



DB2 Performance Monitor for OS/390

Online Monitor User's Guide

Version 6

Note

Before using this information and the product it supports, be sure to read the information in "Appendix C. Notices" on page 277.

First Edition, June 1999

This edition applies to Version 6 of IBM DATABASE 2 Performance Monitor for OS/390, a feature of IBM DATABASE 2 Universal Database Server for OS/390 Version 6 (5645-DB2), and to all subsequent releases and modifications until otherwise indicated in new editions.

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About This Book

This book describes how to use the Online Monitor of IBM DATABASE 2(TM) Performance Monitor for OS/390 Version 6. DB2 PM is a performance analysis tool that helps you monitor and tune the following IBM DATABASE 2 products:

- IBM DATABASE 2 Universal Database Server for OS/390 (DB2 UDB for OS/390) Version 6, Program Product 5645-DB2
- IBM DATABASE 2 Server for OS/390 (DB2 for OS/390) Version 5, Program Product 5655-DB2
- IBM DATABASE 2 for MVS/ESA (DB2 MVS/ESA(TM)) Version 4, Program Product 5695-DB2.

DB2 PM Version 6 is a feature of DB2 UDB for OS/390.

The tuning information in this book may not be appropriate for all sites. In particular, the tuning information in this book applies to situations from a performance viewpoint only. At some sites, there may be other factors of higher priority that need to be considered.

The panel examples shown in this book apply to DB2 UDB for OS/390 Version 6 unless otherwise specified. In some cases, panel examples for DB2 for OS/390 Version 5 and DB2 for MVS/ESA Version 4 are also shown where they display information not shown on the DB2 UDB for OS/390 Version 6 panel of the same name. All panels have a short and long function key display. In this book, only the long form is shown under the command line.

Who Should Read This Book

This book is helpful to any DB2 user responsible for one or more of the following activities:

- Determining total DB2 system performance and efficiency
- Analyzing and improving SQL statements
- Tuning DB2 subsystems and DB2 applications
- Identifying and removing potential bottlenecks in the system
- Problem determination.

How to Send Your Comments

Your feedback is important in helping to provide the most accurate and high-quality information. If you have any comments about this book or any other DB2 PM documentation, send your comments using:

- Internet. The address is: swsdid@de.ibm.com.
- The form at the back of this book. Return it by mail or fax, or give it to an IBM representative. The fax number is: +49-7031-166901.
- IBM Mail Exchange. The address is: DEIBM3P3 at IBMMAIL.

Be sure to include the name of the book, the version of DB2 PM, and, if applicable, the specific location of the text you are commenting on (for example, a page number or a table number).

How to Use This Book

Whether you are a database administrator, a data processing manager, a DB2 application programmer, or a system programmer, read “Chapter 1. Introduction to the Online Monitor” on page 3 and “Chapter 2. Monitoring and Problem Determination” on page 9 the first time you use this book. We also recommend that you read “Authority” on page 17, and “Input Data” on page 17. Any time you have questions about a specific Online Monitor function, refer to the corresponding chapter.

How This Book Is Organized

This book describes the Online Monitor performance analysis tool. It consists of the following chapters:

