrollable list of summary lines for each unique location name (eight characters only) found in the trace entries.

TSUMP—Trace Summary by Plan Name (PLAN)

The Trace Summary by Plan panel is a scrollable list of trace entries summarized and sorted by plan name (PLAN column). Both totals and averages of key workload indicators are shown.

```

BMC Software ----- TRACE SUMMARY BY PLAN ----- RX AVAILABLE
SERV ==> TSUMP          INPUT 14:24:47 INTVL=> 3 LOG=> N TGT==> DB2D
PARM ==> PBCR02,SORT=PL,GRAPH=NO                      ROW 1 OF 5 SCROLL=> CSR
EXPAND: LINESEL(LTRAC), HISTORY                      ENTRIES IN DATASET 1 - 132
19SEP02                PBCRCP - SQL/SCAN/IO          19SEP02 - 17SEP02
PLAN      ENTRY      AVG      AVG      AVG      AVG      TOTAL      TOTAL      TOTAL      TOTAL
          COUNT     ELAPSED   CPU     #STMTS  GETPGS   ELAPSED   CPU     #STMTS  GETPGS
-----
DSNESPCS      2 5,516 ms  307 ms   3.0    70.0    11 s    615 ms   6      140
DSNESPRR      3 5,675 ms  446 ms  100.6  109.3   17 s   1,338 ms 302    328
DSNTIA22     12 00:01:49 281 ms  10.6  169.0  00:21:54 3,379 ms 128   2,029
DSNTIB22     11 7,330 ms  122 ms   49.0   34.0   00:01:20 1,351 ms 539   374
DSNUTIL       2 6,740 ms  186 ms   0.0    72.0   13 s    372 ms   0     144
DSN8CC22     22 6,380 ms   18 ms    7.5   10.0   00:02:20 398 ms  165   220
          *** END OF SUMMARY ENTRIES ***

```

Figure 92. Trace Summary by Plan Name

Select Code:

TSUMP

Parameter:

The following parameters can be specified:

trace id

IS a unique ID identifying the trace. A blank can be an identifier. This parameter is the first positional parameter; a comma delimits the next parameter. If there is no identifier, a comma must precede any other parameter.

,GRAPH=NO | AVG | TOT

Displays a graphic presentation of the Entry Count (number of threads) followed by either the averages (AVG) or the totals (TOT). NO requests a numerical display of both average and total values. Default is NO.

,SORT=PL | EC | AE | AC | A# | AG | TE | TC | T# | TG

Sorts the list of summarized trace entries. Initially, the list is sorted alphabetically by plan (default) and ,SORT=PL is displayed in the PARM field (the comma is a required positional parameter for SORT). SORT specifies the first two characters of a display column as described in [“Sorting the Display” on page 252](#).

[“Selecting a Subset of Trace Entries” on page 253](#) provides more information about the following parameters that applies to all the trace summary services:

,A | AUTHID=xxxxxxx

Selects the specified authorization ID only.

,C | CONNECT=xxxxxxx

Selects the specified connection name only.

,P | PLAN=xxxxxxx

Selects the specified plan name only.

,L | LOC=xxxxxxx

Selects the specified location name only.

TSUMP

- ,R | CORRID=xxxxxxxxxxxx
Selects the specified correlation ID only.
- ,T | TIME=hhmm[-hhmm]
Selects the specified time only.
- ,D | DAY=nn[-nn]
Selects the specified day only.

Summary Key:

PLAN is the first column of this display. The summary key used for the default sort of summarized trace entries is shown in the first column. The summary key for the TSUMP service is plan name.

Description:

Summarizes the traced threads by plan name. The display is a scrollable list of summary lines for each unique plan name found in the trace entries.

TSUMR—Trace Summary by Correlation ID (CORR-ID)

The Trace Summary by Correlation ID panel is a scrollable list of trace entries summarized and sorted by the DB2 correlation ID (CORR column). Both totals and averages of key workload indicators are shown.

```

BMC Software -----TRACE SUMMARY BY CORR-ID ----- RX AVAILABLE
SERV ==> TSUMR          INPUT 15:15:22 INTVL=> 5 LOG=> N TGT==> DB2HHH
PARM ==> WORKSTTN, SORT=CR, GRAPH=NO                      ROW 1 OF 3 SCROLL=> CSR
EXPAND: LINESEL(LTRAC)                                     ENTRIES IN DATASET 1 - 74
                DB2 APPLICATION TRACE
CORR          ENTRY  AVG      AVG      AVG      AVG      TOTAL  TOTAL  TOTAL  TOTAL
              COUNT ELAPSED CPU    #STMTS GETPGS ELAPSED CPU    #STMTS GETPGS
-----
db2bp.ex      72    11 s    742 ms    9.1    14.6 00:13:47    53 s    658    1,049
BOLJEH1       1 01:19:13 9,184 ms    0.0    0.0 01:19:13 9,184 ms     0     0
BOLJEH2       1 00:42:42 00:04:15   29.0   295K 00:42:42 00:04:15    29   295K
***** END OF SUMMARY ENTRIES *****
    
```

Figure 93. Trace Summary by Correlation ID

Select Code:

TSUMR

Parameter:

The following parameters can be specified:

trace id

Is a unique ID identifying the trace. A blank can be an identifier. This parameter is the first positional parameter; a comma delimits the next parameter. If there is no identifier, a comma must precede any other parameter.

,GRAPH=NO | AVG | TOT

Displays a graphic presentation of the ENTRY COUNT (number of threads) followed by either the averages (AVG) or the totals (TOT). NO requests a numerical display of both average and total values. The default is NO.

,SORT=CR | EC | AE | AC | A# | AG | TE | TC | T# | TG

Sorts the list of summarized trace entries. Initially, the list is sorted alphabetically by DB2 correlation ID (default) and ,SORT=CR is displayed in the PARM field (the comma is a required positional parameter for SORT). SORT specifies the first two characters of a display column as described in “[Sorting the Display](#)” on page 252.

“[Selecting a Subset of Trace Entries](#)” on page 253 provides information about the following parameters that applies to all the trace summary services:

,A | AUTHID=xxxxxxx

Selects the specified authorization ID only.

,C | CONNECT=xxxxxxx

Selects the specified connection name only.

,P | PLAN=xxxxxxx

Selects the specified plan name only.

,L | LOC=xxxxxxx

Selects the specified location name only.

,R | CORRID=xxxxxxxxxxx

Selects the specified correlation ID only.

TSUMR

,T | TIME=hhmm[-hhmm]
Selects the specified time only.

,D | DAY=nn[-nn]
Selects the specified day only.

Summary Key:

CORR is the first column of this display. The summary key used for the default sort of summarized trace entries is shown in the first column. The summary key for the TSUMR service is the DB2 correlation ID.

Note: This column displays only the first eight characters of the correlation ID; however, all twelve characters of the correlation ID are used and sorted on.

Description:

Summarizes the traced threads by DB2 correlation ID. The display is a scrollable list of summary lines for each unique correlation ID found in the trace entries.

TSUMT—Trace Summary by Time (INTERVAL START)

The Trace Summary by Time panel is a scrollable list of trace entries summarized and sorted by time (INTERVAL START column). Both totals and averages of key workload indicators are shown.

```

BMC Software ----- TRACE SUMMARY BY TIME ----- RX AVAILABLE
SERV ==> TSUMT          INPUT  14:26:50 INTVL=> 3 LOG=> N TGT==> DB2D
PARM ==> PBCR02,INTVL=1M,SORT=IS,GRAPH=NO          ROW 1 OF 3 SCROLL=> CSR
EXPAND: LINESEL(LTRAC), HISTORY                    ENTRIES IN DATASET 1 - 132
19SEP02          PBCRCP - SQL/SCAN/IO          19SEP02 - 17SEP02
INTERVAL  ENTRY   AVG     AVG     AVG     AVG     TOTAL   TOTAL   TOTAL   TOTAL
START     COUNT  ELAPSED  CPU    #STMTS GETPGS  ELAPSED  CPU    #STMTS GETPGS
-----
14:00:00    38 00:05:12  464 ms  16.2   67.3 03:17:59   17 s    616  2,560
15:00:00    15  19 s    103 ms  34.9   45.0 00:04:50 1,550 ms  524  675
*** END OF SUMMARY ENTRIES ***
    
```

Figure 94. Trace Summary by Time

Select Code:

TSUMT

Parameter:

The following parameters can be specified:

trace id

Is a unique ID identifying the trace. A blank can be an identifier. This parameter is the first positional parameter; a comma delimits the next parameter. If there is no identifier, a comma must precede any other parameter.

,INTVL=nnM | nnH

Allows a different time interval to be selected. When the list of summarized trace entries is displayed initially, the list is summarized by hour (default) and ,INTVL=1H is displayed in the PARM field (the comma is a required positional parameter for INTVL).

The summary time interval can be changed by typing **nnM** or **nnH** where

- nnM specifies minutes
- nnH specifies hours

The first INTERVAL START displayed is determined by rounding the earliest end time of a trace entry back to an even interval start time.

- Any minute interval that divides evenly into 60 starts at the latest prior period from an even hour. Those not evenly divisible start at the current minute.
- Any hour interval that divides evenly into 24 starts at the latest prior period from midnight. Those not evenly divisible start at the current hour.

For example:

- If an interval is 15 minutes and the earliest end time is 12:41:30, the first interval start time would be 12:30:00.
- If an interval is 25 minutes and the earliest end time is 12:41:30, the first interval start time would be 12:41:00.
- If an interval is 4 hours and the earliest end time is 9:21:35, the first interval start time would be 08:00:00.

,GRAPH=NO | AVG | TOT

Displays a graphic presentation of the Entry Count (number of threads) followed by either the averages (AVG) or the totals (TOT). NO requests a numerical display of both average and total values. Default is NO.

,SORT=IS | EC | AE | AC | A# | AG | TE | TC | T# | TG | ISD

Sorts the list of summarized trace entries. Initially, the list is sorted in ascending sequence by interval start (default) and ,SORT=IS is displayed in the PARM field (the comma is a required positional parameter for SORT). ISD (Interval Start Descending) displays the most current measurements at the top.

SORT specifies the first two characters of a display column as described in [“Sorting the Display” on page 252](#).

Note: You also can sort on each column by moving (with the Tab key) to the column header and pressing ENTER.

[“Selecting a Subset of Trace Entries” on page 253](#) provides more information about the following parameters that applies to all the trace summary services:

,A | AUTHID=xxxxxxx

Selects the specified authorization ID only.

,C | CONNECT=xxxxxxx

Selects the specified connection name only.

,P | PLAN=xxxxxxx

Selects the specified plan name only.

,L | LOC=xxxxxxx

Selects the specified location name only.

,R | CORRID=xxxxxxxxxxx

Selects the specified correlation ID only.

,T | TIME=hhmm[-hhmm]

Selects the specified time only.

,D | DAY=nn[-nn]

Selects the specified day only.

Summary Key:

INTERVAL START is the first column of this display. The summary key used for the default sort of summarized trace entries is shown in the first column. The default summary key for the TSUMT service is the start time stamp of the summarized time interval.

If there is data for only one day in the trace buffer, the format of the time stamp is hh:mm:ss. If there is data for more than one day, the format is dd-hh:mm, where dd is the relative day number from the date of the first accounting record in the trace buffer.

Each accounting record traced is assigned to a time period based on its end time stamp. Therefore, the processing done for that unit of work is assigned to one interval, but work may have partially occurred during one or more previous time intervals depending on its elapsed time.

Description:

Summarizes the traced threads by time interval start. The display is a scrollable list of summary lines by a start time stamp of each summarized time interval found in the trace entries.

Viewing Summary Data for a Specific Thread

To view summary data for a specific thread, select an entry in the LTRAC display and press ENTER to access the STRAC display for that thread.

STRAC—Summary Trace Entry

The Summary Trace Entry panel displays summary data for a completed transaction or thread. There is one per DB2 accounting record. This panel is scrollable and displays a base section with the most critical information, followed by sections showing all accounting data. For a detail trace, additional summary sections might be available for SQL activity, database scans, database lock and I/O activity, and sort activity.

Note: If the target for a historical trace is not equal to the current TGT field, it is displayed in a HIST TGT field.

Figure 95 through Figure 110 show representative displays of each STRAC section.

```

BMC Software ----- SUMMARY TRACE ENTRY ----- RX AVAILABLE
SERV ==> STRAC          INPUT  15:14:16 INTVL=> 3 LOG=> N TGT==> DB2F
PARM ==> ,SEQ=2                               ROW 1 OF 129 SCROLL=> CSR
EXPAND: MON(WKLD), DETAIL, CURRENT              HIST TGT--- DSN2
          ACCOUNTING: ENV, ELAPSED, SQLCOUNTS, BPOOL, LOCKS, PRL, PKG, SPAS, DDF
          SUMMARIES:  SQL, SCANS, IO/LOCK, SORTS
STOP.....07MAY 13:35:20.20 PLAN.....DSN8CC0 TYPE.....ALLIED
START....07MAY 13:35:20.17 AUTHID.....T127 CONNECT....LRTEST1/CICS
ELAPSED.....33 ms ORIG PRIM AUTH.....T127 CORR ID....GT00PROB
TERM.....NORMAL/APPL END  COMMITS.....1 ROLLBACKS.....0
-----
RUNTIME ANALYSIS  IN DB2      IN APPL.      TOTAL      %IN DB2(=)      TOTAL(*)
-----
ELAPSED TIME      14 ms      19 ms      33 ms | =====***** |
CPU TIME          12 ms      1,552 us   13 ms | =====*      |
DB2 WAIT TIME     0 us
- - - - - ACTIVITY - - - - -
TOTAL SQL.....12      SQL: SELECT= 1, FETCH= 0
GETPAGES.....21      SQL: DYNAMIC(PREPARE)= 3
SYNC READS (PRL=00).....0 I/O RSP: SYNC= 45 ms, ASYNC= 107 ms
PREFETCH PAGES READ.....1
UPDATES/COMMIT.....0.0
BFR HIT RATIOS:...VP=100%,HP= 0%

```

Figure 95. Summary Trace Entry Panel (Base Section)

See “Key Indicators:” on page 280.

```

- - - - - ENVIRONMENTAL INDICATORS - - - - -
LUWID.....USB00L1.DSN2.A8E1BAF1B5DF0001
RLF TABLE ID....NOT ACTIVE
- - - - - CICS CONNECTION - - - - -
ACCOUNTING TOKEN.....(TOKEN NOT SPECIFIED)

```

Figure 96. STRAC Environmental Indicators (ENV) Section

```

- - - - - ELAPSED TIME ANALYSIS (ACCTG CLASSES 2,3 ONLY) - - - - -
CATEGORY          #EVENTS AVG/EVENT  ELAPSED  %TOTAL
-----
ELAPSED TIME
  IN DB2          00:12:39  99.86  *****
  IN APPLICATION  1,038 ms  0.13  <
  --TOTALS--     00:12:40  100.00 *****
WAITS IN DB2 (LOCAL)
  LOCK/LATCH      0      0 us    0 us    0.00
  I/O WAIT        19     21 ms   392 ms  0.05  <
  LOG WRITE I/O   0      0 us    0 us    0.00
  OTHER READ I/O  0      0 us    0 us    0.00
  OTHER WRITE I/O 0      0 us    0 us    0.00
  UNIT SWITCH EVENTS
  . . COMMIT/ROLLBK  0      0 us    0 us    0.00
  . . OPEN/CLOSE     6  8,965 ms  54 s    7.07  *
  . . SYSLGRNG       1     700 ms   700 ms  0.09  <
  . . DATASPACE MGR  4     243 ms   973 ms  0.12  <
  . . OTHER          0      0 us    0 us    0.00
  ARCH. LOG(QIS)   0      0 us    0 us    0.00
  ARCH. READ(TAPE) 0      0 us    0 us    0.00
  DRAIN LOCK       0      0 us    0 us    0.00
  CLAIM RELEASE    0      0 us    0 us    0.00
  PAGELATCH CONT.  0      0 us    0 us    0.00
  SPAS SERVER TCB  0      0 us    0 us    0.00
WAITS IN DB2 (GLOBAL)
  LOCKS           0      0 us    0 us    0.00
  MSG. PROCESSING  0      0 us    0 us    0.00
  ---TOTAL WAITS--- 30  1,862 ms  56 s    7.34  *
  *NOT ACCOUNTED          00:11:44  92.54  *****

```

Figure 97. STRAC Elapsed Time Analysis (ELAPSED) Section

```

- - - - - SQL STATEMENT EXECUTION COUNTS - - - - -
SELECT.....0   LOCK TABLE.....0   CREATE.....0
INSERT.....0   GRANT/REVOKE.....0   DROP.....0
UPDATE.....0   SET CURR.SQLID.....0   ALTER.....0
DELETE.....0   SET HOST VAR. ....0
                SET CURR.DEGREE.....0   COMMENT ON.....0
PREPARE.....1   SET CURR. RULES.....0   LABEL ON.....0
DESCRIBE.....0   CONNECT TYPE 1.....0
                CONNECT TYPE 2.....0   CREATE TEMP.....0
OPEN.....1     SET CONNECTION.....0   RENAME TBL.....0
FETCH.....5     RELEASE.....0
CLOSE.....1     CALL.....0
                ASSOCIATE LOCATOR.....0
                ALLOCATE CURSOR.....0

** DML.....8   ** DCL.....0   ** DDL.....0
** REOPTIMIZED.....0

- - - - - DYNAMIC SQL CACHE COUNTS - - - - -
STMT FOUND.....0   KPDYN-PREP.AVOID.....0   STMT DISCRD.....0
STMT NOT FOUND.....0   KEEPDPYD_IMPL.PREP.....0   STMT PURGED.....0

```

Figure 98. STRAC SQL Statement Execution Counts (SQLCOUNTS) Section

- - - - - BUFFER POOL ACTIVITY - - - - -			
ACTIVITY	TOTAL	BP0	BP3
GETPAGES.....	30	25	5
SYNC READS.....	25	15	10
GETPAGES/READIO....	1.2	1.7	0
COND. GP FAILURES..	0	0	0
SEQ. PREFETCH REQS.	0	0	0
LIST PREFETCH REQS.	0	0	0
DYNAMIC PREFETCHES.	2	0	2
ASYNC PAGES READ...	0	0	0
PAGES/PREFETCH REQ.	0.0	0.0	0.0
PAGE UPDATES.....	3	2	1
IMMEDIATE WRITES...	0	0	0
HP SYNC READS.....	0	0	0
HP SYNC READ FAIL..	0	0	0
HP ASYNC PAGES READ	0	0	0
HP WRITES.....	0	0	0
HP WRITE FAILURES..	0	0	0
- - - - - GLOBAL BUFFER POOL (DATA SHARING ONLY) - - - - -			
CF READS (BUFFER CROSS INVALIDATION)			
-DATA RETURNED....	2	-	2
-R/W INTEREST.....	1	-	1
CF READS (DATA NOT IN BUFFER POOL)			
-DATA RETURNED....	2	-	2
-R/W INTEREST.....	1	-	1
-NO R/W INTEREST..	1	-	1
CF-WRITE (CHGD PGS)	2	-	2
CF-WRITE (CLEAN PG)	1	-	1
NBR UNREG PAGES....	1	-	1
NBR EXPLICIT XI....	0	-	0
NBR WRITES 2ND BP..	0	-	0

Figure 99. STRAC Buffer Pool Activity (BPOOL) Section

- - - - - LOCK ACTIVITY - - - - -	
TIMEOUT.....0	MAX PAGE/ROW LOCKS.....1
DEADLOCK.....0	
	LOCK REQUEST.....6
SUSPEND-LOCK.....0	UNLOCK REQUEST.....9
SUSPEND-LATCH.....0	QUERY REQUEST.....0
SUSPEND-OTHER.....0	CHANGE REQUEST.....8
	OTHER REQUEST.....0
ESCALATION(SHR).....0	
ESCALATION(EXCL).....0	
DRAIN REQUEST.....0	DRAIN FAILURE.....0
CLAIM REQUEST.....2	CLAIM FAILURE.....0
	- - - - - GLOBAL LOCK ACTIVITY - - - - -
LOCK REQUEST.....1	XES LOCK REQUEST.....3
LOCK CHANGE REQUEST.....0	XES CHANGE REQUEST.....0
UNLOCK REQUEST.....0	XES UNLOCK REQUEST.....1
IRLM GLOBAL SUSPEND.....0	XES GLOBAL SUSPEND.....0
FALSE CONTENTION.....0	
INCOMPATIBLE RETAINED.....0	NOTIFY MESSAGES SENT.....0