- “Chapter 1. Introduction to the Online Monitor” on page 3 describes the purpose and function of the Online Monitor, and gives an overview of the Online Monitor main menu options.
- “Chapter 2. Monitoring and Problem Determination” on page 9 describes how DB2 PM supports monitoring and tuning.
- “Chapter 3. Using the Online Monitor” on page 17 describes the Online Monitor options, using the online help, the function key default settings, Interactive Report Facility (IRF) options, how the Online Monitor performs correlation ID translation, how to issue DB2 commands from the Online Monitor, global commands, and common errors encountered when using DB2 PM.
- “Chapter 4. Common Errors Using DB2 PM” on page 37 describes problems often encountered using DB2 PM.
- “Chapter 5. Viewing Past Data” on page 43 describes how to view previous thread activity data, previous DB2 statistics, and previous DB2 system parameters.
- “Chapter 6. Exception Processing” on page 47 describes display exception, periodic exception, and exception event processing. This chapter also covers exception threshold data set maintenance.
- “Chapter 7. Displaying Thread Activity” on page 71 describes the thread activity panels, associated commands, thread activity tuning information, and the thread diagnosis panels.
- “Chapter 8. Viewing DB2 Statistics” on page 125 describes the statistics panels, associated commands, and statistics tuning information.
- “Chapter 9. Monitoring the Access Path—Explain” on page 177 describes Online Monitor explain, source explain, associated panels and commands, performance considerations, and tuning advice.
- “Chapter 10. Viewing System Parameters” on page 199 describes the system parameters option and the DB2 System Parameters Detail panel.
- “Chapter 11. Problem Identification Examples” on page 203 shows examples of using the Online Monitor to identify potential problems on a subsystem-wide or thread basis.
- “Chapter 12. Tailoring Exception Thresholds—Exception Profiling” on page 225 describes how to use DB2 PM to calculate exception thresholds from previous system activity.

- “Chapter 13. Customizing Panels” on page 229 describes how to customize the Thread Detail panel, DB2 Statistics Detail panel, and DB2 System Parameters Detail panel.
- “Chapter 14. Data Collector Purpose and Function” on page 233 describes the purpose and function of the data collector, and how it affects various data collector dependent functions.
- “Chapter 15. Administrator User” on page 235 describes the purpose of an administrator user and the administrator dialog panels in detail.

Programming Interface Information

This publication is intended as a guide for using the DB2 PM Online Monitor to monitor and tune DB2.

This publication also documents product-sensitive programming interface and associated guidance information provided by IBM DATABASE 2 (DB2) only, as well as diagnosis, modification, or tuning information provided by IBM DATABASE 2 Performance Monitor (DB2 PM) only.

Product-sensitive programming interfaces allow the customer installation to perform tasks such as diagnosing, modifying, monitoring, repairing, tailoring, or tuning DB2. Use of such interfaces creates dependencies on the detailed design or implementation of the IBM software product. Product-sensitive programming interfaces should be used only for these specialized purposes. Because of their dependencies on detailed design and implementation, it is to be expected that programs written to such interfaces may need to be changed in order to run with new product releases or versions, or as a result of service.

Product-sensitive programming interface and associated guidance information is identified where it occurs by the following marking:

┌ **Product-Sensitive Programming Interface** _____

Product-sensitive programming interface and associated guidance information...

└ **End of Product-Sensitive Programming Interface** _____

Diagnosis, modification, or tuning information is provided to help the customer perform diagnosis, monitoring, or tuning of DB2.

Warning: Do not use this diagnosis, modification, or tuning information as a programming interface.

Diagnosis, modification, or tuning information is identified where it occurs by the following marking:

┌ **Diagnosis, Modification, or Tuning Information** _____

Diagnosis, modification, or tuning information...

└ **End of Diagnosis, Modification, or Tuning Information** _____

Prerequisites

A working knowledge of, and experience with, either one of the following IBM DATABASE 2 products is required:

- DB2 UDB for OS/390 Version 6
- DB2 for OS/390 Version 5
- DB2 for MVS/ESA Version 4.

How to Read the Syntax Diagrams

The following rules apply to the syntax diagrams used in this book:

- Read the syntax diagrams from left to right, from top to bottom, following the path of the line.

The ►— symbol indicates the beginning of a statement.

The —► symbol indicates that the statement syntax is continued on the next line.

The ►— symbol indicates that a statement is continued from the previous line.

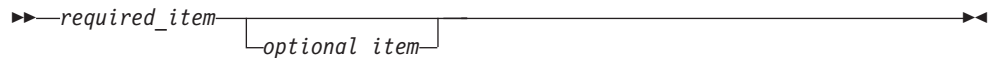
The —►◀ symbol indicates the end of a statement.

Diagrams of syntactical units other than complete statements start with the ►— symbol and end with the —► symbol.

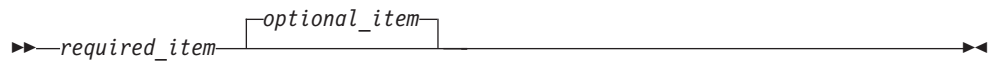
- Required items appear on the horizontal line (the main path).



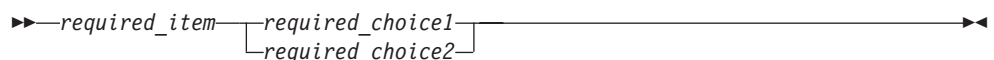
- Optional items normally appear below the main path.



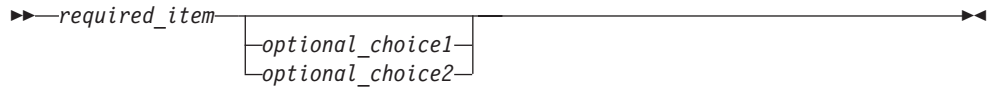
If an optional item appears above the main path, that item has no effect on the execution of the statement and is used only for readability.



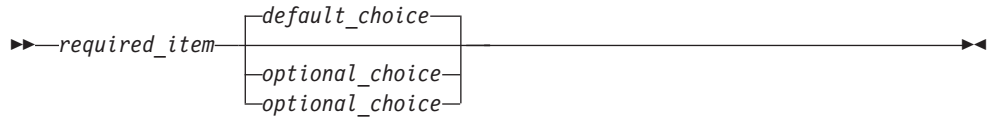
- If you can choose from two or more items, they appear vertically, in a stack. If you *must* choose one of the items, one item of the stack appears on the main path.



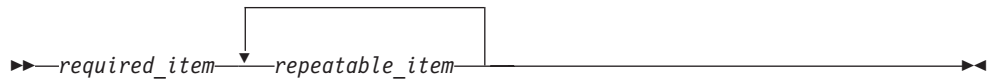
If choosing one of the items is optional, the entire stack appears below the main path.



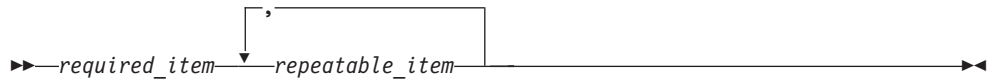
If one of the items is the default, it appears above the main path and the remaining choices are shown below.



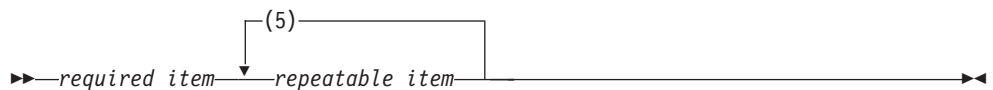
- An arrow returning to the left, above the main line, indicates an item that can be repeated.



If the repeat arrow contains a comma, you must separate repeated items with a comma.



If the repeat arrow contains a number in brackets, the number represents the maximum number of times that item can appear.



A repeat arrow above a stack indicates that you can repeat the items in the stack.

- Keywords appear in uppercase (for example, FROM). Variables appear in all lowercase letters (for example, *column name*). They represent user-supplied names or values.
- If punctuation marks, parentheses, arithmetic operators, or other such symbols are shown, you must enter them as part of the syntax.

Summary of Changes

This section lists the changes to DB2 PM in Version 6. DB2 PM Version 6 supports all the functions available in DB2 PM Version 4 and Version 5. In addition, all new instrumentation data of DB2 UDB for OS/390 Version 6 is supported by the Workstation Online Monitor and batch reports.

- DB2 PM now shows time and events for the newly introduced triggers and user-defined functions.
- DB2 PM monitors the behavior of large objects and the new ROWID data type.

- Service task switch time and synchronous I/O time are broken down into various class-3 times.
- DDF threads are shown in more detail, such as information on the end user's user ID, the workstation name, and the transaction name, which you can use as ordering and filtering criteria to customize your report sets.