Figure 100. STRAC Lock Activity (LOCKS) Section

- - - - - PARALLELISM - - - - -	
MAXIMUM DEGREE.....2	FALLBACK - NO BUFFER.....1
GROUPS EXECUTED.....3	FALLBACK - NO ESA SORT.....0
-- PLANNED DEGREE.....1	FALLBACK - AMBIG. CURSOR.....1
-- REDUCED DEGREE.....2	
PARALLEL TASKS.....3	FALLBACK - NO ENCLAVE.....0
CORRELATION TOKEN.....X'00000000'	FALLBACK - RLF LIMITED.....NO
	- - - - - SYSPLEX - - - - -
COORDN/ASSISTANT.....COORDN	FALLBACK - NO COORDN.....1
PRL COORDN NAME.....	FALLBACK - ISOL RR/RS.....2
MAXIMUM MEMBERS.....2	REDUCED - VP SHORTAGE.....0
INTENDED PRL GROUPS.....0	
QUERY REFORMULATED (ENV).....0	QUERY REFORMULATED (BP).....0

Figure 101. STRAC Parallelism (PRL) Section

```

- - - - - STORED PROCEDURES - - - - -
SPAS CPU TIME.....200 us      SQL CALLS.....9
SPAS IN-DB2 TIME.....200 us   CALLS ABENDED.....0
SPAS WAITING ON TCB.....600 ms CALLS REJECTED.....0
                                CALLS TIMED OUT.....0
Total elapsed time.....200 us  WAITS ON TCB.....6
Elapsed time in SQL.....200 us  SQL nest level.....5

---and/or---

- - - - - USER-DEFINED FUNCTIONS - - - - -
UDF CPU TIME.....200 us      UDFs executed.....9
UDF IN-DB2 TIME.....200 us   UDFs ABENDED.....0
UDF WAITING ON TCB.....600 ms UDFs REJECTED.....0
                                UDFs TIMED OUT.....0
Total elapsed time.....200 us  SQL STMTS executed.....15
Elapsed time (SQL).....200 us  SQL nest level.....5

---and/or---

- - - - - TRIGGERS - - - - -
-- non-enclave times --
CPU Time.....200 us          Stmt TRG activated.....9
Elapsed time.....600 ms     Row TRG activated.....0
                                Trigger SQL errors.....0
-- enclave times --
CPU time.....200 us         CPU time (before enclave)...200 us
Elapsed time.....200 us     SQL nest level.....5

```

Figure 102. STRAC Routines (RTN) Section

```

----- DDF SUMMARY -----
CURRENT LOCATION: DB2D (DBAT SERVER/ALLIED DIST REQUESTOR)
WORKSTATION USER ID...bo1bp12          WORKSTATION NAME..
WORKSTATION TRANSACTION ID...db2bp.exe

MVS WLM SERVICE CLASS NAME.....DB2JWLM

REMOTE          FROM          TO
LOCATION: DB1D
REMOTE PROD-ID: DB2PROD          SQL STATEMENTS          0          1
DB AGENT CPU.....505 ms        ROWS                    250          0
ELAPSED LOCAL.....00:02:19     BYTES                   63,237      1,237
ELAPSED REMOTE.....00:02:18    TRANSACTIONS           0          1
CONVERSATIONS QUEUED.....0     MESSAGES                5          6
BLOCK FETCH %.....21%         CONVERSATIONS          0          1
MAX CONVERSATIONS.....1       COMMITS                 0          1
UNSUCCESSFUL CONV'S.....0     ABORTS                  0          0
                                BLOCK FETCH            20          0

TWO-PHASE COMMIT (2PH):
                                2PH PREPARE            0          0
                                2PH LAST AGENT        0          0
REMOTE COORDINATOR            2PH COMMITS           0          0
-----
                                2PH BACKOUTS          0          0
-- INDOUBT.....1              2PH FORGET RSP        0          0
-- COMMIT.....3                2PH REQ COMMIT        0          0
-- ROLLBACK.....0              2PH BACKOUT RSP       0          0
    
```

Figure 103. STRAC DDF Summary (DDF) Section

```

----- PACKAGE / DBRM OVERVIEW (ACCTG CLASSES 7,8 ONLY) -----
PACKAGE/
DBRM      NO. SQL  CPU TIME  WAIT TIM  ELAPSED  %TOTAL
-----  -----  -----  -----  -----  -----
0 . . . 25 . . . 50 . . . 75 . . . 100
RXSEL1M   5    23 ms   611 ms   860 ms   9.78 | *
RXSEL2M   6    21 ms   514 ms   538 ms   6.12 | *
RXSEL3M  24    38 ms   193 ms   250 ms   2.84 | <
RXSEL4M*   8    22 ms   765 ms   828 ms   9.43 | *
RXSEL5M   9    24 ms   298 ms   337 ms   3.83 | <
RXSEL6M  10    25 ms   363 ms   408 ms   4.64 | <
RXSEL7M  11    26 ms   179 ms   211 ms   2.40 | <
RXSEL8M  12    28 ms   270 ms   299 ms   3.40 | <
RXSEL9M  13    27 ms   288 ms   351 ms   3.99 | <
RXSELAM  14    28 ms   256 ms   286 ms   3.25 | <
    
```

Figure 104. STRAC Package/DBRM Overview (PKG) Section

```

BMC Software ----- SUMMARY TRACE ENTRY ----- PERFORMANCE MGMT
SERV ==> STRAC          INPUT  11:12:21 INTVL=> 3 LOG=> N TGT==> DB2E
PARM ==> THRDHIST,SEQ=6                                SCROLL=> CSR

- - - - - PACKAGE / DBRM SECTION (ACCTG CLASSES 7,8 ONLY) - - - - -

NAME:          DB2E.BOLLA1.ACUT0300
TYPE:          PACKAGE          LOCATION:          DB2E
PROGRAM:       ACUT0300        COLLECTION ID:    BOLLA1
              LOADED BY A STORED PROCEDURE      CONSISTENCY TOKEN: 152B76830BA4B826

SQL STATEMENTS - TOTAL:      8
DB2 ENTRY/EXIT - TOTAL:     29

TIMINGS          #EVENTS AVG/EVENT   IN-DB2   %TOTAL
-----
ELAPSED TIME          139 ms    0.15 | <
TCB CPU TIME          7,831 us    0.00 |
TOTAL WAITS:         14 8,250 us   116 ms   0.13 | <
  LOCK/LATCH          0 0 us     0 us    0.00 |
  I/O WAIT            8 4,451 us   36 ms   0.04 | <
  OTHER READ          0 0 us     0 us    0.00 |
  OTHER WRITE         0 0 us     0 us    0.00 |
  UNIT SWITCH         6 13 ms    80 ms   0.09 | <
  ARCH. LOG(QIS)      0 0 us     0 us    0.00 |
  ARCH.READ(TAPE)    0 0 us     0 us    0.00 |
  DRAIN LOCK          0 0 us     0 us    0.00 |
  CLAIM RELEASE       0 0 us     0 us    0.00 |
  PAGELATCH CONT.    0 0 us     0 us    0.00 |
  SPAS SERVER TCB     0 0 us     0 us    0.00 |
  GLOBAL LOCK         0 0 us     0 us    0.00 |
  DATA SHR MSGS.    0 0 us     0 us    0.00 |
  UDF Schedule        0 0 us     0 us    0.00 |
*NOT ACCOUNTED          307 us    0.00 |

```

Figure 105. STRAC Package/DBRM Pop-Up Display

```

BMC Software ----- SUMMARY TRACE ENTRY ----- RX AVAILABLE
SERV ==> STRAC INPUT 14:27:16 INTVL=> 3 LOG=> N TGT==> DB2D
PARM ==> PBCR02,SEQ=5,SQL,SORT=PGM ROW 1 OF 18 SCROLL=> CSR
EXPAND: MON(WKLD), DETAIL, HISTORY
ACCOUNTING: ENV, ELAPSED, SQLCOUNTS, BPOOL, LOCKS, PRL, PKG, SPAS, DDF
SUMMARIES: SQL, SCANS, IO/LOCK, SORTS
----- SQL SUMMARY (DETAIL TRACE ONLY) -----

```

STMT TYPE	STMT	COUNT	AVG. ELAPSED	% ELAP	AVG. CPU	% CPU	SORT RECS	PAGES SCANNED		
								INDX	DATA	WORK+
SELECT	3228	1	25 ms	2.7	1,930 us	0.3	0	2	1	0
SELECT	3347	2	11 ms	2.4	4,047 us	1.5	0	11	4	0
OPEN	3565	6	172 us	0.1	170 us	0.2	0	0	0	0
FETCH	3578	11	1,986 us	2.3	782 us	1.6	0	19	3	0
CLOSE	3664	6	192 us	0.1	149 us	0.2	0	0	0	0
SELECT	3671	6	1,776 us	1.1	1,091 us	1.2	0	12	0	0
SELECT	3283	1	2,643 us	0.3	1,888 us	0.3	0	1	0	0
OPEN	3299	1	109 us	0.0	107 us	0.0	0	0	0	0
FETCH	3313	2	907 us	0.2	855 us	0.3	0	1	0	0
CLOSE	3334	1	142 us	0.0	141 us	0.0	0	0	0	0
OPEN	3456	1	693 ms	74.1	414 ms	74.9	8	23	1187	2
FETCH	3468	5	440 us	0.2	322 us	0.3	0	0	0	6
SELECT	4803	1	1,269 us	0.1	1,121 us	0.2	0	2	0	0
PGM: P025D100		44		83.9		81.0	8	71	1195	8
SELECT	1239	1	1,040 us	0.1	1,040 us	0.2	0	2	1	0
OPEN	1263	1	66 ms	7.1	47 ms	8.6	172	13	6	9
FETCH	1273	87	201 us	1.9	177 us	2.8	0	0	0	2
CLOSE	1324	1	250 us	0.0	250 us	0.0	0	0	0	0
OPEN	1333	1	15 ms	1.6	14 ms	2.6	7	6	4	5
FETCH	1343	5	254 us	0.1	254 us	0.2	0	0	0	2
SELECT	1375	3	1,746 us	0.6	1,165 us	0.6	0	0	12	0
CLOSE	1393	1	126 us	0.0	126 us	0.0	0	0	0	0
PGM: P025D200		100		11.4		15.0	179	21	23	18
SELECT	389	1	38 ms	4.2	18 ms	3.4	0	10	3	0
OPEN	482	1	135 us	0.0	134 us	0.0	0	0	0	0
FETCH	489	10	459 us	0.5	302 us	0.5	0	1	0	0
PGM: P025D300		12		4.7		3.9	0	11	3	0
TOTALS *		156					187	103	1221	26

Figure 106. STRAC SQL Summary Section

```

BMC SOFTWARE-----  DETAIL TRACE ENTRY -----PERFORMANCE MGMT
SERV ==> STRAC          INPUT  10:22:51 INTVL=> 3 LOG=> N TGT==> DB2C
PARM ==> TEST3,SEQ=000017,SQL          ROW    1 OF    18 SCROLL=> CSR
EXPAND:  SQLTEXT(EXPLAIN)

STATEMENT:  350  SELECT                                NUMBER OF EXECUTIONS:    2
PLAN:       DSNESPRR                                ELAPSED:  AVERAGE 2,794 us  TOTAL 5,588 us
PROGRAM:    DSNITIAUL                                CPU:      AVERAGE 1,271 us  TOTAL 2,543 us
LOCATION:    DB1D
PACKAGE:    SAJUYH2I

-----
INDEX  SEQ-DATA  SEQ-WORK
-----
ROWS PROCESSED ALL TYPES                4          2          0
ROWS PROCESSED CORRECT TYPE              4          2          0
ROWS QUALIFIED BY DM (STAGE 1)           3          0          0
ROWS QUALIFIED BY RDS (STAGE 2)          0          0          0
ROWS INSERTED                             0          0          0
ROWS UPDATED                              0          0          0
ROWS DELETED                              0          0          0
PAGES SCANNED                             8          2          0
REFERENTIAL INTEGRITY PROCESSING:
  PAGES SCANNED                           0          0          0
  ROWS DELETED/SET NULL                    0          0          0
LOB- PAGES SCANNED                         0          0          0
  - PAGES UPDATED                          0          0          0

```

Figure 107. STRAC SQL Statement Pop-Up Display

```

BMC Software -----  SUMMARY TRACE ENTRY -----  RX AVAILABLE
SERV ==> STRAC INPUT  14:27:46 INTVL=> 3 LOG=> N TGT==> DB2D
PARM ==> PBCR02,SEQ=5,SCAN,SORT=DA  ROW 1 OF 11 SCROLL=> CSR
EXPAND:  MON(WKLD), DETAIL, HISTORY
ACCOUNTING: ENV, ELAPSED, SQLCOUNTS, BPOOL, LOCKS, PRL, PKG, SPAS, DDF
SUMMARIES: SQL, SCANS, IO/LOCK, SORTS
- - - - - DATABASE SUMMARY (DETAIL TRACE ONLY) - - - - -

-----  INDX -----  -----  DATA -----  -----  WORK+ -----
DATABASE  PAGESET  OBID  #SCAN  #PAGE  #ROWS  #SCAN  #PAGE  #ROWS  #SCAN  #PAGE  #ROWS
-----
DD028    S021FT10    8    16    32    193    12    9    185    0    0    0
DD028    S021FT20   13    94    18    110     2    4    16    0    0    0
DD028    S021FT30   18     0     0     0     3   12    39    0    0    0
DD028    S021FT40   23     3     3   360     0    0     0    0    0    0
DD028    S021PR10   28     6    12     7     6  1181 44566  0    0    0
DD028    S021PR30   33    33    36   815    11   14   298    0    0    0
DD028    S021UI10   40     1     2     1     1    1     1    0    0    0
DSNDB07  DSN4K01     3     0     0     0     0    0     0    3    6    0
DSNDB07  DSN4K02     5     0     0     0     0    0     0    1    2    0
DSNDB07  DSN4K03     7     0     0     0     0    0     0    2    4    0
**** TOTALS ****          153   103  1486    35  1221 45105     6   12    0

```

Figure 108. STRAC Database Summary Section

```

BMC Software ----- SUMMARY TRACE ENTRY ----- RX AVAILABLE
SERV ==> STRAC INPUT 14:27:53 INTVL=> 3 LOG=> N TGT==> DB2D
PARM ==> PBCR02,SEQ=5,IOLock,SORT=DP ROW 1 OF 11 SCROLL=> CSR
EXPAND: MON(WKLD), DETAIL, HISTORY
ACCOUNTING: ENV, ELAPSED, SQLCOUNTS, BPOOL, LOCKS, PRL, PKG, SPAS, DDF
SUMMARIES: SQL, SCANS, IO/LOCK, SORTS
----- DATABASE LOCK AND I/O SUMMARY (DETAIL TRACE ONLY) -----

```

DATABASE	PAGESET	----- LOCKS -----			----- SYNC. I/O -----				ASYNC I/O	
		MAX.	SUSP.	TM/OUT	READ	WRITE	ELAPSED	AVG.ELAP	READ	PAGES
B1C0DB	BB040A12	0	0	0	1	0	21 ms	21 ms	0	0
B2C0DB	BB051012	2	0	0	1	0	18 ms	18 ms	0	0
B3C0DB	BB09TS02	3	0	0	0	0	0 us	0 us	0	0
**** TOTALS ****		5	0	0	2	0	39 ms	19 ms	0	0

Figure 109. STRAC Database Lock and I/O Summary Section

```

BMC Software ----- SUMMARY TRACE ENTRY ----- RX AVAILABLE
SERV ==> STRAC INPUT 14:27:16 INTVL=> 3 LOG=> N TGT==> DB2D
PARM ==> PBCR02,SEQ=5,SORTS ROW 1 OF 18 SCROLL=> CSR
EXPAND: MON(WKLD), DETAIL, HISTORY
ACCOUNTING: ENV, ELAPSED, SQLCOUNTS, BPOOL, LOCKS, PRL, PKG, SPAS, DDF
SUMMARIES: SQL, SCANS, IO/LOCK, SORTS
----- SORT SUMMARY (DETAIL TRACE ONLY) -----

```

		SORT		RECORD
		ELAPSED	RECORDS	SIZE
NUMBER OF SORTS.....6	AVERAGE	135 ms	31	353M
AVG # WORK FILES.....1.3	MAXIMUM	263 ms	86	2,118M
	MINIMUM	263 ms	3	0
	TOTAL	263 ms	187	N/A
***** END OF DATA *****				

Figure 110. STRAC Sort Summary Section

Select Code:

STRAC

Parameter:

The following parameters can be specified:

trace id

A unique ID identifying the trace. A blank can be an identifier. Therefore, this parameter is positional and a comma delimits the next parameter. For example, if there is no identifier, a comma must precede any other parameter. However, if there is an ID, it must be in the first position.

,SEQ=

A unique internal sequence number assigned to each trace entry. The number is assigned sequentially throughout the trace, across multiple log data sets. If this keyword is not entered, the first entry in the trace buffer is displayed. The value after the equals sign can be overtyped to jump directly to any valid trace entry.

,ENV | ELAPSED | SQLCOUNTS | BPOOL | LOCKS | PRL | DDF | PKG | SPAS

A request to display a specific STRAC accounting section as described on page 278.

,SQL | SCAN | IOLOCK | SORTS

A request to display a specific STRAC summary section as described on page 279.

,SORT=

A request to sort a qualified SQL or Database Summary display as described in “SQL Summary” and “Database Summary” in this section.

Description:

Displays accounting data on the activity generated by one transaction or thread. It also might include summaries of detail trace events. It is invoked by cursor selection from the LTRAC scrollable list display.

Note: All the fields are formatted from the DB2 accounting record that is written by DB2 to the specified destination. A record is written for each DB2 thread and is available to the trace facility when the thread terminates. For more information, refer to the IBM publication, *DB2 Administration Guide*.

Scrolling:

By using the PF10/22 and PF11/23 keys, you can scroll backwards or forwards one trace buffer entry (thread) at a time. The current entry number is displayed in the SEQ= field. PF7/19 scrolls the display up and PF8/20 scrolls the display down.

Expand:

The STRAC display can be EXPANDED to the following displays:

MON(WKLD)

Active Timer Requests display of all active monitors in the DB2 workload (WKLD) area

DETAIL

Detail Trace Entry display

HISTORY

Historical trace data set for this trace (if you are viewing a current trace with logging, this display provides access to data no longer in the online buffer)

CURRENT

Active trace data still in the buffers (if you are viewing a trace log data set for a still-active trace or a complete trace that has not yet been purged)

ACCOUNTING:

The following sections format data from the DB2 accounting record:

ENV

STRAC Environmental Indicators display section

ELAPSED

STRAC Elapsed Time Analysis display section (accounting classes 2 and 3 only)

SQLCOUNTS

STRAC SQL Statement Execution Counts display section

BPOOL

STRAC Buffer Pool Usage Analysis display section

LOCKS

STRAC Lock Activity display section

PRL

STRAC Parallelism display section

RTN

STRAC Routines display section (available only if the thread has issued stored procedure calls or user-defined functions or has been invoked by a trigger)

DDF

STRAC DDF Summary display section (available only if there is DDF activity for the displayed thread)

PKG

STRAC Package/DBRM Overview display section (available only when accounting trace 7 is active)

From the Package/DBRM Overview section of STRAC, you can expand to

Package/DBRM Pop-Up

Place the cursor on a line of data for a package or DBRM in the Package/DBRM Overview section of STRAC and press ENTER to view a pop-up display of detail statistics for that package or DBRM.

SUMMARIES:

The following sections format data summarized from detail trace events and are available only if these events are traced.

SQL

STRAC SQL Summary display section

From the SQL Summary section of STRAC you can expand to these two displays:

SQL Statement Pop-Up

Place the cursor on a line of data for an SQL statement in the SQL Summary section of STRAC and press ENTER to view a pop-up display that summarizes all statistics from the individual occurrences of that statement. See [“SQL Statement Pop-Up Display” on page 308](#) for a description of this pop-up display.

DTRAC PGM=

Place the cursor on the PGM line in the SQL Summary section of STRAC and press ENTER to request a DTRAC display of only those events from a given program.

The statements displayed by DTRAC are qualified by the program name specified by the PGM field. Only those SQL statements issued by that originating program and all events subordinate to the selected SQL statements are shown. For more information about the DTRAC display, see [“DTRAC—Detail Trace Entry” on page 287](#).

SCANS

STRAC Database Summary display section

IO/LOCK

STRAC Lock and I/O Summary display section

SORTS

STRAC Sort Summary display section

You also can move to any one of several defined lines with the Tab key and press ENTER to transfer to the following related displays:

Line Identifier	STRAC Section Transferred To
CURRENT	ENV
ELAPSED TIME	ELAPSED
TOTAL SQL	SQLCOUNTS
GETPAGES	BPOOL
SYNC I/O (PRL=nn)	PRL
UPDATES/COMMIT	LOCKS

Any other position transfers to DTRAC.

Key Indicators:

A maximum of six of the most important key indicators of failures or degradation are displayed in the following order of importance:

- These indicators show the cause of degradation and are highlighted:

- **TIMEOUT (or DEADLOCK)**

Indicates that this unit of work failed because either a timeout condition or deadlock condition was detected.

TIMEOUT means that the unit of work was suspended for a length of time longer than permitted by installation options.

DEADLOCK means that two units of work attempted to access the same resource and prevented each other from completing their processes normally.

Action: N/A

Field: QTXATIM, QTXADEA

- **STORED PROC. FAILED (reason) = nnnnnn**

Indicates the number of times a stored procedure call failed for one of the following reasons:

ABEND	The stored procedure call terminated abnormally.
REJECT	The stored procedure call was rejected.
TIMEOUT	The stored procedure call was timed out while waiting to be scheduled.

Action: N/A

Field: QXCALLAB, QXCALLRJ, QXCALLTO

- **FILTER: fieldname=xxxxx (>n)**

Indicates that this trace was selected because one of the trace exception filter conditions was met. These filter conditions are specified when the trace is started.

where

fieldname	Name of the trace exception filter condition
xxxxxx	Target value
nnnnnn	Actual value measured

See [“Selecting Trace Data for Retention”](#) on page 145.

Action: N/A

Field: N/A

- **RID FAILURE - STORAGE**

Indicates that RID list processing for this unit of work failed because not enough storage was available.

Action: Review the storage allocations specified when DB2 was installed.

Field: QXNSMIAP

– **RID FAILURE - NUMBER OF RIDS**

Indicates that RID list processing for this unit of work failed because one of the internal limits was exceeded.

The internal limits include the physical limit of the number of RIDs a RID list can contain and internal thresholds for the retrieval and manipulation of RIDs.

Action: N/A

Field: QXMRMIAP

– **CLAIM FAILURE**

Indicates that CLAIM processing failed for this unit of work.

Action: N/A

Field: QTXACLUN

– **DRAIN FAILURE**

Indicates that DRAIN processing failed for this unit of work.

Action: N/A

Field: QTXADRUN

– **PARALLEL CPU FALLBACK - reason**

Indicates that parallel CPU processing was turned off and sequential mode was used.

The possible causes indicated by *reason* are as follows:

NO ENCLAVE The MVS ENCLAVE feature is not supported on this machine (MVS 5.2 or later).

RLF The Resource Limit Facility has limited CPU parallelism for some SELECT statement.

Action: N/A

Field: QXDEGENC, QXRLFDPA

– **PARALLEL I/O FALLBACK - reason**

Indicates that parallel I/O processing was turned off and sequential mode was used.

The possible causes indicated by *reason* are as follows:

STORAGE Storage shortage or insufficient buffers in the buffer pool.

ESA SORT The ESA sort feature is not installed on this machine.

AMBIG. CURSOR The cursor in use is capable of UPDATE or DELETE.

Action: N/A

Field: QXDEGBUF, QXDEGESA, QXDEGCUR

– **SYSPLEX PRLI FALLBACK - reason**

Indicates that sysplex parallel processing was disabled and the parallel group was executed on a single DB2 (DB2 version 5 and later only).

Possible causes indicated by *reason* are as follows:

COORDINATR=NO	Bound COORDINATOR=YES, but run on COORDINATOR=NO system.
ISOLAT..RR/RS	PLAN/PACKAGE was bound with isolation level of repeatable read.
BYPASS-BUFFER	Bypassed due to insufficient buffer pool storage.

Action: N/A

Field: QXCOORNO, QXISOOR, QXXCSKIP

– **PARALLEL I/O REDUCED DEGREE - nnnnnn**

Indicates that parallel I/O processing was reduced from the planned degree to a lesser degree because of insufficient storage or insufficient buffers in the buffer pool.

where

nnnnnn Number of times this condition has occurred

Action: If this number is not zero, consider increasing the size of the buffer pool or specifying a different buffer pool for the table space.

Field: QXREDGRP

– **INCREMENTAL BINDS = nnnnnn**

Indicates the number of incremental binds this unit of work performed.

This message indicates that the plan/package had become invalid for some reason, such as an ALTER on an index or table.

Action: Nothing needs to be done for this plan, but you might want to explicitly bind any plans whose tables/indexes are being altered. Incremental binds can have a significant impact in an online transaction system.

Field: QXINCRB

– **SEE RTN FOR MORE CPU/ELAPSED**

Indicates that the total elapsed time may be less than the CPU time or DB2 wait time if stored procedures, user-defined functions, or triggers are present.

Action: See the Routines (RTN) section for more information on stored procedures, user-defined functions, and triggers when any of them are present.

Field: N/A

- **TOTAL DDL = nnnnnn**

Indicates the number of Data Definition Language (DDL) statements performed by this unit of work.

DDL statements, such as CREATE TABLE, can have a significant impact on system performance. To perform DDL operations, exclusive locks need to be obtained against the DB2 catalog.

Action: In an online transaction system, avoid designing transactions that use DDL operations.

Field: QXCRTAB, QXCRINX, and so on

- **BUFFER INCOMPLETE**

Indicates the thread spans multiple trace log data sets. No accounting statistics data is available except in the last log, and detail trace data is incomplete in each log.

However, accounting data in the final log is complete and represents the entire thread. The detail trace data in each log can be added together for total results.

Action: Allocate a larger trace log data set.

Field: N/A

- The following indicators are informational in nature and are not highlighted:

- **GRANTS/REVOKES = nnnnnn**

Indicates the number of GRANT and REVOKE SQL statements issued by this unit of work.

Action: N/A

Field: QXGRANT, QXREVOK

- **LOCK TABLE = nnnnnn**

Indicates the number of LOCK TABLE SQL statements issued by this unit of work.

Action: Use LOCK TABLE carefully. It means that this unit of work owns exclusive control of the table, allowing no concurrent access.

Field: QXLOCK

- **LOCK ESCALATIONS = nnnnnn**

Indicates the number of times that the total locks per table have exceeded the installation limit for this unit of work. When this limit is exceeded, DB2 promotes the current page locks to a single table space lock of the same type.

Action: Lock escalation usually indicates that the application has encountered an exceptional condition. If this situation occurs frequently, the design of the application should be reviewed.

Field: QTXALES, QTXALEX

– **PARALLEL I/O CONDITIONAL GETPAGE FAILURE**

Indicates that a conditional GETPAGE request was not satisfied for this buffer pool. This condition applies only to parallel I/O that is conditional in nature.

When this condition occurs, it indicates that a prefetch operation failed to retrieve a page before the application required it.

Action: N/A

Field: QBACNGT

– **SQL: SELECT=nnnnnn, FETCH=nnnnnn**

Summary of the number of SQL SELECT and FETCH statements issued by this unit of work.

In a DDF environment, the number of FETCH statements might not truly reflect the number of FETCHes issued by the application due to internal DDF processing.

Action: N/A

Field: QXSELECT, QXFETCH

– **SQL: INS=nnnnnn, UPD=nnnnnn, DEL=nnnnnn**

Summary of the number of SQL INSERT, UPDATE, and DELETE SQL statements issued by this unit of work.

Action: N/A

Field: QXINSRT, QXUPDTE, QXDELET

– **SQL: DYNAMIC(PREPARE)=nnnnnn**

Summary of the number of PREPARE SQL statements issued by this unit of work. Each PREPARE statement is equivalent to one dynamic SQL statement.

In a DDF environment, the number of PREPARE statements might not truly reflect the number of dynamic SQL statements issued by the application due to internal DDF processing.

Action: N/A

Field: QXPREP

– **I/O RSP: SYNC= time, ASYNC= time**

Provides an indication of the average I/O response times this unit of work experienced for synchronous and asynchronous requests.

Action: N/A

Field: For synchronous requests:
QWACARNE, QWACAWTI

For asynchronous requests:
QWACARNR, QWACARNW, QWACAWTR, QWACAWTW

– **LOCK SUSPENSIONS = nnnnnn**

Number of times this unit of work was suspended due to a lock or latch conflict with another unit of work.

This number should be small, ideally zero.

Action: N/A

Field: QTXASLOC, QTXASLAT, QTXASOTH

– **PARALLEL MAINTASK, SUBTASKS = nnnnnn**

Indicates that this unit of work is the primary, or originating unit of work in a group supporting a query or utility using parallel tasks. SUBTASKS shows the number of subtask units of work that were created to support this query or utility.

Action: N/A

Field: QWACPACE, QWACPCNT

– **PARALLEL - SUBTASK**

Indicates that this unit of work was created in support of a query or utility using parallel tasks.

Action: N/A

Field: QWACPACE

– **SYSPLEX PARALLELISM - COORDINATOR/ASSISTANT**

Indicates that a query was processed across more than one DB2, where this DB2 was either the coordinator or an assistant (DB2 version 5 and later only).

Action: N/A

Field: QWDA

– **NUMBER OF DISTRIBUTED LOCATIONS = nnnnnn**

Number of separate DDF locations accessed by this unit of work.

Action: N/A

Field: N/A

– **RID LIST PROCESSING USED = nnnnnn**

Number of times RID list processing was used for this unit of work.

During RID list processing, DB2 produces a list of candidate record IDs from an index. The resulting RID list can be used to efficiently retrieve the qualifying rows.

Action: N/A

Field: QXMAIP

– **RLF(nn), TYPE=xxxxxxxxxxxxxxxx**

Indicates that the Resource Limit Facility (RLF) is active and displays the RLF limit rule that applies to this unit of work.

where

nn Suffix of the Resource Limit Facility (RLF) table in effect.

xx..xx RLF rule that applies to this thread. Refer to the *DB2 Administration Guide* for the definition of the rule.

Action: N/A

Field: QTXARLID, QTXAPREC

Viewing All Events for a Specific Thread

To view all events for a specific thread, expand from STRAC to the DTRAC display.

You also can access all the traced events of the current active thread for a specific user (UTRAC) by expanding from the DUSER display.

DTRAC—Detail Trace Entry

The DTRAC Trace Entry Display shows all the traced events in chronological order for a specific thread entry in the trace buffer. Three levels of display (shown in [Figure 111](#), [Figure 112](#), and [Figure 113](#)) can be specified. The levels are 1, 2, or 3, which are typed in the LEVEL= field of the DTRAC display. Each succeeding level shows more detail trace events.

```

BMC Software -----  DETAIL TRACE ENTRY -----PERFORMANCE MGMT
SERV ==> DTRAC          INPUT  10:20:10  INTVL=> 3  LOG=> N  TGT==> DB2C
PARM ==> TEST3,SEQ=000017,LEVEL=1          ROW    1 OF   22  SCROLL=> CSR
EXPAND: LINESEL(DETAIL), HISTORY
START: 09:17:11 AUTH: JEK1    PLAN: DSNTIB21 CORR: DB221REQ    CONN: BATCH
=====
EVENT      AT      ELAPSED    CPU    DETAIL
-----
PREPARE   350     2.069 1,361 ms   26 ms *RC( 0) C=DT      D/X  PS( 10)
OPEN      524     3.489 204 us    202 us *RC( 0) C=DT
FETCH    (5)532  3.489 2,058 ms 6,247 us *RC( 0) C=DT      D/X  PS( 2)
CLOSE     564     5.701 93 ms     809 us *RC( 0) C=DT
PREPARE   350     5.925 656 ms    31 ms *RC( 0) C=DT      D/X  PS( 22)
OPEN      524     6.635 198 us    196 us *RC( 0) C=DT
FETCH     532     6.636 2,239 ms   10 ms *RC( 0) C=DT      D/X  PS( 5)

```

Figure 111. Detail Trace Display for a Thread (Level 1) - User Requests

```

BMC Software -----  DETAIL TRACE ENTRY -----PERFORMANCE MGMT
SERV ==> DTRAC          INPUT  10:21:48  INTVL=> 3  LOG=> N  TGT==> DB2C
PARM ==> TEST3,SEQ=000017,LEVEL=2          ROW    5 OF   35  SCROLL=> CSR
EXPAND: LINESEL(DETAIL), HISTORY
START: 09:17:11 AUTH: JEK1    PLAN: DSNTIB21 CORR: DB221REQ    CONN: BATCH
=====
EVENT      AT      ELAPSED    CPU    DETAIL
-----
PREPARE   350     2.069 1,361 ms   26 ms *RC( 0) C=DT      D/X  PS( 10)
BIND-TEXT 2.070          *TYPE=DYNAMIC TEXT=SELECT * FROM DS+
EXPLAIN   2.078          *PLAN=DSN8IC22 COST(4.6)
EDM-REQ   3.302    123 ms 3,964 us  DB=00000258
OPEN      524     3.489 204 us    202 us *RC( 0) C=DT
FETCH     532     3.489 2,058 ms 6,247 us *RC( 0) C=DT      D/X  PS( 2)
OPEN-TS   4.235          DB=DSN8D21A TS=DSN8S21D
OPEN-TS   5.352          DB=DSN8D21A TS=XDEPT3
FETCH     532     5.549 35 ms     441 us *RC( 0) C=DT      D/X
FETCH     532     5.615 354 us    353 us *RC( 0) C=DT      D/X
FETCH     532     5.616 335 us    335 us *RC( 0) C=DT      D/X
FETCH     532     5.620 354 us    353 us *RC( 0) C=DT      D/X
FETCH     532     5.621 386 us    387 us *RC( 0) C=DT      D/X
FETCH     532     5.672 386 us    387 us *RC( 0) C=DT      D/X
FETCH     532     5.673 337 us    337 us *RC( 0) C=DT      D/X

```

Figure 112. Detail Trace Display for a Thread (Level 2) - DB2 Requests

```

BMC Software -----  DETAIL TRACE ENTRY  -----PERFORMANCE MGMT
SERV ==> DTRAC          INPUT  08:45:42  INTVL=> 5  LOG=> N  TGT==> DBOG
PARM ==> TEST410,SEQ=1,LEVEL=3          ROW 59 OF 88  SCROLL=> CSR
EXPAND: LINESEL(DETAIL)                  HIST TGT--- DB2G
START: 17:59:40 AUTH: BOLHHH4  PLAN: DSNESPRR CORR: BOLHHH4  CONN: TSO
=====
EVENT          AT          ELAPSED      CPU          DETAIL
-----
LOCK           14.397          0 us *DB=DSNDB06          TYP=PAGESET
INDX-SCAN     14.484 00:01:15 8,136 us *TS=SYSDBAUT TB=SYSDBAUT
CLAIM         14.513          0 us *DB=DSNDB06 OB=DSNADH01 PART=0
LOCK          14.572          0 us *DB=DSNDB06 OB=SYSDBAUT TYP=DATAPAGE
LOCK-SUSP     14.572 00:01:14 352 us *DB=DSNDB06 OB=SYSDBAUT TYP=DATAPAGE
WAIT-SERVER   88.744          0 us RMID=MESSAGE GENERATOR (MG)
WAIT-SERVER   88.746          0 us RMID=MESSAGE GENERATOR (MG)
LOCK-TMO-DET  89.114          0 us *DB=DSNDB06 OB=SYSDBAUT NUMBER=1
LOCK          89.152          0 us *DB=DSNDB06 OB=SYSDBAUT TYP=DATAPAGE
WAIT-SERVER   89.374          0 us RMID=MESSAGE GENERATOR (MG)
WAIT-SERVER   89.376          0 us RMID=MESSAGE GENERATOR (MG)
UNLOCK        89.942          0 us *IRLM TOKEN=00000000
ABORT         90.047 551 ms 1,905 us
WAIT-SERVER   90.065          0 us RMID=RECOVERY MANAGER (RM)
UNLOCK        90.124          0 us *DB=          OB=          TYP=INDEXPAG
UNLOCK        90.581          0 us *IRLM TOKEN=061B618C
CLAIM         90.581          0 us *DB=DSNDB06 OB=DSNADH01 PART=0
CLAIM         90.581          0 us *DB=DSNDB01 OB=DSNSPT01 PART=0
CLAIM         90.582          0 us *DB=DSNDB01 OB=SPT01 PART=0
LOCK-SUMMARY  90.582          0 us *MAXPG(1) ESCL(0) TS( 3)
COMMIT-LSN   90.582          0 us *LOCK-AVOID=N PAGESETS=3
UNLOCK        90.596          0 us *IRLM TOKEN=00000000
SQL-ERROR 19 90.598          0 us *RC( 692)
SYNC          123.435 36 ms 900 us
WAIT-SERVER   123.435          0 us RMID=RECOVERY MANAGER (RM)
UNLOCK        123.436          0 us *IRLM TOKEN=00000000
COMMIT/DES232 123.471          0 us *RC( 0)
TERM-THD     123.471          0 us
WAIT-SERVER   123.472          0 us RMID=RECOVERY MANAGER (RM)
UNLOCK        123.472          0 us *IRLM TOKEN=00000000

```

Figure 113. Detail Trace Display for a Thread (Level 3) - DB2 Processing Events

Select Code:

DTRAC

Parameter:

The following parameters can be specified:

trace id

Unique ID identifying the trace. It must match the ID of the request that started the trace. This parameter is positional and a comma delimits the next parameter. If the ID is blank, a comma must precede any other parameter.

LEVEL=1 | 2 | 3

The default is 2. Levels 1 or 3 can be typed in this field to change the display at any time. The entries shown at the three levels depend upon the type of detail trace started (see [Appendix B, "IFCID Table \(ATRAC Data Collection\)"](#) on page 339 and ["Event Data"](#) on page 291).

Note: There are several types of data collection levels that can be started with an ATRAC request (D, SQL, SCAN, IO, LOCK, DDF, or DDFVTAM), but there are three display levels, which means the correct type of trace must be started to see all of the events. A warning message is displayed on the fourth line of the display if all possible data is not available.

SEQ=

Unique internal sequence number assigned to each trace entry. The number is assigned sequentially and wraps at 32768. If DTRAC is selected from the STRAC display by cursor positioning within the STRAC display, the thread displayed is identified in the SEQ field. If DTRAC is selected from the Analyzer Display Service list application, the first active entry in the trace buffer is displayed and identified in the SEQ field. Any valid trace buffer entry can be displayed by typing its trace sequence number in the SEQ field. Also see “Scrolling” below.

PGM=

Program name. Only the statements for the specified program are shown. All events subordinate to the selected SQL statements are also displayed.

Description:

Displays all the traced events for one thread at three succeeding levels by using the LEVEL= parameter field. These display levels provide the following information:

LEVEL=1

Displays only those events related to user requests (SQL statements) plus any exception conditions such as authorization failures, timeouts, or deadlocks.

LEVEL=2

Displays level 1 events plus events related to DB2 requests such as CREATE THREAD, EDM requests, or sorts. This display is the default and is the initial display shown when DTRAC is invoked.

LEVEL=3

Displays level 1 and level 2 events plus events related to DB2 processing caused by the user and DB2 requests such as scan, I/O, and lock/latch activity.

Note: If the target for a historical trace is not equal to the current TGT field, it is displayed in the HIST TGT field.

Scrolling:

Each display can be scrolled up (PF7/19) or down (PF8/20). Data for only the current entry in the trace buffer is scrolled. A new thread in the trace buffer can be displayed by using the left and right PF scroll keys. PF10/22 (left) moves backward through the thread entries in the buffer. PF11/23 (right) moves forward through the thread entries. The thread displayed is identified in the SEQ field of the display.