The following sections describe the components and functions that are new or enhanced for DB2 PM Version 6.

Workstation Online Monitor for Windows NT and OS/2

DB2 PM Version 5 introduced the Workstation Online Monitor for both the OS/2(R) and Windows NT environments. The Workstation Online Monitor offers some significant advantages:

- Eliminate the need to monitor through TSO
- Improve your efficiency with an easy-to-use graphical interface
- Monitor multiple DB2 subsystems concurrently
- Offer improved tuning recommendations on a per-field basis
- Let you submit DB2 commands from DB2 PM workstation windows
- Display historical data in enhanced System Health graphics.

For Version 6, the Workstation Online Monitor adds several new functions, such as:

- Thread qualification and thread sort
- Intervall processing
- Reporting of statistics delta
- Statistics data is provided for cached SQL statements so you can analyze and evaluate their efficiency.

DB2 PM Installer

In Version 6, you can install, migrate, and customize DB2 PM from your workstation using a graphical interface, which guides you through the installation sequence. You can activate the DB2 PM Installer as a subfunction from the DB2 Installer and

- Install DB2 PM and control the overall installation process
- Run SMP/E installation jobs.

You receive job status information dynamically, and you can edit JCL, perform job cleanup, and examine job output from the workstation. The DB2 PM Installer enhances your productivity significantly whether you are installing DB2 PM for the first time or are an experienced installer.

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Chapter 1. Introduction to the Online Monitor

You can use the Online Monitor to determine overall performance of a DB2 subsystem or to identify potential performance problems on an individual thread basis.

Performance counters for DB2 versions up to and including Version 5 are supported. If you want to monitor counters introduced in DB2 Version 6, you should use the Workstation Online Monitor or batch reports.

The Online Monitor displays subsystem-wide performance information such as CPU times, buffer pool usage, locking, log, and I/O activity. For an individual thread, the Online Monitor displays information such as the elapsed time, the time spent in DB2, the time it was suspended, the read and write activity involved, the locks obtained, and the SQL statements executed.

By analyzing this information, you can identify areas where tuning is required to enhance the performance of a DB2 subsystem, applications, or queries.

Purpose and Function

DB2 generates data about its own performance, but it does not provide any reporting facilities for analyzing this data. The Online Monitor provides you with the capability to view an active DB2 subsystem and identify performance problems online.

The Online Monitor displays DB2 performance information in a comprehensive form that is easy to understand and analyze.

You can use the Online Monitor to:

- Determine total DB2 system performance and efficiency
- Measure an application's performance and resource use
- Evaluate an application's impact on other applications and the system
- Analyze and improve SQL statements
- Identify potential problems
- Determine tuning requirements for DB2.

When changes are made to an application or to the DB2 subsystem, the Online Monitor can help you determine the impact. This is very important for determining whether the changes increased or decreased performance.

When DB2 performance is not satisfactory, the Online Monitor can help you identify areas where tuning is required to optimize the performance of DB2. The Online Monitor can log DB2 activities and events and provide this information for later viewing to assist you in determining the cause of potential problems.

You can also perform a thread diagnosis to view an analysis of a thread's performance and suggested improvements.

For a long-term view of DB2 performance, your needs are best served by the DB2 PM Batch reporting capabilities.

DB2 Performance Data Generation

DB2 generates trace information about performance and events in the DB2 subsystem. The Online Monitor retrieves and displays this information.

Overview of the Online Monitor

The Online Monitor displays DB2 system and application performance data on panels which you access from the DB2 PM Online Monitor Main Menu (Figure 1).

```

DGOMMENU 13:01   DB2 PM Online Monitor Main Menu          PM01DLOC DSN1 V6
                  GROUP001 MEMBER01

Select one of the following.

—  1. Display Thread Activity
    2. Display Statistics
    3. Display System Parameters
    4. Options
    5. Control Exception Processing
    6. Collect Report Data
    7. IRF - Create and execute DB2 PM commands
    8. IRF - Display and print graphs
    9. IRF - Maintain parameter data sets
   10. Explain

Command ===>
F1=Help   F2=Split   F3=Exit   F9=Swap   F12=Cancel F16=Look
F17=Collect
```

Figure 1. DB2 PM Online Monitor Main Menu

You can access the following Online Monitor options from this menu.