Expand:

Pop-up displays of additional statistical information can be selected by positioning the cursor anywhere on the line of an entry that has an asterisk (*) in the DETAIL column and pressing ENTER.

An asterisk (*) preceding a field in the DETAIL column means a pop-up display is available for that event.

In addition, you can EXPAND to the following displays when available:

HISTORY

Historical trace data set for this trace (if you are viewing a current trace with logging, this display provides access to data no longer in the online buffer).

CURRENT

Active trace data still in the buffers (if you are viewing a trace log data set for a still-active trace or a complete trace that has not yet been purged).

Display Fields

Each display level shows the detail trace data in the fields shown in [Figure 114](#).

BMC Software ----- DETAIL TRACE ENTRY ----- PERFORMANCE MGMT				
SERV ==>	DTRAC	INPUT	10:20:10	INTVL=> 3 LOG=> N TGT==> DB2C
PARAM ==>	TEST3,SEQ=000017,LEVEL=1	ROW	1 OF	22 SCROLL=> CSR
EXPAND: LINESEL(DETAIL), HISTORY				
START: 09:17:11 AUTH: JEK1 PLAN: DSNTIB21 CORR: DB221REQ CONN: BATCH				
=====				
EVENT	AT	ELAPSED	CPU	DETAIL

PREPARE	350	2.069 1,361 ms	26 ms	*RC(0) C=DT D/X PS(10)

Figure 114. DTRAC Display Fields

DTRAC displays each traced event in a row. Subordinate events are indented by event name to a maximum of four. The data collected is shown by the following fields:

Field Name	Description
EVENT	Type of event (see “Event Data” on page 291).
AT	Time in seconds relative to the CREATE THREAD time.
ELAPSED	Elapsed time for the event if applicable.
CPU	CPU time for the event if applicable.
DETAIL	Detail data specific to the type of event. An asterisk (*) preceding this field indicates a pop-up display is available that shows additional data.

Note: The ELAPSED and CPU time adjusts to us (microseconds), ms (milliseconds), or hh:mm:ss (hours, minutes, seconds) depending upon the amount of time measured.

Group SQL

Based on a user's ATRAC request (GROUPSQL=Y | N), multiple SQL statements can be merged into one displayed line with no intervening traced events by the following fields:

Field Name	Description
EVENT	Grouped SQL statements with a numeric indicator (n) as to the number of grouped events.
AT	Time in seconds relative to the first event.
ELAPSED	Total of all elapsed events.
CPU	Total of all CPU time for individual events.
DETAIL	If any value (except for PAGES SCAN total) changes and if that value stops a grouping, that value is shown.

Event Data

The displayed events are a set of IFCIDs collected by the ATRAC service. [Appendix B, “IFCID Table \(ATRAC Data Collection\)” on page 339](#) lists the IFCIDs that can be requested by ATRAC with each collection category. Each event traced has different types of data associated with it, depending on the requested ATRAC collection category and the DTRAC display level as shown in the following IFCID table. Events with paired IFCIDs can have elapsed and CPU times.

An asterisk (*) in the DETAIL field for a DTRAC event indicates additional data about that event can be shown in a pop-up display. The additional event data is described in the IFCID table below. Each available pop-up display is shown and described in [“Event Pop-Up Displays” on page 304](#).

The following table summarizes events collected for a detail trace. It shows the collection category required to include an event in the trace (TYPE=xxx) and the level at which that event is displayed (DTRAC display level). An asterisk (*) indicates a pop-up display is available for that event.

Table 19. Detail Trace Event Data

Event	ATRAC Collection Category	DTRAC Display Level	IFCID	Description and Detail Information
ABORT	D	1	068/069	Rollback thread.
ASSOC-LOCATR*	SQL	2	272	ASSOCIATE LOCATORS statement (DB2 version 5 and later). STPROC= Stored procedure name.
ALLOC-CURSOR*	SQL	2	273	ALLOCATE CURSOR statement (DB2 version 5 and later). STPROC= Stored procedure name.

Table 19. Detail Trace Event Data (Continued)

Event	ATRAC Collection Category	DTRAC Display Level	IFCID	Description and Detail Information																																																																										
AUTH-FAIL*	D	1	140	<p>Authorization ID not privileged to perform requested operation.</p> <p>Type of request:</p> <table border="0"> <tr> <td>START RLF</td> <td>STOP RLF</td> </tr> <tr> <td>DISPLAY RLF</td> <td>MONITOR 1</td> </tr> <tr> <td>MONITOR 2</td> <td>CHECK UTILITY</td> </tr> <tr> <td>SELECT</td> <td>INSERT</td> </tr> <tr> <td>DELETE</td> <td>UPDATE</td> </tr> <tr> <td>CREATE INDEX</td> <td>DBADM</td> </tr> <tr> <td>ALTER</td> <td>DISPLAY THREAD</td> </tr> <tr> <td>EXECUTE</td> <td>BIND/REBIND/FREE</td> </tr> <tr> <td>CREATEDBA</td> <td>CREATE STOGROUP</td> </tr> <tr> <td>DBCTRL</td> <td>DBMAINT</td> </tr> <tr> <td>RECOVER INDOUBT</td> <td>DROP</td> </tr> <tr> <td>COPY</td> <td>LOAD</td> </tr> <tr> <td>EXPLICIT QUALIFIER USE</td> <td>REORG</td> </tr> <tr> <td>REPAIR</td> <td>START DB</td> </tr> <tr> <td>START/STOP DB2/DB(*)</td> <td>RUNSTAT</td> </tr> <tr> <td>STOP DB</td> <td>START/STOP TRACE</td> </tr> <tr> <td>SYSADM</td> <td>SYSOPR</td> </tr> <tr> <td>USE</td> <td>BIND ADD</td> </tr> <tr> <td>RECOVER (UTILITY)</td> <td>CREATE DBC</td> </tr> <tr> <td>RECOVER BSDS</td> <td>CREATE TABLE</td> </tr> <tr> <td>CREATE TABLESPACE</td> <td>DISPLAY UTILITY</td> </tr> <tr> <td>COMMENT ON</td> <td>LOCK TABLE</td> </tr> <tr> <td>DISPLAY DB</td> <td>CREATE SYNONYM</td> </tr> <tr> <td>ALTER INDEX</td> <td>DROP SYNONYM</td> </tr> <tr> <td>DROP INDEX</td> <td>STOPSPACE UTILITY</td> </tr> <tr> <td>CREATE VIEW</td> <td>TERM UTILITY</td> </tr> <tr> <td>DISPLAY BUFFERPOOL</td> <td>ALTER BUFFERPOOL</td> </tr> <tr> <td>SET ARCHIVE</td> <td>DISPLAY ARCHIVE</td> </tr> <tr> <td>REFERENCES</td> <td>TERM UTIL ON DB</td> </tr> <tr> <td>PACKADM</td> <td>RENAME TABLE</td> </tr> <tr> <td>SET ARCHIVE</td> <td>DISPLAY ARCHIVE</td> </tr> <tr> <td>START PROCEDURE</td> <td>STOP PROCEDURE</td> </tr> <tr> <td>DISPLAY PROCEDURE</td> <td>CREATE GLOB TEM TBL</td> </tr> <tr> <td>ALTERIN</td> <td>START</td> </tr> <tr> <td>CREATIN</td> <td>STOP</td> </tr> <tr> <td>DROPIN</td> <td>DISPLAY</td> </tr> <tr> <td>USAGE</td> <td></td> </tr> </table>	START RLF	STOP RLF	DISPLAY RLF	MONITOR 1	MONITOR 2	CHECK UTILITY	SELECT	INSERT	DELETE	UPDATE	CREATE INDEX	DBADM	ALTER	DISPLAY THREAD	EXECUTE	BIND/REBIND/FREE	CREATEDBA	CREATE STOGROUP	DBCTRL	DBMAINT	RECOVER INDOUBT	DROP	COPY	LOAD	EXPLICIT QUALIFIER USE	REORG	REPAIR	START DB	START/STOP DB2/DB(*)	RUNSTAT	STOP DB	START/STOP TRACE	SYSADM	SYSOPR	USE	BIND ADD	RECOVER (UTILITY)	CREATE DBC	RECOVER BSDS	CREATE TABLE	CREATE TABLESPACE	DISPLAY UTILITY	COMMENT ON	LOCK TABLE	DISPLAY DB	CREATE SYNONYM	ALTER INDEX	DROP SYNONYM	DROP INDEX	STOPSPACE UTILITY	CREATE VIEW	TERM UTILITY	DISPLAY BUFFERPOOL	ALTER BUFFERPOOL	SET ARCHIVE	DISPLAY ARCHIVE	REFERENCES	TERM UTIL ON DB	PACKADM	RENAME TABLE	SET ARCHIVE	DISPLAY ARCHIVE	START PROCEDURE	STOP PROCEDURE	DISPLAY PROCEDURE	CREATE GLOB TEM TBL	ALTERIN	START	CREATIN	STOP	DROPIN	DISPLAY	USAGE	
START RLF	STOP RLF																																																																													
DISPLAY RLF	MONITOR 1																																																																													
MONITOR 2	CHECK UTILITY																																																																													
SELECT	INSERT																																																																													
DELETE	UPDATE																																																																													
CREATE INDEX	DBADM																																																																													
ALTER	DISPLAY THREAD																																																																													
EXECUTE	BIND/REBIND/FREE																																																																													
CREATEDBA	CREATE STOGROUP																																																																													
DBCTRL	DBMAINT																																																																													
RECOVER INDOUBT	DROP																																																																													
COPY	LOAD																																																																													
EXPLICIT QUALIFIER USE	REORG																																																																													
REPAIR	START DB																																																																													
START/STOP DB2/DB(*)	RUNSTAT																																																																													
STOP DB	START/STOP TRACE																																																																													
SYSADM	SYSOPR																																																																													
USE	BIND ADD																																																																													
RECOVER (UTILITY)	CREATE DBC																																																																													
RECOVER BSDS	CREATE TABLE																																																																													
CREATE TABLESPACE	DISPLAY UTILITY																																																																													
COMMENT ON	LOCK TABLE																																																																													
DISPLAY DB	CREATE SYNONYM																																																																													
ALTER INDEX	DROP SYNONYM																																																																													
DROP INDEX	STOPSPACE UTILITY																																																																													
CREATE VIEW	TERM UTILITY																																																																													
DISPLAY BUFFERPOOL	ALTER BUFFERPOOL																																																																													
SET ARCHIVE	DISPLAY ARCHIVE																																																																													
REFERENCES	TERM UTIL ON DB																																																																													
PACKADM	RENAME TABLE																																																																													
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START PROCEDURE	STOP PROCEDURE																																																																													
DISPLAY PROCEDURE	CREATE GLOB TEM TBL																																																																													
ALTERIN	START																																																																													
CREATIN	STOP																																																																													
DROPIN	DISPLAY																																																																													
USAGE																																																																														
AUTH-XLAT*	D	2	169	<p>Authorization ID translation either OUTBOUND or INBOUND .</p> <p>OLD= ID before translation. NEW= ID after translation.</p>																																																																										
BFR-SND BFR-RCV	DDFVTAM	3	166	<p>Buffer send or receive.</p> <p>LU= Logical unit name. SIZE(999) Size of buffer in bytes.</p>																																																																										

Table 19. Detail Trace Event Data (Continued)

Event	ATRAC Collection Category	DTRAC Display Level	IFCID	Description and Detail Information
BIND*	D	1	108/109	Bind/rebind a plan or package. PLAN= Plan name. PACKAGE= Package name. RC(nnn) Return code.
BIND-TEXT*	SQL	2	063	Dynamic/static SQL BIND. TYPE= DYNAMIC or static. Type of language when static: ASM COBOL C FORTRAN PL/1 COBOL II TEXT= First 17 bytes of text of SQL statement. Full text is available in a pop-up display.
CLAIM*	LOCKS	3	211	Claim request. DB= Database name. OB= Table space or index space name. PART= Partition number.
CLAIM-WAIT*	D	3	215/216	Wait for pending claims to go to zero. DB= Database name. OB= Table space or index space name. PART= Partition number.
CLOSE-TS	D	2	107	Close table space data set. TS= Table space name. DB= Database name.
COMMIT-LSN*	D	2	218	Summary of COMMIT log sequence numbers. LOCK AVOID= Y for successful lock avoidance technique for unit of work N for unsuccessful PAGESETS= Number of pagesets involved in unit of work TYPL= Type of lock: PAGE ROW IXEOF (index end-of-file)

Table 19. Detail Trace Event Data (Continued)

Event	ATRAC Collection Category	DTRAC Display Level	IFCID	Description and Detail Information
CONV-QUEUED*	D	2	167	Conversation request queued. LU= Logical unit name. MODE= VTAM mode name from communications database.
CONV-REQ*	DDF	2	159	Conversation request. TYPE= Type of request: CREATE WAIT LOC= Sixteen-character location name.
CREATE-THD	D	2	072/073	CREATE THREAD.
DEADLOCK*	D	1	172	Deadlock details. RESOURCES INVOLVED= Number of locked resources in the deadlock.
DIST-SQL*	D	2	168	Distributed SQL statement.
DRAIN*	LOCKS	3	212	Drain request. DB= Database name. OB= Table space or index space name. PART= Partition number.
DRAIN-WAIT*	D	3	213/214	Wait for drain request. DB= Database name. OB= Table space or index space name. PART= Partition number.
EDM-FULL	D	1	031	EDM pool full condition. Type of request that received condition. CT= Plan name for cursor table. XT= Plan name for cursor table extension. SKCT-HDR Skeleton cursor table header. SKCT-DIR Skeleton cursor table directory. DB= Database name; zeros in this field indicate an internal latch. PT= Package name. SKPT Skeleton package table entry. SKPT-DIR Skeleton package table directory.

Table 19. Detail Trace Event Data (Continued)

Event	ATRAC Collection Category	DTRAC Display Level	IFCID	Description and Detail Information
EDM-REQ	D	2	029/030	EDM I/O Request. CT= or XT= The plan name for the cursor table or extended cursor table respectively. SKCT-DIR Skeleton cursor table directory. SKCT-HDR Skeleton cursor table header. RDS-SECTION Cursor table sections. DB= Database name. Zeros in this field indicate an internal latch. PT= Collection ID and package ID.
End SQL*: COMMIT/DESC or SQL-ERROR	SQL	1	053	End DESCRIBE, COMMIT, ROLLBACK, or SQL statement error (see “SQL Statement Pop-Up Display” on page 308).
EXPLAIN*	SQL	2	022	Explain the data access path for an SQL statement (see “EXPLAIN Pop-Up Display (IFCID 022)” on page 305). PLAN/PKG= Plan name or package ID. COST(n.n) The relative cost assigned by the DB2 optimizer for the execution of the SQL statement; for large numbers, a unit of measure (K, M, or B) is appended.
FREE*	D	1	110/111	Free a plan or package. PACKAGE= Package name. PLAN= Plan name. RC(nnn) Return code.
FRST-INSRT (n)*	SCAN	3	016/018	Internal INSERT of rows where (n) identifies the number of grouped scan entries, if any. IX= Index name. TS= Table space name. DB= Database name.
HASH-SCAN	SCAN	3	013/014	Hash scan. TS= Table space name. DB= Database name.

Table 19. Detail Trace Event Data (Continued)

Event	ATRAC Collection Category	DTRAC Display Level	IFCID	Description and Detail Information
HJOIN-FAIL*	D	2	190	Hybrid join failure. This failure is a single-event record with no elapsed or CPU time. #RIDS= Number of record ID entries (RIDs) in the RID list. type-of-failure Type of failure described in a short phrase.
INDX-SCAN (n)*	SCAN	3	015/018	Matching or non-matching index scan, where (n) identifies the number of grouped scan entries, if any. IX= Index name. TS= Table space name. DB= Database name.
INV-SELECT	D	1	224	Invalid SELECT procedure. COL=nnn Total columns bypassed, followed by plan name, package ID, or collection ID.
LATCH WAIT	D	3	052/051 056/057	SHARED. EXCLUSIVE.
LOCK* UNLOCK* LOCK CHG* LOCK QRY*	LOCKS	3	021	Lock request. OB= Table space or index space name. DB= Database name. TYP= Type of lock (same as LOCK-SUSP). Note: If there is no OB or DB information, the IRLM request token is displayed. PLAN= Plan name. TYP= Type of lock (same as LOCK-SUSP).
LOCK-SUMMARY*	D	2	020	Lock summary at COMMIT/ABORT. MAXPG(nnn) Maximum page locks held concurrently. ESCL(nnn) Total lock escalations. TS(nn) Number of table spaces in which locks were held.

Table 19. Detail Trace Event Data (Continued)

Event	ATRAC Collection Category	DTRAC Display Level	IFCID	Description and Detail Information																																										
LOCK-SUSP*	D	3	044/045	<p>Lock suspension.</p> <p>TYP= Abbreviated lock type.</p> <p>Type of lock:</p> <table border="0"> <tr><td>ALTER BP</td><td>OPEN</td></tr> <tr><td>BINDLOCK</td><td>PAGE PLK</td></tr> <tr><td>CATM CAT</td><td>PAGESET</td></tr> <tr><td>CATM DIR</td><td>PART-DS</td></tr> <tr><td>CATM MIG</td><td>P/P CAST</td></tr> <tr><td>CDB PLOK</td><td>P/P PLOK</td></tr> <tr><td>COLLECTN</td><td>REPR DBD</td></tr> <tr><td>CS-DRAIN</td><td>RLF PLOK</td></tr> <tr><td>DATABASE</td><td>ROW</td></tr> <tr><td>DATAPAGE</td><td>RR-DRAIN</td></tr> <tr><td>DBALLOC</td><td>SCA ACC</td></tr> <tr><td>DBD PLOK</td><td>SERVICE</td></tr> <tr><td>GBP CAST</td><td>SKCT</td></tr> <tr><td>GP EX UP</td><td>SKPT</td></tr> <tr><td>GROUP BP</td><td>SYSLGRNG</td></tr> <tr><td>HASH-ANC</td><td>TABLE</td></tr> <tr><td>INDEXPAG</td><td>UTIL EXC</td></tr> <tr><td>IX EOF</td><td>UTILSER</td></tr> <tr><td>IXTREEPL</td><td>UTILUID</td></tr> <tr><td>LPL/GREC</td><td>WR-DRAIN</td></tr> <tr><td>MASSDEL</td><td></td></tr> </table> <p>OB= Table space or index space name. DB= Database name.</p> <p>Note: If there is no OB or DB information, the IRLM request token is displayed.</p>	ALTER BP	OPEN	BINDLOCK	PAGE PLK	CATM CAT	PAGESET	CATM DIR	PART-DS	CATM MIG	P/P CAST	CDB PLOK	P/P PLOK	COLLECTN	REPR DBD	CS-DRAIN	RLF PLOK	DATABASE	ROW	DATAPAGE	RR-DRAIN	DBALLOC	SCA ACC	DBD PLOK	SERVICE	GBP CAST	SKCT	GP EX UP	SKPT	GROUP BP	SYSLGRNG	HASH-ANC	TABLE	INDEXPAG	UTIL EXC	IX EOF	UTILSER	IXTREEPL	UTILUID	LPL/GREC	WR-DRAIN	MASSDEL	
ALTER BP	OPEN																																													
BINDLOCK	PAGE PLK																																													
CATM CAT	PAGESET																																													
CATM DIR	PART-DS																																													
CATM MIG	P/P CAST																																													
CDB PLOK	P/P PLOK																																													
COLLECTN	REPR DBD																																													
CS-DRAIN	RLF PLOK																																													
DATABASE	ROW																																													
DATAPAGE	RR-DRAIN																																													
DBALLOC	SCA ACC																																													
DBD PLOK	SERVICE																																													
GBP CAST	SKCT																																													
GP EX UP	SKPT																																													
GROUP BP	SYSLGRNG																																													
HASH-ANC	TABLE																																													
INDEXPAG	UTIL EXC																																													
IX EOF	UTILSER																																													
IXTREEPL	UTILUID																																													
LPL/GREC	WR-DRAIN																																													
MASSDEL																																														
LOCK-TMO*	D	1	054	<p>Lock timeout/deadlock.</p> <p>TYPE= ACE for another user or URE for unit of recovery element.</p> <p>Note: This event does not exist for DB2 version 4 and later (see TIMEOUT and DEADLOCK events).</p>																																										
LSN-DETAIL	LOCKS	3	223	<p>Detail of successful COMMIT-LSNs (lock avoidance).</p> <p>OB= Table space or index space name. DB= Database name.</p>																																										
OPEN-TS	D	2	107	<p>Open table space data set.</p> <p>TS= Table space name. DB= Database name.</p>																																										

Table 19. Detail Trace Event Data (Continued)

Event	ATRAC Collection Category	DTRAC Display Level	IFCID	Description and Detail Information
PAGE P-LOCK*	LOCKS	2	259	Page physical lock (P-lock) request. DB= Database name. PS= Page set name. IRLM function LOCK, UNLOCK, CHANGE, or EXITCH (change from P-lock exit). If the field is blank, it is not displayed.
PGLAT-WAIT	D	1	226/227	Page latch wait. OB= Table space or index space name. DB= Database name. POOL= Buffer pool ID.
PH1-COMMIT	D	2	084/085	Phase 1 commit.
PH2-COMMIT	D	2	070/071	Phase 2 commit.
PKG-ALLOC*	D	2	177	Package allocated. ISO= Type of isolation, either CS (cursor stability), RR (repeatable read), or UR (uncommitted read). ACQ= Acquire locks at ALLOC (allocation) or USE (first use). REL= Release level of the package, determining when resource are released; possible values are DEALLOC (deallocation) or COMMIT.
PLAN-ALLOC*	D	2	112	Plan allocated. ISO= Type of isolation, either CS (cursor stability) or RR (repeatable read). ACQ= Acquire locks at ALLOC (allocation) or USE (first use). REL= Release locks at DEALLOC (deallocation) or COMMIT.
P-LOCK*	LOCKS	2	251	Physical lock (P-lock) operation. DB= Database name. PS= Page set name. IRLM function LOCK, UNLOCK, CHANGE, or EXITCH (change from P-lock exit). If the field is blank, it is not displayed.