Display Thread Activity

Display Thread Activity is used to view detailed thread and locking information for all threads currently connected to a DB2 subsystem.

You can view active threads in a summary format, or examine them individually in greater detail.

When you select this option, the Thread Summary panel is displayed listing all active threads. You can filter the listing using the QUALIFY command (refer to “QUALIFY Command” on page 116 for more information). You can also sort the threads listed using the SORT command (refer to “SORT Command” on page 120 for more information). From the Thread Summary panel, you can select any active thread to display the Thread Detail panel, where you can examine the thread.

The Thread Detail panel provides an overview of key values for the selected thread. From the Thread Detail panel, you can access additional windows to view thread activity data in greater detail.

Refer to “Chapter 7. Displaying Thread Activity” on page 71 for more information on viewing thread activity.

The headings, field labels, fields displayed, and the order they appear on the Thread Detail panel can be tailored. Refer to “Chapter 13. Customizing Panels” on page 229 for more information.

Display Statistics

The Display Statistics option is used to view important statistics and ratios of a DB2 subsystem in a summary format or in detail.

When you select this option, the DB2 Statistics Detail panel is displayed providing an overview of key statistics values for the system. From this panel, you can access additional windows to view statistics data in greater detail.

Refer to “Chapter 8. Viewing DB2 Statistics” on page 125 for more information.

The headings, field labels, fields displayed, and the order they appear on the DB2 Statistics Detail panel can be tailored. Refer to “Chapter 13. Customizing Panels” on page 229 for more information.

Display System Parameters

The Display System Parameters option is used to view an overview of the current DSNZPARM values in effect for a DB2 subsystem including any changes to the buffer pool and group buffer pool parameters.

When you select this option, the DB2 System Parameters Detail panel is displayed providing an overview of key system parameter values. From this panel, you can access additional windows providing system parameters information in greater depth.

Refer to “Chapter 10. Viewing System Parameters” on page 199 for more information.

The headings, field labels, fields displayed, and the order they appear on the DB2 System Parameters Detail panel can be tailored. Refer to “Chapter 13. Customizing Panels” on page 229 for more information.

Options

Options is used to change the parameters affecting the behavior of your own Online Monitor session. You can use this option to:

- Select the DB2 subsystem to be monitored.
- Display your installation-specific history parameters (only available if the data collector is installed at your site). Refer to “Chapter 14. Data Collector Purpose and Function” on page 233 and the following chapters for a description of the data collector.
- Control the writing of monitor records to an output data set.
- Set the default auto-display interval.
- Set various Interactive Report Facility (IRF) session options.
- Set the current SQLID for explain processing.

Introduction

Refer to “Online Monitor Options” on page 21 for more information.

Control Exception Processing

The Control Exception Processing option is used to activate or deactivate exception processing. You can use exception processing to identify DB2 threads and statistics data with fields that contain values outside limits you have specified. Use this option to better manage service levels by identifying performance problems in a DB2 subsystem, or performance problems with application threads.

Refer to “Chapter 6. Exception Processing” on page 47 for more information.

Collect Report Data

The Collect Report Data option is used to start and stop DB2 traces, either manually or automatically by specified triggers. The resulting trace data can be directed to a data set for immediate input to DB2 PM Batch reporting. The DB2 traces started are determined by the reports you want to produce.

Refer to the *DB2 PM Batch User's Guide* for more information.

IRF - Create and Execute DB2 PM Commands

The IRF - Create and execute DB2 PM commands option is used to generate and execute DB2 PM Batch report command streams.

Refer to the *DB2 PM Report Reference* and the *DB2 PM Batch User's Guide* for more information.