Table 19. Detail Trace Event Data (Continued)

Event	ATRAC Collection Category	DTRAC Display Level	IFCID	Description and Detail Information
PRL-DEGREE*	SCAN	3	221	Degree of parallel I/O processing for group. PLANNED= Degree planned at run time. ACTUAL= Actual parallel I/O degree. GROUP#= Parallel group number.
PRL-ELAP*	SCAN	3	222	Elapsed time of parallel group. ELAP= Elapsed time of parallel group pipe. ROWS= Number of rows processed.
PRL-GROUP*	SCAN	3	231	Individual task information for a parallel group (DB2 5.1 and later). ELAP= Elapsed time of parallel group. GROUP= Parallel group number.
READ-I/O*	IO	3	006/007	READ I/O. DB= Database name. TS= Table space name. BPnnnn Buffer pool in use. One of four possible descriptions is reported: SYNC-RD Synchronous read of one page. SEQ-PF Asynchronous read for sequential prefetch. LIST-PF Asynchronous read for list prefetch. DYN-SEQ Asynchronous read for dynamic sequential detection prefetch.
REQ-AGNT*	DDF	2	183	Requesting agent data. RC Return code from event. function Runction type; possible values are REBIND FREE BEGIN BIND BIND STMT END BIND SQL STMT CONNECT EXTRACT CONNECT RESET IMPLICIT CONNECT EXPLICIT CONNECT BIND CONNECT DISCONNECT CONNECT TYPE 2 SET CONNECTION RELEASE

Table 19. Detail Trace Event Data (Continued)

Event	ATRAC Collection Category	DTRAC Display Level	IFCID	Description and Detail Information
REQ-DRDS*	DDF	2	157	DRDS request at requesting site. TYPE= Type of request: AUXCALL SETUPCAL DSCRBCAL OPENCALL LOC= Sixteen-character location name.
REQ-DTM*	DDF	2	162	Distributed Transaction Manager request at requesting site. TYPE= Type of request: MIGRATE TRANSACTION COMMIT MESSAGE SENT DEALLOCATION INITIATED READ RESPONSE RECV'D BACKOUT REQUEST SENT COMMIT RESPONSE RECV'D BACKOUT RESPONSE RECV'D PREPARE REQUEST SENT
REQ-VTAM*	DDF	3	160	VTAM request at requesting site. TYPE= Type of request: SEND REQUEST MESSAGE ALLOCATE CONVERSATION CREATE CONVERSATION DEALLOCATE CONVERSATION RESET CONVERSATION RECEIVE RESPONSE MESSAGE TERMINATE CONVERSATION WAIT FOR RESPONSE MESSAGE
RIDLIST*	D	2	125	Multiple index access path processing of RID lists. One of three possible descriptions is reported: RIDS IN FINAL LIST (nnn) NOT USED - NO RID STORAGE NOT USED - RIDS > MAXIMUM LIMIT
SEQ-SCAN (n)*	SCAN	3	017/018	Sequential table space or work file scan, where (n) identifies the number of grouped scan entries, if any. TS= Table space name. DB= Database name.

Table 19. Detail Trace Event Data (Continued)

Event	ATRAC Collection Category	DTRAC Display Level	IFCID	Description and Detail Information
SERV-DRDS*	DDF	2	158	RDS request at serving site. TYPE= Type of request: AUXCALL SETUPCAL DSCRBCAL OPENCALL
SERV-DTM*	DDF	2	163	Distributed Transaction Manager request at serving site. TYPE= Type of request: MIGRATE TRANSACTION RECEIVED COMMIT MESSAGE RECEIVED DEALLOCATION INITIATED RESPONSE SENT (READ LOCATION) ACKNOWLEDGE COMMIT SENT (UP LOCATION) NEW USER BROADCAST RECEIVED DBAA CREATION QUEUED BACKOUT REQUEST RECV'D NEW USER BROADCAST DB ACCESS AGENT CREATE Q'D COMMIT RESPONSE SENT BACKOUT RESPONSE SENT PREPARE REQUEST RECV'D LAST AGENT REQUEST RECV'D
SERV-VTAM*	DDF	3	161	VTAM request at serving site. TYPE= Type of request: RECEIVE CONVERSATION DEALLOCATE CONVERSATION RECEIVE REQUEST MESSAGE SEND RESPONSE MESSAGE
SET DEGREE	D	1	237	Set current degree. DEGREE= OLD NEW, where OLD is previous degree and NEW is attempted degree. Only valid values are 1 or ANY. SUCCESS= Y for yes. N for no.
SET SQLID	SQL	1	055	SET SQLID. STATUS= S (successful), F (failed), or X (successful with SYSADM AUTH). TO= New SQL ID. FROM= Old SQL ID.

Table 19. Detail Trace Event Data (Continued)

Event	ATRAC Collection Category	DTRAC Display Level	IFCID	Description and Detail Information
SORT*	D	2	095/096	DB2 internal sort. REC(nnn) Number of records. RECSZ(nn) Record size. WKFILE(n) Number of work files.
SQL* FETCH SELECT INSERT/UPDATE/ DELETE DDL PREPARE OPEN CURSOR CLOSE CURSOR	SQL	1	059/058 060/058 061/058 062/058 064/058 065/058 066/058	Contains the SQL statement type followed by the SQL precompiler statement number (see “SQL Statement Pop-Up Display” on page 308). For grouped SQL statements, the number of grouped events is shown in parentheses in front of the statement number. The statement number has a unique character appended to it to identify the program. The first program is assigned a blank. Additional programs for the same plan are assigned the characters A - Z; for example, FETCH 120A. The program name can be seen in the pop-up display (a series of periods (.)) indicates an unidentifiable program name). RC(snnn) SQL return code for the statement. C= Cursor name, if applicable. D Data scan was done. X Index scan was done. W Work scan was done. PS(nnnn) Pages scanned; includes pages scanned for referential integrity. object type For DDL, the object type (TABLE) followed by the table name.
STORPROC*	SQL	2	233	Stored procedure CALL statement. MODE ENTRY (upon entry to the stored procedure) or EXIT (upon exit back to the caller of the stored procedure). PROC Stored procedure name.
SYNC	D	2	088/089	Synchronization event as part of explicit or implicit commit processing.
SYNC-WRITE*	IO	3	008/009	Synchronous write. DB= Database name. TS= Table space name. BPnnnn Buffer pool in use.
TBL-CONSTR*	SQL	2	305	Table check constraint activity. DB= Database name. OB= Table space or index space name.

Table 19. Detail Trace Event Data (Continued)

Event	ATRAC Collection Category	DTRAC Display Level	IFCID	Description and Detail Information
TEMPTABLE*	SQL	2	311	Temporary table information (DB2 version 5 and later). TABLE= Temporary table name.
TERM-THD	D	2	074	Terminate thread.
TIMEOUT*	D	1	196	Lock timeout details. DB= Database name. OB= Table space or index space name. NUMBER= Number of lock holders/waiters.
TRIGGER*	SQL	2	325	Trigger activation (DB2 version 6 and later). MODE= ENTRY (upon the start of trigger activation) or EXIT (upon the end of trigger activation). TRIG= Trigger name.
UDF*	SQL	2	324	User-defined function resolution information (DB2 version 6 and later). APPL= Application name. PLAN= Plan name.
Utility name*	D	1	023/024 024/024 024/025	Utility name, such as RUNSTATS or RECOVER. ID= Sixteen-character utility ID. PH= Phase name.
VTAM-EXIT*	DDFVTAM	3	164	VTAM exit entered. TYPE= Type of request: ATTN RPL with SUBTYPE= CNOS LOSS FMH5 TPEND with SUBTYPE= HALT NET HALT QUICK HALT CANCEL
VTAM-MACRO*	DDFVTAM	3	165	VTAM macro issued. RC(xx) Return code from macro; type of macro: OPEN CLOSE SETLOGON APPCCMD.....

Table 19. Detail Trace Event Data (Continued)

Event	ATRAC Collection Category	DTRAC Display Level	IFCID	Description and Detail Information
WAIT-I/O*	IO	3	127/128	Page wait for I/O in progress. DB= Database name. TS= Table space name. BPnnnn Buffer pool in use. SYNC-RD Synchronous read I/O.
WAIT-SERVER	D	3	170/171	Wait for DB2 server task. Records the beginning of a suspend for a synchronous (either related or unrelated) execution unit. RMID= Subcomponent name that corresponds to the Resource Manager the server task is calling. This field might be blank when displaying an old trace data set.

Event Pop-Up Displays

The pop-up displays are invoked by placing the cursor on any event row of the DTRAC display that contains an asterisk (*) in the DETAIL field and pressing ENTER. Pressing the END key (PF3/15) returns the previous DTRAC display level. Once a pop-up display is selected, the previous or next event's pop-up display can be viewed by using PF10/22 or PF11/23 respectively.

You can expand from both the EXPLAIN pop-up display and the SQL Statement pop-up display to access more detailed information. These two pop-up displays are described in the following sections. For a description of the individual fields in each of the pop-up displays, see the online Help.

EXPLAIN Pop-Up Display (IFCID 022)

Additional data for the EXPLAIN event is displayed in the EXPLAIN pop-up display, as shown in [Figure 115](#).

Note: Some fields are not displayed if the data is not relevant for the version of DB2 that you are running.

```

BMC SOFTWARE -----  DETAIL TRACE ENTRY -----  RX AVAILABLE
SERV ==>DTRAC INPUT  11:57:59 INTVL=>5LOG=>NTGT==>DB2K
PARM ==>JOINT,SEQ=3,LEVEL=2                               ROW 1 OF 76SCROLL=>CSR
EXPAND: CATALOG                                           HIST TGT--- DB2J
START: 09:51:44 AUTH: BOLCJN2  PLAN: DSNESPRR CORR: BOLCJN2  CONN: TSO
=====
EVENT          AT          ELAPSED      CPU          DETAIL
-----
EXPLAIN        2.690                *PLAN=DSNESPRR COST(5,635 K)
=====
QUERY NUMBER: 2          EXPLAIN DATE...: 2001-04-23 09:51:2260
GROUP MEMBER: DB2J      STATEMENT TYPE: SELECT  PARENT QRY BLK#: 0
PROGRAM NAME: DSNESM68  COLLECTION ID.: DSNESPRR
VERSION NAME:
WHEN_OPTIMIZ: AT BIND TIME USING DEFAULT VALUES
OPTIMIZATION HINT ID:
PROCESSOR COST IN MILLISECONDS:          IN SU:
COST CATEGORY:          CATEGORY B REASON:
-----
BLKNO: 1          SEQNO: 1          MXSEQNO: 0
METHOD: FIRST TABLE
ACCESS: INDEX SCAN          PREFETCH: NONE
COL_FN:
PAGE RANGE SCAN: NO
TSLOCK: S          TABLE TYPE: TABLE          STARJOIN BY DATA MGR
TABLE CARDINALITY: 4,774.0  PAGES: 72
TABLE: KELI01 .DEPT01          CORRELATION: D1
INDEX:          MATCHING:
PARALLELISM: CPU          RLF: NONE DISABLED
ACCESS DEGREE: 4          ACCESS GROUP ID: 1
-----
BLKNO: 1          SEQNO: 1          MXSEQNO: 1
METHOD: FIRST TABLE
ACCESS: MULTINDEX/UNION          INDEX ONLY  PREFETCH: NONE
COL_FN:
PAGE RANGE SCAN: NO
TSLOCK: S
TABLE CARDINALITY: 4,774.0  PAGES: 72
TABLE: KELI01 .DEPT01          CORRELATION: D1
INDEX: KELI01 .XDEPT01          MATCHING: 0          KEYS
PARALLELISM: CPU          RLF: NONE DISABLED
ACCESS DEGREE: 4          ACCESS GROUP ID: 1
-----

```

Figure 115. DTRAC EXPLAIN Pop-Up Display

Expand:

From the DTRAC EXPLAIN pop-up display you can expand to

CATALOG

The corresponding RxD2 catalog display for the table defined in the TABLE line, if RxD2 is installed. From the table display, you can access information on columns, indexes, keys, referential constraints, or plan dependencies. You can also see the statistics that are used in access path selection and the timestamps of when these values were updated. (See the *IBM DB2 Administration Guide* for a complete description.)

Note: Access is possible to remote DB2 subsystems only if connected with DDF to a local DB2 (in the same MVS system as the TS).

Description:

Provides critical access path selection information similar to EXPLAIN. This information is produced by the DB2 optimizer when it binds SQL statements. A cost factor is also provided.

The EXPLAIN pop-up shows the access path chosen and can be used to evaluate SQL coding techniques and identify potential performance problems. Detail trace captures the information for the following SQL:

- Dynamic SQL at execution, including
 - QMF queries
 - SPUIFI requests
 - Dynamic SQL within static plans
- Static SQL at BIND, REBIND, or EXPLAIN

Note: This information is captured whether or not EXPLAIN is specified on the BIND.

An EXPLAIN event always is preceded by a BIND-TEXT event that contains the full SQL statement text in its pop-up display. You can use PF10/11 to move back and forth between the BIND-TEXT and EXPLAIN pop-up displays. For multiple statements in a plan, the EXPLAIN entries are interleaved with the BIND-TEXT entries. This result compares to the QUERYNO level in the PLAN_TABLE. There can be multiple EXPLAIN pop-up displays for a statement in those cases where there are multiple QBLOCKNO entries in the PLAN_TABLE.

Note: Detail trace collects the access path information provided by the DB2 optimizer in the IFCID 22 trace record (see “[Event Data](#)” on page 291). These fields are equivalent to the columns available in a PLAN_TABLE and the column names are referenced in the following field descriptions (see the *IBM DB2 Administration Guide*). The following differences to the columns in the PLAN_TABLE exist for different releases of DB2:

- Not available:
 - REMARKS
- Not available for DB2 6.1 and earlier:
 - PROCESSOR COST IN MILLISECONDS
 - IN SU
 - COST CATEGORY
 - CATEGORY B REASON
 - TABLE CARDINALITY
 - PAGES
- Not available for DB2 4.1 and earlier:
 - MIXOPSEQ
 - COL_FN_EVAL
 - PROGRAM NAME
 - VERSION
 - WHEN OPTIMIZED
 - STATEMENT TYPE
- Not available for DB2 3.1:
 - TSLOCKMODE
 - CREATOR
 - ACCESSCREATOR
 - TIMESTAMP
- ACESSTYPE of blank
 - Does not generate an EXPLAIN trace event

SQL Statement Pop-Up Display

Additional data for SQL statement events is displayed in the SQL Statement pop-up display, as shown in [Figure 116](#).

```

BMC Software -----  DETAIL TRACE ENTRY  -----  RX AVAILABLE
SERV ==> DTRAC          INPUT   10:48:24 INTVL=> 5 LOG=> N TGT==> DB2HSR
PARM ==> ALLNEW51,SEQ=4,LEVEL=2          ROW 1 OF 17 SCROLL=> CSR
EXPAND: .SQLTEXT(EXPLAIN)
START: 13:59:23 AUTH: BOLSMR3  PLAN: DSNTIA51 CORR: DB251REQ   CONN: BATCH
=====
EVENT          AT          ELAPSED      CPU    DETAIL
-----
CREATE  1817      0.475      14 s      62 ms *RC(  0) TABLESPACE DEMOS51D
=====
CURSOR:  DEMOS51D
LOCATION:  DB2H
ISOLATION: READ STABILITY
REOPTIMIZ: REOPTIMIZATION FOR INPUT VARS
PACKAGE:  SAJUYH2I
PROGRAM:  DSNTIAD
                                INDEX  SEQ-DATA
                                -----  -----
ROWS PROCESSED ALL TYPES                6      6
ROWS PROCESSED CORRECT TYPE              12     6
ROWS QUALIFIED BY DM (STAGE 1)           6      0
ROWS QUALIFIED BY RDS (STAGE 2)          0      0
ROWS INSERTED                             0      1
ROWS UPDATED                              0      0
ROWS DELETED                              0      1
PAGES SCANNED                             17     14
REFERENTIAL INTEGRITY PROCESSING:
PAGES SCANNED                             0      0
ROWS DELETED/SET NULL                     0      0
LOB- PAGES SCANNED                         0      0
  - PAGES UPDATED                         0      0

```

Figure 116. DTRAC SQL Statement Pop-Up Display

Expand:

From the DTRAC SQL Statement pop-up display you can expand to

SQLTEXT(EXPLAIN)

A display of the complete statement text, if the statement is static SQL and can be explained and if RxD2 is installed.

From this panel you can choose to

- EXPLAIN the text and access the RxD2 EXPLAIN display for the statement

A qualifier panel is first displayed primed with the SQL text and query number 1. Your user ID is primed as the PLAN_TABLE owner. You can change these specifications before executing the EXPLAIN.

- Access existing EXPLAIN data in a PLAN_TABLE

Your user ID is primed as the PLAN_TABLE owner. You can change it before making the request.

- Execute the statement

You can specify the maximum number of fetches, whether to commit or rollback, and change the SQLID if necessary before execution.

If any host variables are in the statement, they are replaced by question marks and the text is presented on the Execute SQL panel to allow for tailoring into an executable format.

Note: Access is possible to remote DB2 subsystems only if connected with DDF to a local DB2 (in the same MVS system as the TS).

Description:

A maximum of five columns can be displayed showing the individual statistics for index (INDEX), sequential data (SEQ-DATA), work tables (SEQ-WORK), temporary tables (SEQ-TEMP), and transition tables (SEQ-TRAN). Only columns for the types of scan that is used are displayed.

UTRAC—User Detail Trace

The UTRAC User Detail Trace display shows all the traced events of the current active thread for a specified user. It can be accessed only for threads that are being traced (see [“Starting a Detail Trace” on page 149](#)).

```

BMC Software ----- USER DETAIL TRACE -----PERFORMANCE MGMT
SERV ==> UTRAC          INPUT    17:25:19 INTVL=> 8 LOG=> N TGT==> DB2D
PARM ==> CIR4X,SEQ=000001,LEVEL=2          ROW    1 OF    85 SCROLL=> CSR
EXPAND: LINESEL (DETAIL)
START: 17:21:38 AUTH: CIR4X  PLAN: DSNESPRR CORR: CIR4X      CONN: TSO
=====
EVENT          AT          ELAPSED      CPU    DETAIL
-----
SYNC           0.000 4,049 us 1,619 us
LOCK-SUMMARY  0.002
PREPARE 71    115.047 747 ms 37 ms *MAXPG(12) ESCL(0) TS(3)
           115.052 *RC( 0) C=C1 D/X PS( 22)
BIND-TEXT     115.052 *TYPE=DYNAMIC TEXT=SELECT DBID, OBI+
EXPLAIN       115.791 *PLAN=DSNESPRR COST=0.0
OPEN 131     115.797 2,705 ms 87 ms *RC( 0) C=C1 D/X/W PS( 707)
SORT          115.797 2,703 ms 86 ms REC( 78) RECSZ( 26) WKFILE( 2)
FETCH 125    118.504 1,235 us 664 us *RC( 0) C=C1 W PS( 2)
FETCH 125    118.564 263 us 263 us *RC( 0) C=C1 W
FETCH 125    118.565 291 us 292 us *RC( 0) C=C1 W
FETCH 125    118.566 232 us 233 us *RC( 0) C=C1 W
FETCH 125    118.567 230 us 230 us *RC( 0) C=C1 W
FETCH 125    118.569 257 us 257 us *RC( 0) C=C1 W
FETCH 125    118.570 231 us 231 us *RC( 0) C=C1 W
FETCH 125    118.571 361 us 258 us *RC( 0) C=C1 W
FETCH 125    118.572 332 us 248 us *RC( 0) C=C1 W
    
```

Figure 117. User Detail Trace Panel

Select Code:
UTRAC

Parameter:

The first parameter for this panel is required to identify the thread to be displayed. Any of the following identifiers can be used:

- User ID
- Correlation ID
- Authorization ID

The following parameters are optional:

LEVEL=1 | 2 | 3

The default is 2. Levels 1 or 3 can be typed in this field to change the display at any time. The entries shown at the three levels depend upon the type of detail trace started (see [Appendix B, “IFCID Table \(ATRAC Data Collection\)” on page 339](#) and [“Event Data” on page 291](#)).

Note: There are different levels of data collection started with an ATRAC request. This means the correct type of trace must be started to see all the events. A warning message is displayed on the fourth line of the display if all possible data is not available.

SEQ=

Unique internal sequence number assigned to each trace entry. When UTRAC is first selected, the first active entry in the trace buffer is displayed and identified in the SEQ field. Any valid trace buffer entry can be displayed by typing its trace sequence number in the SEQ field.

Description:

Shows all the traced events of the current active thread for the specified user. It clears when the thread terminates.

The traced events can be displayed at three succeeding levels by using the LEVEL= parameter. These display levels provide the following information:

- LEVEL=1 Displays only those events related to user requests (SQL statements) plus any exception conditions such as authorization failures, timeouts, or deadlocks.
- LEVEL=2 Displays level 1 events plus events related to DB2 requests such as CREATE THREAD, EDM requests, or sorts. This display is the default and is the initial display shown when UTRAC is invoked.
- LEVEL=3 Displays level 1 and level 2 events plus events related to DB2 processing caused by the user and DB2 requests such as scan, I/O, and lock/latch activity.

Scrolling:

Each display can be scrolled up (PF7/19) or down (PF8/20). Data for only the current entry in the trace buffer is scrolled. A new thread in the trace buffer can be displayed by using the left and right PF scroll keys. PF10/22 (left) moves backwards through the thread entries in the buffer. PF11/23 (right) moves forwards through the thread entries. The thread displayed is identified in the SEQ field of the display.

Expand:

Pop-up displays of additional statistical information can be selected by positioning the cursor anywhere on the line of an entry that has an asterisk (*) in the DETAIL column and pressing ENTER.

An asterisk (*) preceding a field in the DETAIL column means a pop-up display is available for that event.

Display Fields

The display fields on the UTRAC panel are the same as those for the DTRAC display. For a detailed description of these fields, see the online Help.

Viewing I/O Activity

To view I/O activity, expand from LTRAC or TSTAT to the DBIO display. From there, you can expand to the other DBIOx displays described in this section.

DBIOx—I/O Analysis (Trace)

The I/O Analysis (Trace) panels display information about I/O activity that is collected in a detail trace that includes I/O events. When viewing an I/O trace, an expand button of I/O—DB/TS is displayed on the LTRAC list of completed threads and also on the TSTAT summary display.

A traced I/O event identifies not only the table space accessed, its buffer pool, time stamp and elapsed time, but also the thread that caused the I/O to occur. This information allows analysis of various causes of I/O problems, such as

- Poor I/O response (data set / volume level)
- Excessive I/O caused by an application
- Contention at particular time periods between applications for buffer space or data on the same volumes

I/O events can be summarized by the following categories:

- Database and table space (DBIO service)
- Plan (DBIOP service)
- Authorization ID (DBIOA service)
- Buffer pool (DBIOF service)
- Time (DBIOT service - selectable interval of minutes or hours)
- Connection name (DBIOC service)
- Location (DBIOL service)

If the detail trace also includes SQL events, two additional summary displays are available:

- Package/Program (DBIOK service)
- SQL statement (DBIOS service)

The summary by database and table space (DBIO) can be cursor-selected from the EXPAND line of the LTRAC display service. The others can be cursor-selected from the EXPAND line of the DBIO display.

The requests can be for a specific purpose or situation. You can use the trace I/O displays as you need them to analyze I/O activity over time, by application, or by user instead of waiting for batch reports. They can be used to view both current traces and history traces.

After summarizing by one of these other categories, you can sort the display by any column and then cursor-select a single line in that display; for example, the plan with the highest I/O count. This action returns you to a list of table spaces, but now it is restricted to only the selected identifier; for example, for a single plan or time interval. This process can be repeated until you have narrowed the focus to a specific problem area.

Display Fields

The columns for all I/O analysis displays include the values shown in [Figure 118](#).

```

BMC Software ----- I/O ANALYSIS BY xxxxxxx -----
SERV ==> DBIOx          INPUT    14:27:17  INTVL=> 3  LOG=> N  TGT=> DB2D
PARM ==> traceid,TOTAL,SORT=xx                                ROW 1 OF 93  SCROLL => CSR
EXPAND: LINESEL(DBIO), CATALOG, HISTORY
OPTION: TOTAL, SYNC, ASYNC

07FEB94                X----TRACE TITLE-----X
                        sum-  I/O  I/O  MAX  AVG
sumkey1  sumkey2  key3  COUNT  %  IOWAIT  IOWAIT
-----  -----  -----  -----  --ms--  --ms--  0  . . .20. . .40. . .60. . .80ms
xxxxxxxx xxxxxxxx      xxxxxxxx xxx.x  xxxxxx  xxxxxx | ***** |

```

Figure 118. I/O Analysis Display Fields

An I/O analysis display shows the summarized I/O events for each object in a row. The entries are shown by the following columns:

summary key

There can be 1–3 summary keys, as follows:

- DATA BASE and TABLE SPACE (DBIO)
- AUTHID (DBIOA)
- BUFFER POOL (DBIOF)
- CONNECT (DBIOC)
- INTERVAL START (DBIOT)
- LOCATION (DBIOL)
- PLAN (DBIOP)
- PLAN and PACKAGE/PROGRAM (DBIOK) (only with SQL trace)
- PLAN and PACKAGE/PROGRAM and SQL STMT (DBIOS) (only with SQL trace)

ddmmyy

Date I/O events were collected (earliest if more than one).

Title

Trace title.

I/O COUNT

Number of I/Os to this object, total or only synchronous or asynchronous, depending on the parameter.

I/O %

Percent of total I/Os issued to this object.

Note: The total is the sum of the I/Os for all objects in the scrollable display, not for all monitored objects. For example, if parameters of ,SYNC,BP=BP1 restrict the display to only synchronous I/O events to the table spaces in BP1, the total is also only for these table spaces.

MAX IOWAIT

Highest I/O wait time observed for this object. A high value here can indicate a potential problem that is masked in the average value.

AVG IOWAIT

Average I/O wait time observed for this object.

Note: Both the maximum and average wait times are those observed by DB2, so this value is the actual delay for the application. It may be higher than the DASD volume response time, since it can include MVS delays in redispaching the task.

Graph of Average I/O Wait Time

Graph of average I/O wait time is based on a constant maximum value, so that the scale does not change when moving from one display to another. The default values are 40ms for synchronous I/O and 80ms for asynchronous and total I/O.

Description

Displays I/O information about table spaces, buffer pools, or workload. It includes a count of the number of I/Os processed, the percent of the total I/Os for the selected objects, and the maximum and average I/O wait time. This information is used to analyze how I/O is balanced across table spaces or buffer pools, to see which applications are causing the most I/O, and to detect I/O response time problems.

This list is scrollable.

Service Message

A message in the parameter field of the service shows the sequence number of the first object displayed and the total number of objects that can be displayed in the scrollable list; for example:

```
ROW 1 OF 85
```

Using EXPAND

All the DBIOx services can be EXPANDED to the following displays:

LINESEL(DBIO)

Display of I/O data by table space for the selected summary key.

Position the cursor anywhere in a summary line for a summary key entry and press ENTER. PF3 (END) from that display returns to this list.

CATALOG

Corresponding RxD2 catalog display for the objects selected in the DBTS= parameter if RxD2 is installed. A detailed list of databases, table spaces, or indexes is shown.

Detailed catalog information is available per object from these lists. They provide access to tablepart or indexpart specifications, as well as a LISTCAT option.

Note: Access is possible to remote DB2 subsystems only if connected with DDF to a local DB2 (in the same MVS system as the TS).

HISTORY

Shows the data from the current trace log data set for this trace (if you are viewing a current trace with logging, this provides access to data no longer in the online buffer). It is only shown when logging is active.

Sorting the Display

The I/O analysis displays show a list of scrollable, summarized I/O entries sorted by one or more summary keys (first display columns). Any of the column data in the display can be sorted by typing the first two characters of the column heading with the SORT parameter as

```
,SORT=cc
```

where cc can be any of the following two characters:

DB | AU | BP | CO | LO | PL | IS | ISD

Sorts the list alphabetically by the selected summary keys:

- Database and table space (DATABASE and TABLE SPACE columns in DBIO service)
- Authorization ID (AUTHID column in DBIOA service)
- Buffer pool (BUFFER POOL column in DBIOF service)
- Connection name (CONNECT column in DBIOC service)
- Location name (LOCATION column in DBIOL service)
- Plan name (PLAN column in DBIOP service)
- Plan name (PLAN and PACKAGE columns in DBIOK service)
- Plan name (PLAN and PACKAGE and SQL columns in DBIOS service)
- Ascending time (INTERVAL START column in DBIOT service)
- Descending time (INTERVAL START column in DBIOT service)

IC

Sorts the list in a numerically descending order (I/O COUNT column)

I%

Sorts the list in a numerically descending order (I/O % column)

MI

Sorts the list in a numerically descending order (MAX IOWAIT column)

AI

Sorts the list in a numerically descending order (AVG IOWAIT column)

Note: You also can sort on each column by tabbing to the column header and pressing ENTER.

Selecting a Subset of I/O Events

The following selection keywords can be typed directly in the parameter field:

```
,DBTS=(dbname,tsname)
```

Selects only the partitions/data sets in the specified table space. Both dbname and tsname are required; however, generic qualifiers can be used to specify them. See “Qualifying Requests” in *Using MAINVIEW*.

```
,A | AUTHID=xxxxxxx
```

Selects a subset of the I/O events by authorization ID. Specify one authorization ID or a generic group of authorization IDs by replacing character positions with a + (one position) or an * (multiple positions).

,BP=BPnn

Selects only those I/O events for the specified buffer pool.

,C | CONNECT=xxxxxxx

Selects a subset of the I/O events by connect type. Specify one connect type (TSO, BATCH, DB2CALL, imsid, cicsjobname) or a generic group of connections by replacing character positions with a + (one position) or an * (multiple positions).

,L | LOC=xxxxxxx

Selects a subset of the I/O events by location. Specify one location or a generic group of locations by replacing character positions with a + (one position) or an * (multiple positions).

,P | PLAN=xxxxxxx

Selects a subset of the I/O events by plan. Specify one plan or a generic group of plans by replacing character positions with a + (one position) or an * (multiple positions).

,T | TIME=hhmm[-hhmm]

Selects a subset of the I/O events by a start time or time period, where hhmm indicates hours and minutes.

Midnight wrap is supported, where the start time is higher than the end time; for example, TIME=2000-3000. The end time stamp of an accounting record is used to assign it a time period.

,D | DAY=nn[-nn]

Selects a subset of the I/O events by a day or range of days, where nn can be a relative number from the date of the first accounting record in the trace buffer (first date = 1, up to a maximum of 99). If a time period is selected without a DAY specification, it uses the default value of the day of the most current record in the buffer.

Note: Each keyword can be specified only once. If more than one keyword is specified, the result is ANDed.

The parameter field is filled in automatically with any of these keywords when a series of summarizations and selections are made; for example:

- From DBIO, select PLAN (DBIOP—I/O Analysis by Plan) to see all I/O events summarized by plan.
- From DBIOP, sort by percent of total I/Os (SORT=I%) and cursor select (expand) the line for the plan with the highest percent of I/Os. This action returns to DBIO but displays only the table spaces and I/O for that one plan. The parameter field is filled in with PLAN=xxxxxxx.
- From this DBIO subset, select TIME (DBIOT—I/O Analysis by Time) to see a summary of all the plan I/O activity by time interval. The default interval is one hour, but this value can be modified to any interval of minutes or hours. The parameter field is still filled in with PLAN=xxxxxxx.

DBIO—I/O Analysis by Database / Table Space (DB/TS)

The I/O Analysis by DB/TS panel is a scrollable list of I/O events summarized and sorted by database and table space (DATABASE and TABLESPACE columns).

```

BMC Software ----- I/O Analysis-HT -----PERFORMANCE MGMT
SERV ==> DBIO          INPUT    11:02:14 INTVL=> 3 LOG=> N TGT==> DB2F
PARM ==> ,SORT=DB,TOTAL                                LINE  1 OF  19 SCROLL=> CSR
EXPAND: PLAN, AUTH, BPOOL, TIME, CONNECT, LOCATION
EXPAND: LINESEL(DBTS), CATALOG
OPTION: TOTAL, SYNC, ASYNC

19SEP02                CIR2.DB2F.JQSIO.SEP19.T1818.V01
DATA  TABLE           I/O  I/O  MAX  AVG
BASE  SPACE            COUNT %  IOWAIT IOWAIT
-----
DSNDB01 DBD01          4  5.6   89   34 | ***** |
DSNDB01 DSN SCT02      1  1.4   28   28 | ***** |
DSNDB01 DSN SPT01      1  1.4   17   17 | **** |
DSNDB01 SCT02          2  2.8   38   31 | ***** |
DSNDB01 SPT01          4  5.6  351   95 | ***** |

```

Select Code:

DBIO

Parameter:

The following parameters can be specified:

trace id

Is a unique ID identifying the trace.

,TOTAL | SYNC | ASYNC

Displays total I/O events, or only synchronous or asynchronous I/Os.

,SORT=DB | IC | I% | MI | AI

Sorts the list of summarized I/O events. Initially, the list is sorted alphabetically by database and table space (default) and ,SORT=DB is displayed in the PARM field. SORT specifies the first two characters of a display column as described in [“Sorting the Display” on page 315](#).

data selection parameters

[“Selecting a Subset of I/O Events” on page 315](#) provides more information about the following parameters that applies to all the I/O Analysis services:

- ,DBTS=(dbname,tsname)
- ,A | AUTHID=xxxxxxx
- ,BP=BPnn
- ,C | CONNECT=xxxxxxx
- ,L | LOC=xxxxxxx
- ,P | PLAN=xxxxxxx
- ,T | TIME=hhmm[-hhmm]
- ,D | DAY=nn[-nn]

Note: Generic qualifiers can be used to specify database and table space names for the ,DBTS parameter. See [“Qualifying Requests” in Using MAINVIEW](#).

Summary Key:

DATABASE is the first column and TABLESPACE is the second column of this display. They are the two summary keys used for the default sort of summarized I/O events.

Description:

Summarizes the I/O events by database and table space. The display is a scrollable list of summary lines for each unique table space found in the traced I/O events. (See “[DBIOx—I/O Analysis \(Trace\)](#)” on page 312.)

Expand

The DBIO display can be EXPANDED to the following displays (in addition to those described in “[Using EXPAND](#)” on page 314):

PLAN

I/O Analysis by Plan display (DBIOP) that summarizes the I/O events from this trace by plan.

AUTH

I/O Analysis by AUTHID display (DBIOA) that summarizes the I/O events from this trace by authorization ID.

BPOOL

I/O Analysis by BPOOL display (DBIOB) that summarizes the I/O events from this trace by buffer pool.

TIME

I/O Analysis by Time display (DBIOT) that summarizes the I/O events from this trace by time interval.

CONNECT

I/O Analysis by Connect display (DBIOC) that summarizes the I/O events from this trace by connection name.

LOCATION

I/O Analysis by Location display (DBIOL) that summarizes the I/O events from this trace by location name.

LINESEL(DBTS)

Status display of open databases and table spaces, which includes the first volume and number of extents per data set, showing only the data sets or partitions within the selected table space.

CATALOG

Corresponding RxD2 catalog display for the objects selected in the DBTS= parameter if RxD2 is installed. A detailed list of databases, table spaces, or indexes is shown.

Detailed catalog information is available per object from these lists. They provide access to tablepart or indextpart specifications, as well as a LISTCAT option.

Note: Access is possible to remote DB2 subsystems only if connected with DDF to a local DB2 (in the same MVS system as the TS).

DBIOA—I/O Analysis by Authorization ID (AUTHID)

The I/O Analysis by AUTHID panel is a scrollable list of I/O events summarized and sorted by authorization ID (AUTHID column).

```

BMC Software ----- I/O Analysis-Authid -----PERFORMANCE MGMT
SERV ==> DBIOA          INPUT    11:04:22  INTVL=> 3  LOG=> N  TGT==> DB2F
PARM ==> ,SO=AU,TOTAL                                LINE   1 OF   1  SCROLL=> CSR
EXPAND: LINESEL(DBIO), CATALOG
OPTION:  TOTAL, SYNC, ASYNC

19SEP02                CIR2.DB2F.JQSIO.SEP19.T1818.V01
AUTHID                  I/O   I/O   MAX   AVG
-----                COUNT  %   IOWAIT IOWAIT
-----                ----- --ms-- --ms-- 0 .. .20...40...60...80
CIR1                    71   100  1028   51 | ***** |

```

Select Code:

DBIOA

Parameter:

The following parameters can be specified:

trace id

Is a unique ID identifying the trace.

,TOTAL | SYNC | ASYNC

Displays total I/O events, or only synchronous or asynchronous I/Os.

,SORT=AU | IC | I% | MI | AI

Sorts the list of summarized I/O events. Initially, the list is sorted alphabetically by authorization ID (default) and ,SORT=AU is displayed in the PARM field. SORT specifies the first two characters of a display column as described in [“Sorting the Display” on page 315](#).

data selection parameters

[“Selecting a Subset of I/O Events” on page 315](#) provides more information about the following parameters that applies to all the I/O Analysis services:

- ,DBTS=(dbname,tsname)
- ,A | AUTHID=xxxxxxxx
- ,BP=BPnn
- ,C | CONNECT=xxxxxxxx
- ,L | LOC=xxxxxxxx
- ,P | PLAN=xxxxxxxx
- ,T | TIME=hhmm[-hhmm]
- ,D | DAY=nn[-nn]

Note: Generic qualifiers can be used to specify database and table space names for the ,DBTS parameter. See [“Qualifying Requests” in Using MAINVIEW](#).

Summary Key:

AUTHID is the first column of this display and is the summary key used for the default sort of summarized I/O events.

Description:

Summarizes the I/O events by authorization ID. The display is a scrollable list of summary lines for each unique authorization ID found in the traced I/O events. (See [“DBIOx—I/O Analysis \(Trace\)”](#) on page 312.)

DBIOF—I/O Analysis by Buffer Pool (BPOOL)

The I/O Analysis by BPOOL panel is a scrollable list of I/O events summarized and sorted by buffer pool (BUFFER POOL column).

```

BMC Software ----- I/O Analysis-Bpool -----PERFORMANCE MGMT
SERV ==> DBIOF          INPUT  11:20:33  INTVL=> 3  LOG=> N  TGT==> DB2F
PARM ==> ,S0=BP,TOTAL          LINE   1 OF   2  SCROLL=> CSR
EXPAND: LINESEL(DBIO), CATALOG
OPTION:  TOTAL, SYNC, ASYNC

19SEP02                CIR2.DB2F.JQSIO.SEP19.T1818.V01
BUFFER                 I/O   I/O   MAX   AVG
POOL                  COUNT  %   IOWAIT IOWAIT
-----
BP0                    67  94.4  1028   52 | *****
BP32K                  4   5.6   37    23 | *****

```

Select Code:

DBIOF

Parameter:

The following parameters can be specified:

trace id

Is a unique ID identifying the trace.

,TOTAL | SYNC | ASYNC

Displays total I/O events, or only synchronous or asynchronous I/Os.

,SORT=BP | IC | I% | MI | AI

Sorts the list of summarized I/O events. Initially, the list is sorted alphabetically by buffer pool (default) and ,SORT=BP is displayed in the PARM field. SORT specifies the first two characters of a display column as described in [“Sorting the Display” on page 315](#).

data selection parameters

[“Selecting a Subset of I/O Events” on page 315](#) provides more information about the following parameters that applies to all the I/O Analysis services:

- ,DBTS=(dbname,tsname)
- ,A | AUTHID=xxxxxxx
- ,BP=BPnn
- ,C | CONNECT=xxxxxxx
- ,L | LOC=xxxxxxx
- ,P | PLAN=xxxxxxx
- ,T | TIME=hhmm[-hhmm]
- ,D | DAY=nn[-nn]

Note: Generic qualifiers can be used to specify database and table space names for the ,DBTS parameter. See [“Qualifying Requests” in Using MAINVIEW](#).

Summary Key:

BUFFER POOL is the first column of this display and is the summary key used for the default sort of summarized I/O events.

Description:

Summarizes the I/O events by buffer pool. ID. The display is a scrollable list of summary lines for each unique buffer pool found in the traced I/O events. (See [“DBIOx—I/O Analysis \(Trace\)”](#) on page 312.)

DBIOC—I/O Analysis by Connection Name (CONNECT)

The I/O Analysis by CONNECT panel is a scrollable list of I/O events summarized and sorted by connection name (CONNECT column).

```

BMC Software ----- I/O Analysis-Connect -----PERFORMANCE MGMT
SERV ==> DBIOC          INPUT    11:27:55  INTVL=> 3  LOG=> N  TGT==> DB2F
PARM ==> ,S0=CO,TOTAL          LINE    1 OF    2  SCROLL=> CSR
EXPAND: LINESEL(DBIO), CATALOG
OPTION: TOTAL, SYNC, ASYNC

19SEP02                CIR2.DB2F.JQSIO.SEP19.T1818.V01
CONNECT                I/O    I/O    MAX    AVG
COUNT    %    IOWAIT    IOWAIT
-----    -ms--  -ms--  0    . . .20. . .40. . .60. . .80
BATCH                35  49.3    89    20 | ***** |
DB2CALL              36  50.7   1028   80 | ***** |

```

Select Code:

DBIOC

Parameter:

The following parameters can be specified:

trace id

Is a unique ID identifying the trace.

,TOTAL | SYNC | ASYNC

Displays total I/O events, or only synchronous or asynchronous I/Os.

,SORT=CO | IC | I% | MI | AI

Sorts the list of summarized I/O events. Initially, the list is sorted alphabetically by connection name (default) and ,SORT=CO is displayed in the PARM field. SORT specifies the first two characters of a display column as described in [“Sorting the Display” on page 315](#).

data selection parameters

[“Selecting a Subset of I/O Events” on page 315](#) provides more information about the following parameters that applies to all the I/O Analysis services:

- ,DBTS=(dbname,tsname)
- ,A | AUTHID=xxxxxxxx
- ,BP=BPnn
- ,C | CONNECT=xxxxxxxx
- ,L | LOC=xxxxxxxx
- ,P | PLAN=xxxxxxxx
- ,T | TIME=hhmm[-hhmm]
- ,D | DAY=nn[-nn]

Note: Generic qualifiers can be used to specify database and table space names for the ,DBTS parameter. See [“Qualifying Requests” in Using MAINVIEW](#).

Summary Key:

CONNECT is the first column of this display and is the summary key used for the default sort of summarized I/O events.

Description:

Summarizes the I/O events by connection name. The display is a scrollable list of summary lines for each unique connection name found in the traced I/O events. (See [“DBIOx—I/O Analysis \(Trace\)”](#) on page 312.)

DBIOL—I/O Analysis by Location (LOCATION)

The I/O Analysis by LOCATION panel is a scrollable list of I/O events summarized and sorted by location (LOCATION column).

```

BMC Software ----- I/O Analysis-Loc -----PERFORMANCE MGMT
SERV ==> DBIOL          INPUT    11:28:32 INTVL=> 3 LOG=> N TGT==> DB2F
PARM ==> ,S0=L0,TOTAL                                LINE  1 OF  2 SCROLL=> CSR
EXPAND: LINESEL(DBIO), CATALOG
OPTION: TOTAL, SYNC, ASYNC

19SEP02                CIR2.DB2F.JQSIO.SEP19.T1818.V01
LOCATION                 I/O  I/O  MAX  AVG
COUNT                %  IOWAIT IOWAIT
-----
DB2E                   18  25.4   40   23 | ***** |
DB2F                   53  74.6  1028  60 | ***** |

```

Select Code:

DBIOL

Parameter:

The following parameters can be specified:

trace id

Is a unique ID identifying the trace.

,TOTAL | SYNC | ASYNC

Displays total I/O events, or only synchronous or asynchronous I/Os.

,SORT=LO | IC | I% | MI | AI

Sorts the list of summarized I/O events. Initially, the list is sorted alphabetically by location name (default) and ,SORT=LO is displayed in the PARM field. SORT specifies the first two characters of a display column as described in [“Sorting the Display” on page 315](#).

data selection parameters

[“Selecting a Subset of I/O Events” on page 315](#) provides more information about the following parameters that applies to all the I/O Analysis services:

- ,DBTS=(dbname,tsname)
- ,A | AUTHID=xxxxxxx
- ,BP=BPnn
- ,C | CONNECT=xxxxxxx
- ,L | LOC=xxxxxxx
- ,P | PLAN=xxxxxxx
- ,T | TIME=hhmm[-hhmm]
- ,D | DAY=nn[-nn]

Note: Generic qualifiers can be used to specify database and table space names for the ,DBTS parameter. See [“Qualifying Requests” in Using MAINVIEW](#).

Summary Key:

LOCATION is the first column of this display and is the summary key used for the default sort of summarized I/O events.

Description:

Summarizes the I/O events by location name. The display is a scrollable list of summary lines for each unique location found in the traced I/O events. (See [“DBIOx—I/O Analysis \(Trace\)”](#) on page 312.)

DBIOP—I/O Analysis by Plan (PLAN)

The I/O Analysis by Plan panel is a scrollable list of I/O events summarized and sorted by plan (PLAN column).

```

BMC Software ----- I/O Analysis-Plan -----PERFORMANCE MGMT
SERV ==> DBIOP          INPUT    11:29:20  INTVL=> 3  LOG=> N  TGT==> DB2F
PARM ==> ,SO=PL,TOTAL          LINE    1 OF    3  SCROLL=> CSR
EXPAND: PKG/PGM, LINESEL(DBIO), CATALOG
OPTION:  TOTAL, SYNC, ASYNC

19SEP02                CIR2.DB2F.JQSIO.SEP19.T1818.V01
PLAN                   I/O    I/O    MAX    AVG
                   COUNT  %    IOWAIT IOWAIT
                   ----- --ms-- --ms-- 0 ..20...40...60...80
DSNTIA31                29 40.8    89    19 | **** |
DSNTIB31                 6  8.5    38    25 | ***** |
RXDB2                    36 50.7  1028   80 | ***** |

```

Select Code:

DBIOP

Parameter:

The following parameters can be specified:

trace id

Is a unique ID identifying the trace.

,TOTAL | SYNC | ASYNC

Displays total I/O events, or only synchronous or asynchronous I/Os.

,SORT=PL | IC | I% | MI | AI

Sorts the list of summarized I/O events. Initially, the list is sorted alphabetically by plan (default) and ,SORT=PL is displayed in the PARM field. SORT specifies the first two characters of a display column as described in [“Sorting the Display” on page 315](#).

data selection parameters

[“Selecting a Subset of I/O Events” on page 315](#) provides more information about the following parameters that applies to all the I/O Analysis services:

- ,DBTS=(dbname,tsname)
- ,A | AUTHID=xxxxxxxx
- ,BP=BPnn
- ,C | CONNECT=xxxxxxxx
- ,L | LOC=xxxxxxxx
- ,P | PLAN=xxxxxxxx
- ,T | TIME=hhmm[-hhmm]
- ,D | DAY=nn[-nn]

Note: Generic qualifiers can be used to specify database and table space names for the ,DBTS parameter. See [“Qualifying Requests” in Using MAINVIEW](#).

Summary Key:

PLAN is the first column of this display and is the summary key used for the default sort of summarized I/O events.

Description:

Summarizes the I/O events by plan. The display is a scrollable list of summary lines for each unique plan found in the traced I/O events. (See [“DBIOx—I/O Analysis \(Trace\)” on page 312.](#))

Expand:

Can also EXPAND to the following display (in addition to those described in [“Using EXPAND” on page 314.](#)):

PKG/PGM

Display of I/O events summarized and sorted by plan and package/program name (DBIOP)

DBIOK—I/O Analysis by Package / Program (PKG/PGM)

The I/O Analysis by PKG/PGM panel is a scrollable list of I/O events summarized and sorted by plan and package/program name (PLAN and PACKAGE/PROGRAM columns).

Note: This panel is available only from a detail trace that includes both SQL and I/O events.

```

BMC Software ----- I/O Analysis-Plan/PKG ----- PERFORMANCE MGMT
SERV ==> DBIOK          INPUT 12:00:35 INTVL=> 3 LOG=> N TGT==> DB2F
PARM ==> ,SO=PL,TOTAL          LINE 1 OF 3 SCROLL=> CSR
EXPAND: SQL, LINESEL(DBIO), CATALOG, HISTORY
OPTION: TOTAL, SYNC, ASYNC

19SEP02                DB2 APPLICATION TRACE
PACKAGE/              I/O I/O  MAX  AVG
PLAN  PROGRAM          COUNT % IOWAIT IOWAIT
-----
RXDB2 RXSEL2M          30 93.8 21464 1505 | ***** |
RXDB2 RXSEL4M           1  3.1   49    49 | ***** |
RXDB2 RXSEL9M           1  3.1   49    49 | ***** |

```

Select Code:

DBIOK

Parameter:

The following parameters can be specified:

trace id

Is a unique ID identifying the trace.

,TOTAL | SYNC | ASYNC

Displays total I/O events, or only synchronous or asynchronous I/Os.

,SORT=PL | IC | I% | MI | AI

Sorts the list of summarized I/O events. Initially, the list is sorted alphabetically by plan and package/program name (default) and ,SORT=PL is displayed in the PARM field. SORT specifies the first two characters of a display column as described in [“Sorting the Display” on page 315](#).

data selection parameters

[“Selecting a Subset of I/O Events” on page 315](#) provides more information about the following parameters that applies to all the I/O Analysis services:

- ,DBTS=(dbname,tsname)
- ,A | AUTHID=xxxxxxxx
- ,BP=BPnn
- ,C | CONNECT=xxxxxxxx
- ,L | LOC=xxxxxxxx
- ,P | PLAN=xxxxxxxx
- ,T | TIME=hhmm[-hhmm]
- ,D | DAY=nn[-nn]

Note: Generic qualifiers can be used to specify database and table space names for the ,DBTS parameter. See [“Qualifying Requests” in Using MAINVIEW](#).

Summary Keys:

PLAN is the first column and PACKAGE/PROGRAM the second column of this display and are the two summary keys used for the default sort of summarized I/O events.

Description:

Summarizes the I/O events by plan and package/program name. The display is a scrollable list of summary lines for each unique combination of plan and package/program name found in the traced I/O events. (See [“DBIOx—I/O Analysis \(Trace\)” on page 312.](#))

Expand:

Can also EXPAND to the following display (in addition to those described in [“Using EXPAND” on page 314](#)):

SQL

Display of I/O events summarized and sorted by plan and package/program name and SQL statement number (DBIOS)

DBIOS—I/O Analysis by SQL Statement (SQL STMT)

The I/O Analysis by SQL Stmt panel is a scrollable list of I/O events summarized and sorted by plan and package/program name and SQL statement number (PLAN and PACKAGE/PROGRAM and SQL STMT columns).

Note: This is available only from a detail trace that includes both SQL and I/O events.

```

BMC Software ----- I/O Analysis-SQL Stmt -----PERFORMANCE MGMT
SERV ==> DBIOS          INPUT    12:01:32  INTVL=> 3  LOG=> N  TGT==> DB2F
PARM ==> ,SO=PL,TOTAL          LINE    1 OF    3  SCROLL=> CSR
EXPAND: LINESEL(DBIO), CATALOG, HISTORY
OPTION: TOTAL, SYNC, ASYNC

19SEP02                DB2 APPLICATION TRACE
PACKAGE/ SQL          I/O  I/O  MAX  AVG
PLAN  PROGRAM  STMT  COUNT  % IOWAIT IOWAIT
-----
RXDB2  RXSEL2M  228      30  93.8  21464  1505 | ***** |
RXDB2  RXSEL4M  115       1   3.1    49    49 | ***** |
RXDB2  RXSEL9M  228       1   3.1    49    49 | ***** |

```

Select Code:

DBIOS

Parameter:

The following parameters can be specified:

trace id

Is a unique ID identifying the trace.

,TOTAL | SYNC | ASYNC

Displays total I/O events, or only synchronous or asynchronous I/Os.

,SORT=PL | IC | I% | MI | AI

Sorts the list of summarized I/O events. Initially, the list is sorted alphabetically by plan and package/program name and SQL statement number (default) and ,SORT=PL is displayed in the PARM field. SORT specifies the first two characters of a display column as described in [“Sorting the Display” on page 315](#).

data selection parameters

[“Selecting a Subset of I/O Events” on page 315](#) provides more information about the following parameters that applies to all the I/O Analysis services:

- ,DBTS=(dbname,tsname)
- ,A | AUTHID=xxxxxxx
- ,BP=BPnn
- ,C | CONNECT=xxxxxxx
- ,L | LOC=xxxxxxx
- ,P | PLAN=xxxxxxx
- ,T | TIME=hhmm[-hhmm]
- ,D | DAY=nn[-nn]

Note: Generic qualifiers can be used to specify database and table space names for the ,DBTS parameter. See [“Qualifying Requests” in Using MAINVIEW](#).

Summary Keys:

PLAN is the first column, PACKAGE/PROGRAM the second column, and SQL STMT the third column of this display. They are the three summary keys used for the default sort of summarized I/O events.

Description:

Summarizes the I/O events by plan and package/program name and SQL statement number. The display is a scrollable list of summary lines for each unique combination of plan and package/program name and SQL statement number found in the traced I/O events.

Note: Display lines with no package name or SQL statement number show non-SQL-related I/O for that plan, such as catalog or directory accesses.

(See [“DBIOx—I/O Analysis \(Trace\)”](#) on page 312.)

DBIOT—I/O Analysis by Time (INTERVAL START)

The I/O Analysis by Time panel is a scrollable list of I/O events summarized and sorted by time (INTERVAL START column).

```

BMC Software ----- I/O Analysis-Time -----PERFORMANCE MGMT
SERV ==> DBIOT          INPUT    11:30:20 INTVL=> 3 LOG=> N TGT==> DB2F
PARM ==> ,S0=IS,TOTAL,I=10M          LINE    1 OF    1 SCROLL=> CSR
EXPAND: LINESEL(DBIO), CATALOG
OPTION: TOTAL, SYNC, ASYNC

19SEP02                CIR2.DB2F.JQSIO.SEP19.T1818.V01
INTERVAL              I/O    I/O    MAX    AVG
START                 COUNT   %    IOWAIT IOWAIT
-----              -ms-- --ms-- 0 ..20..40..60..80
18.20.00                71    70    1028    51 | ***** |
18.30.00                29    30     640    65 | ***** |

```

Select Code:

DBIOT

Parameter:

The following parameters can be specified:

trace id

Is a unique ID identifying the trace.

,TOTAL | SYNC | ASYNC

Displays total I/O events, or only synchronous or asynchronous I/Os.

,INTVL=nnM | nnH

Allows a different time interval to be selected. When the list of summarized I/O events is displayed initially, the list is summarized by hour (default) and ,INTVL=1H is displayed in the PARM field (the comma is a required positional parameter for INTVL).

The summary time interval can be changed by typing **nnM** or **nnH** where

nnM

Specifies minutes

nnH

Specifies hours

The first INTERVAL START displayed is determined by rounding the earliest end time of an I/O event back to an even interval start time.

- Any minute interval that divides evenly into 60 starts at the latest prior period from an even hour. Those not evenly divisible start at the current minute.
- Any hour interval that divides evenly into 24 starts at the latest prior period from midnight. Those not evenly divisible start at the current hour.

For example:

- If an interval is 15 minutes and the earliest end time is 12:41:30, the first interval start time would be 12:30:00.
- If an interval is 25 minutes and the earliest end time is 12:41:30, the first interval start time would be 12:41:00.
- If an interval is 4 hours and the earliest end time is 9:21:35, the first interval start time would be 08:00:00.

,SORT=IS | IC | I% | MI | AI | ISD

Sorts the list of summarized I/O events. Initially, the list is sorted in ascending sequence by interval start (default) and ,SORT=IS is displayed in the PARM field. SORT specifies the first two characters of a display column as described in [“Sorting the Display” on page 315](#). ISD (Interval Start Descending) displays the most current measurements at the top.

data selection parameters

[“Selecting a Subset of I/O Events” on page 315](#) provides more information about the following parameters that applies to all the I/O Analysis services:

- ,DBTS=(dbname,tsname)
- ,A | AUTHID=xxxxxxxx
- ,BP=BPnn
- ,C | CONNECT=xxxxxxxx
- ,L | LOC=xxxxxxxx
- ,P | PLAN=xxxxxxxx
- ,T | TIME=hhmm[-hhmm]
- ,D | DAY=nn[-nn]

Note: Generic qualifiers can be used to specify database and table space names for the ,DBTS parameter. See [“Qualifying Requests” in Using MAINVIEW](#).

Summary Key:

INTERVAL START is the first column of this display and is the summary key used for the default sort of summarized I/O events.

If there is data for only one day in the trace buffer, the format of the time stamp is hh:mm:ss. If there is data for more than one day, the format is dd-hh:mm, where dd is the relative day number from the date of the first I/O event record in the trace buffer.

Each I/O event record traced is assigned to a time period based on its end time stamp. Therefore, the processing done for that unit of work is assigned to one interval, but work may have partially occurred during one or more previous time intervals depending on its elapsed time.

Description:

Summarizes the I/O events by time interval start. The display is a scrollable list of summary lines by a start time stamp of each summarized time interval found in the trace I/O events. (See [“DBIOx—I/O Analysis \(Trace\)” on page 312](#).)

Appendix A. Lock Type Table

Table 20 defines the possible lock types and resources for the lock-related detail trace events:

- Detail logical lock - IFCID 21
- Lock Suspension - IFCID 44/45
- Deadlock - IFCID 172
- Timeout - IFCID 196
- Detail physical locks (P-Locks) - IFCIDs 251, 259

Table 20. Lock Types

Lock Type (short)	Lock Type (long)	Resource Name	Resource Number (hexadecimal)
ALTER BP	ALTER BUFFERPOOL	BP = bpid	
BINDLOCK	AUTOBIND/REMOTE BIND	BINDLOCK	
CATM CAT	CATMAINT CONVERT CATALOG	DB = database OB = pageset	
CATM DIR	CATMAINT CONVERT DIRECTORY	DB = database OB = pageset	
CATM MIG	CATMAINT MIGRATION	DB = database OB = pageset	
CDB PLOK	CDB P-LOCK (DDF)	DB = database	
COLLECTN	COLLECTION	Collection ID	
CS-DRAIN	CURSOR STABILITY DRAIN	DB = database OB = pageset	Part# / 0
DATABASE	DATABASE	DB = database	
DATAPAGE	DATA PAGE	DB = database OB = pageset	Page#
DBALLOC	DBALLOC - START/STOP	DB = database OB = pageset	Part# / 0
DBCMDSER	DB CMD SERIAL	DB = database	
DBD PLOK	DBD P-LOCK	DB = database	
GBP CAST	GROUP BP CASTOUT P-LOCK	BP = bpid	
GP EX UP	GROUP DB EXCEPTION UPDATE	DX = GDBET	
GROUP BP	GROUP BP START/STOP	BP = bpid	
HASH-ANC	HASH ANCHOR	DB = database OB = pageset	Page# Anchor

Table 20. Lock Types (Continued)

Lock Type (short)	Lock Type (long)	Resource Name	Resource Number (hexadecimal)
INDEXPAG	INDEX PAGE (# = x'000002FF', index root page)	DB = database OB = pageset	Page# Subpage#
IX EOF	INDEX END-OF-FILE	DB = database OB = pageset	Part# / 0
IXTREEPL	INDEX MANAGER TREE P-LOCK	BP = bpid DB = database OB = pageset	
LPL/GREC	LPL/GRECP DB EXCEPTION	DB = database OB = pageset	Part# / 0
MASSDEL	MASS DELETE	DB = database OB = pageset	
OPEN	OPEN PAGESET / DATASET	DB = database OB = pageset	
PAGE PLK	PAGE P-LOCK	BP = bpid DB = database OB = pageset	Part# / 0 Page#
PAGESET	PAGE SET	DB = database OB = pageset	
PART-DS	PARTITIONED DATASET	DB = database OB = pageset	Part#
PARTLOCK	PARTITION LOCKING	DB = database OB = pageset	Part#
P/P CAST	PAGESET/PARTITION CASTOUT PLOCK	BP = bpid DB = database OB = pageset	Part# / 0
P/P PLOCK	PAGESET/PARTITION P-LOCK	BP = bpid DB = database OB = pageset	Part# / 0
REPR DBD	REPAIR DBD TEST/DIAGNOSE	DB = database OB = pageset	
RLF PLOCK	RLF P-LOCK	DB = database OB = pageset	
ROW	ROW	DB = database OB = pageset	Page# RID
RR-DRAIN	REPEATABLE READ DRAIN	DB = database OB = pageset	Part# / 0
SCA ACC	SCA ACCESS - RESTART/REDO	SC = BMC-RSTP	
SERVICE	SERVICEABILITY	(not identified)	

Table 20. Lock Types (Continued)

Lock Type (short)	Lock Type (long)	Resource Name	Resource Number (hexadecimal)
SKCT	SKELETON CURSOR TABLE	PL = planname	
SKPT	SKELETON PACKAGE TABLE	PK = collection, package, token	
SYSLGRNG	SYSLGRNG RECORDING	DB = database OB = pageset	
TABLE	TABLE	DB = database OB = pageset	
UTIL EXC	UTILITY EXCLUSIVE EXECUTION	UTEXEC	
UTILSER	UTILITY SERIALIZATION	UTSERIAL	
UTILUID	UTILITY UID	UI = utility ID	
WR-DRAIN	WRITE DRAIN	DB = database OB = pageset	Part# / 0

- Page# is 0 for unlocks.
- P-Locks do not cause timeouts or deadlocks, so they do not appear for these events.

Appendix B. IFCID Table (ATRAC Data Collection)

The data collection category used with the TYPE parameter of the ATRAC trace data collection service specifies the type of data to be collected. Each type specifies a set of IFCIDs as shown in the table that follows. The BBI-SS PAS issues an internal -STA TRACE command to collect these IFCIDs.

- D (DETAIL) collects the majority of the IFCIDs required by the DTRAC service.
- SQL includes all detail events plus SQL statements.
- SCAN includes all detail events plus scan and SQL events.
- IO includes all detail events plus I/O events.
- LOCK includes all detail events plus lock requests.
- DDF includes all detail events plus all DDF events except VTAM-related DDF events.
- DDFVTAM includes all detail events plus VTAM-related DDF events.

Note: Each additional category incurs more overhead and requires larger internal trace buffers.

IFI data collection in the BBI-SS PAS pairs start and end IFCID records for an event where they exist so that the elapsed time can be calculated, and the DTRAC service shows a single event line for start/end. Some events do not have an end event; therefore, the elapsed time cannot be calculated.

TYPE=D Data Collection

D (DETAIL) starts a trace for the following IFCIDs. The display level column contains the value that causes the event to be displayed by the DTRAC service (see “Event Data” on page 291).

Table 21. TYPE=D (DETAIL) IFCID Data Collection

IFCID	DTRAC Display Level	Description
020	2	Lock summary (COMMIT/ABORT)
023	1	Utility start
024	1	Utility object/phase change
025	1	End 023
029	2	Begin EDM request
030	2	End 029
031	1	EDM full
044	3	Lock suspend or identify to IRLM
045	3	Lock resume
051	3	Shared latch resume
052	3	Shared latch wait
054	1	Lock contention due to timeout/deadlock
056	3	Exclusive latch wait
057	3	Exclusive latch resume
068	1	Begin ABORT
069	2	End 068
070	2	Begin Phase 2 commit
071	2	End 070
072	2	Begin CREATE THREAD
073	2	End 072
074	2	Begin TERM THREAD
084	2	Begin Phase 1 commit (IMS/CICS)
085	2	End 084
088	2	Begin SYNC
089	2	End 088

Table 21. TYPE=D (DETAIL) IFCID Data Collection (Continued)

IFCID	DTRAC Display Level	Description
095	2	SORT start
096	2	End 095
107	2	OPEN/CLOSE TS
108	1	BIND/REBIND
109	1	End 108
110	1	BIND FREE
111	1	End 110
112	2	Plan allocated
125	2	Multi-index access path
140	1	Authorization failure
167	2	Conversation request queued
168	2	Distributed SQL statement
169	2	Authorization ID translation either OUTBOUND or INBOUND
170	3	Begin WAIT-SERVER
171	3	End 170
172	1	Deadlock details
177	2	Package allocation
190	2	Hybrid join failure
196	1	Lock timeout details
213	3	Begin wait for DRAIN request
214	3	End 213
215	3	Begin wait for pending CLAIMs to go to zero
216	3	End 215
218	2	Summary of COMMIT log sequence numbers
224	1	Invalid select procedure
226	1	Page latch wait
227	1	End 226
237	1	Set current degree

TYPE=SQL Data Collection

SQL collects the following IFCIDs plus those for a detail trace shown in the preceding table, which are displayed by the DTRAC service (see [“Event Data” on page 291](#)).

Table 22. TYPE=SQL IFCID Data Collection

IFCID	DTRAC Display Level	Description
022	2	Record the generated mini-plans
053	1	End DESCRIBE, COMMIT, ROLLBACK, or SQL statement error
055	1	SET SQL ID
058	1	End 059, 060, 061, 062, 063, 064, 065, or 066
059	1	SQL FETCH
060	1	SQL SELECT
061	1	SQL INSERT/UPDATE/DELETE
062	1	SQL DDL
063	2	BIND (TEXT) (unpaired)
064	1	SQL PREPARE
065	1	SQL OPEN CURSOR
066	1	SQL CLOSE CURSOR
233	2	Stored procedure CALL statement
272	2	ASSOCIATE LOCATORS statement (DB2 version 5 and later)
273	2	ALLOCATE CURSOR statement (DB2 version 5 and later)
311	2	Temporary table (DB2 version 5 and later)
324	2	User-defined function resolution (DB2 version 6 and later)
325	2	Start and end of trigger activation (DB2 version 6 and later)

TYPE=SCAN Data Collection

SCAN collects the following IFCIDs plus those for an SQL and detail trace shown in the preceding tables, which are displayed by the DTRAC service (see [“Event Data” on page 291](#)).

Table 23. TYPE=SCAN IFCID Data Collection

IFCID	DTRAC Display Level	Description
013	3	Begin hash scan
014	3	End 013
015	3	Begin index scan
016	3	Begin insert
017	3	Begin sequential scan
018	3	End 015, 016, or 017
221	3	Degree of parallel I/O processing for a parallel group
222	3	Elapsed time of a parallel group
305	2	Table check constraint

TYPE=IO Data Collection

IO collects the following IFCIDs plus those for a detail trace shown in [Table 21 on page 340](#), which are displayed by the DTRAC service (see [“Event Data” on page 291](#)).

Table 24. TYPE=IO IFCID Data Collection

IFCID	DTRAC Display Level	Description
006	3	Begin READ I/O
007	3	End 006
008	3	Begin SYNC WRITE I/O
009	3	End 008
127	3	Begin WAIT-IO
128	3	End 127

TYPE=LOCK Data Collection

LOCK collects the following IFCIDs plus those for a detail trace shown in [Table 21 on page 340](#), which are displayed by the DTRAC service (see “Event Data” on page 291).

Table 25. TYPE=LOCK IFCID Data Collection

IFCID	DTRAC Display Level	Description
021	3	Lock request
211	3	Claim request
212	3	Drain request
223	3	Detail of successful COMMIT LSNs (lock avoidance)
251	3	P-lock operation
259	3	Page P-lock request

TYPE=DDF Data Collection

DDF collects the following IFCIDs plus those for a detail trace shown in [Table 21 on page 340](#), which are displayed by the DTRAC service (see “Event Data” on page 291).

Table 26. TYPE=DDF IFCID Data Collection

IFCID	DTRAC Display Level	Description
157	2	DRDS request at requesting site
158	2	RDS request at serving site
159	2	Conversation request
160	3	VTAM request at requesting site
161	3	VTAM request at serving site
162	2	Distribution Transaction Manager request at requesting site
163	2	Distribution Transaction Manager request at serving site
183	2	Requesting agent data

TYPE=DDFVTAM Data Collection

DDFVTAM collects the following IFCIDs plus those for a detail trace shown in [Table 21 on page 340](#), which are displayed by the DTRAC service (see [“Event Data” on page 291](#)).

Table 27. TYPE=DDFVTAM IFCID Data Collection

IFCID	DTRAC Display Level	Description
164	3	VTAM exit entered
165	3	VTAM macro issued
166	3	Buffer send or receive

Appendix C. Recommendations for Detail Traces of Long-Running Threads

Use the following recommendations when executing detail traces of long-running threads.

Overview

A quick overview of key trace concepts is provided first in this appendix to help put the following discussions in context. See [Chapter 4, “Using a Trace” on page 131](#) for additional information.

Trace Types

Summary traces collect only accounting data, and all share one DB2 trace request (OP ID).

Detail traces collect accounting data plus event information from various performance IFCIDs. Up to four concurrently active detail traces each use a separate DB2 trace.

Exception traces—summary traces specifying exception filters—are a simple, inexpensive way to capture accounting data for later analysis of exception threads.

Current Traces

Trace requests are started and controlled from Current Traces, Option 4. When collected data is viewed from this option, it shows data kept in the online STORAGE buffer. The WRAP option determines whether the earliest data (WRAP=NO) or most recent (WRAP=YES) are kept when the buffer is filled.

History Traces with Logging

Each trace request can optionally be written to a separate set of one or more trace logs to be saved for later analysis. History Traces, Option 5, provides a list of available logs, and access to their data. (You can use the Expand button to switch back and forth from a Current to a History Trace.) Logs can be dynamically allocated, or preallocated to speed up both the trace initialization and the log switching process. Preallocated logs can be of different sizes. When a trace with logging is complete, you can purge the trace from Current Traces to free the storage. You can view the collected data at any time from History Traces. Traces can also be printed from the logs.

Trace Displays

The first data display shown for a trace is LTRAC, a list of completed threads. From here you can summarize the data into totals (TSTAT), or by an identifier like plan name or by time (TSUMx). You can also drill down to get details for each thread. The full accounting data is shown for each thread in the STRAC display. (Use PF11/10 to move from one STRAC display to the next.)

For a detail trace, STRAC also shows summaries of the collected events, such as a summary of SQL statements. From STRAC, you can drill down to a chronological view of the events, shown in DTRAC. DTRAC has 3 levels so you can see an overview of the most important events like SQL, or expand into the whole list. The complete IFCID contents are shown in event pop-up displays. (Use PTF11/10 to move from one pop-up display to the next.)

Detail Trace Specifications

To collect the detail events occurring during the life of the threads, you must first specify which groups of events you really need to see (for example, SQL yes, LOCKS no), which threads you need to trace, and what kind of threads they are. Are there many quick-running transactions that can perhaps run concurrently? Are there one or a few longer running threads? Or perhaps you need to see only a short interval within the life of a very long thread?

As a general rule, limit the data to be collected by qualifying a detail trace request with identifiers, and by choosing only the events that you need. Qualifying by plan or authid also limits the amount of data that is collected by DB2; other qualifiers are not supported in the DB2 trace request and can only be filtered afterward by MVDB2.

Detail Trace Buffers

Depending on the type of work to be traced, you can now decide on the size and number of logs needed, as well as the in-flight detail trace buffers, which are determined by the TRBUFF (number) and TRSIZE (size) parameters. The total amount of storage used can be limited by TR LIM. More extensive information is available in the online Help, but generally the defaults are sufficient for most trace requests. If you are tracing many concurrent threads, or many events, you might need more buffers. If you see error messages in the trace displays, you might need to go back and review these specifications (see [“Solving Problems” on page 204](#)).

Detail Traces of Long-Running Threads

A detail trace can start at any time during the life of thread, and event collection starts immediately.

A trace entry in LTRAC is normally posted when the thread is complete and the accounting record is available. **You will never see an entry for an active thread in Current Traces.** Also, even when a long-running thread is completed, all captured events might only be visible in History Traces, since online event buffers are reused as needed.

You may be able to see trace activity for active threads in two places:

- From the DUSER display (detail user status display of an active thread) you can view the recent collected chronological events (from two online buffers) with the UTRAC display, which is similar to DTRAC. The UTRAC Expand button on DUSER will be highlighted when events are available for viewing from an active detail trace.
- With trace logging, a trace entry in LTRAC becomes available in History Traces as detail event buffers fill up and are written to a log, even during the life of the thread. Such an entry is identified with a status of INCOMP. The STRAC display for an active thread has no accounting data, only the thread identifiers and the detail event summaries - for example, of the SQL statements executed. The chronological events can be viewed in DTRAC. These active threads (INCOMP) can only be viewed from the trace logs, and only after at least one buffer of events has been written. **You must access it from History Traces, Option 5.**

Stopping the Trace before Thread Completion

If you do not want to capture events through to the completion of a thread, no accounting record can be captured, and the following considerations apply:

- A trace without logging will never show an incomplete thread.
- Events for each SQL statement are written after it is completed and the start/end event matching is done. If the trace is stopped before a long-running SQL statement finishes, the data for that SQL statement will be lost.
- Stop the trace when you have collected sufficient data on the logs. You can stop the trace manually, or by specifying a stop time when making the trace request. Since no accounting record is received at thread completion, the trace entry in LTRAC will still show INCOMP. (Partially filled online buffers are not written when the trace is stopped before a thread is completed.)

No log switch is required before stopping the trace.

- If a log fills up, the detail entries on that log are still available through the INCOMP LTRAC entry for each log used, whether one or many. If the thread is traced to completion, the accounting data is available on the last log. Online, you view the data one log at a time. However, the trace print facility can process the data from all the logs of a trace in one report. The events are still shown under their controlling LTRAC entries for each log, but will appear in chronological sequence.
- Specify OVERWRITE LOGS as YES or NO depending on whether you want to preserve the earliest or latest events captured.

Using Exception Filters on Detail Traces

Using exception filters, such as `TIMEOUT > 1`, in a detail trace is much more complex than in a summary trace. These filters can only be checked when the accounting record is received, but in the meantime the event records must be collected and managed. Then, when the thread is completed, the exception conditions can be checked and the decision made whether to keep the collected data or discard it.

Since only completed threads are shown in Current Traces, only threads that meet the filter conditions will be shown. Depending on the number of threads traced, the number of events traced, and the size of the online viewing STORAGE buffer, all events per thread might not be available; however, the events that are available might provide a sufficient amount of data.

If the trace is logged, INCOMP entries are created for a thread whenever a buffer fills up and some of the detail events must be written to a log. When the accounting record is received, but does not match the filter criteria, the INCOMP entry for that thread remains, because it controls the detail events that are already on the log. If the accounting record is never received (a long-running thread), or a log switch occurs before it is received, these INCOMP entries also remain. **Only view complete threads. In this case, all INCOMP entries should be ignored as non-matches.**

Appendix D. Discarded Trace Records

MVDB2 has governors on the processing of trace records to avoid excessive storage usage and possible S878 abends in the PAS. When necessary, trace records are discarded after queues build up too much backlog. When this situation happens, you will see one of the following messages:

```
IM7910W  dddd MAX TRACE LOG RECORDS QUEUED, DISCARDING
DZ0100W  dddd MAX TRACE RECORDS QUEUED, DISCARDING
```

followed by the matching message when the process is completed:

```
IM7911I  TRACE LOG RESUMED - nnnnnnnn RECORDS LOST
DZ0101I  ,ddd,TRACE RESUMED - nnnnnnnn RECORDS LOST
```

These conditions can occur in various situations, for example:

- When too many trace requests are active
- When too much data is being traced in a detail trace
- When the thread rate is very high
- When a temporary contention problem causes a processing delay

Parameters allow this processing to be tuned to address the underlying problem. However, the first action is to determine what might be causing the processing backlog. Check for other conditions that might be causing a delay around the time the warning message is written, as follows:

- If you are receiving the DZ0100W / DZ0101I messages, the backlog is occurring during the collection of the records from DB2 and posting them to the correct traces.

Suggestions (more detail is available in the *MAINVIEW for DB2 Customization Guide* in the Application Trace “Setup Recommendations” section):

- Ensure that the WLM service class (goal mode) or dispatching priority (compatibility mode) of the PAS is higher than DB2 (DBM1 and MSTR address spaces). If this situation is not the case, you could also see DB2 messages about lost data if MVDB2 cannot transfer a filled buffer quickly enough.
- If other MAINVIEW products (especially MVCICS or MVIMS) are active in the same PAS, or a large number of active DB2s are being monitored, consider splitting up the workload into multiple PASs.
- Evaluate whether to increase the BBI-SS PAS region size. BMC Software recommends specifying 0M.
- For the detail trace, adjust the trace buffer sizes higher.
- Consider selectively stopping some traces during times of high activity.
- If you are receiving the IM7910W / IM7911I messages, the backlog is occurring while the trace records are being written to a trace log data set.

Suggestions (in addition to those above):

- Evaluate the number of traces with logging to see if some logging can be reduced.
- For THRDHIST, tune the size of the trace log data sets.
- Consider moving the trace logs to a high performance DASD.

The BBPARM member DMRBEX00 contains the following sets of controls:

- TRPQELO and TRPQEHI control the queued records accepted from DB2 and waiting to be posted to the online buffers. Use the TRPQE* parameters if you are receiving the DZ0100W/DZ0101I messages. The maximum is 9999; the defaults are 100 and 200. The defaults mean that whenever 200 records are queued, new records are discarded until the backlog has been reduced to 100, when normal queuing is resumed.
- TRLWELO and TRLWEHI control the queued records waiting to be written to a trace log data set. Use the TRLWE* parameters if you are receiving the IM7910W/IM7911I messages. The maximum is 9999, the defaults are 100 and 200. The defaults mean that whenever 200 log writes are queued new logging requests are discarded until the backlog has been reduced to 100, when normal queuing of log writes is resumed.

If extended private storage availability permits, the appropriate xxHI value can be increased to provide more space for queuing before discards occur. If you can set the HI value above the usual number of discards, that usually provides enough time to catch up from a temporary backlog. The xxLO parameters should be used to keep the desired relationship between the HI and LO values to avoid frequent discard actions of just a few records. A wider range gives MVDB2 more time to reduce the backlog.

Index

Symbols

#CALL monitor 127
#CLMF monitor 127
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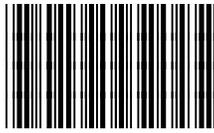
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