IRF - Display and Print Graphs

The IRF - Display and print graphs option is used to produce graphical reports. The following types of graphs can be produced:

- Accounting by field identifiers
- Accounting by DB2 PM identifiers
- Statistics
- Frequency distribution.

Refer to the *DB2 PM Batch User's Guide* for more information.

IRF - Maintain Parameter Data Sets

The IRF - Maintain parameter data sets option is used to maintain the exception threshold data set, the correlation translation member, the timezone information member, and the MAINPACK definition member.

Refer to the *DB2 PM Batch User's Guide* for more information.

Explain

The Explain option is used to examine the access path method chosen by DB2 for a given SQL statement in an easy-to-read format. The SQL statement you want to explain can be an existing entry in a specific PLAN_TABLE, an SQL statement from a previously bound plan or package, or a dynamically entered SQL statement.

You can view detailed information on packages, DBRMs, tables, indexes, and the SQL text. The SQL statement can be modified for online tuning.

You can also explain an SQL statement from within the thread activity function to explain a currently executing SQL statement, or from within an ISPF/PDF editor to explain an SQL statement imbedded in a source program or SPUFI input.

Refer to “Chapter 9. Monitoring the Access Path—Explain” on page 177 for more information.

Chapter 2. Monitoring and Problem Determination

This chapter describes how to monitor a DB2 subsystem and how to determine performance problems using both the Batch reports and the Online Monitor functions of DB2 PM.

You can use DB2 PM for the continuous or periodic monitoring of a DB2 subsystem as well as for determining specific performance problems in DB2. DB2 PM can help you in:

- Determining how an application will perform or is performing over a period of time
- Indicating where there are tuning opportunities in your system
- Distinguishing between subsystem and application problems
- Monitoring an application in a detailed manner so you can identify problem areas
- Analyzing constraints acting on an application
- Determining the performance impact of any adjustments made within the DB2 subsystem
- Determining whether performance objectives are being met.

DB2 PM offers different ways for you to monitor your subsystem depending on whether you want to see current or past activity: the Online Monitor is used to monitor an active subsystem as well as to view events that happened in the recent past, whereas the Batch reports are used to examine performance problems in the more distant past and trends over a period of time.

The amount of data generated for monitoring a DB2 subsystem is vast, so limiting the amount of data to show only potential problem areas is essential. DB2 PM offers various ways of reducing the amount of data that needs to be examined, the most important of which is exception processing. Exception processing makes it easy for you to focus on possible performance problems by highlighting data that is outside limits you have specified. It is available in both Batch reporting and the Online Monitor.

The recommended approach is to monitor an active DB2 subsystem using Online Monitor exception processing (you do not need to be logged on to have exception processing running) and to regularly generate statistics and accounting exception reports. Online Monitor exception processing alerts you to performance problems as soon as they occur, and the accounting and statistics reports give you a detailed picture of application and system performance over a period of time.

Deadlock and timeout participant details are available online through event exception processing. You should also consider generating deadlock and timeout traces regularly, because in this way information is available to help you investigate any locking problems in detail. There is no significant performance overhead on the DB2 side in collecting the data for these reports.

The best way for you to investigate performance trends is by using IRF graphics and by producing accounting and statistics reports ordered by interval.

To detect problems as they occur, use the Online Monitor periodic exception processing. When you detect poor thread performance, you can examine the

Monitoring DB2

comprehensive performance data shown on thread and statistics panels. If you think the problem is caused by SQL, you can analyze the access path using the online explain function.

If the problem occurred in the recent past, you can use the Online Monitor HISTORY command to view the events surrounding the problem without having to recreate it.

If the panels do not provide enough information to solve the problem, you can use the Online Monitor to collect instrumentation data for batch reports. You can specify the data collection to be triggered by exception thresholds; in this way you can minimize the time high-volume and high-cost traces are active and ensure that the data needed is collected at the right time.

DB2 PM provides a comprehensive set of reports with different levels of detail and for different areas of performance. This represents a top-down approach to problem determination: the most generic reports indicate the problem area and, if necessary, more details can be shown to narrow down the cause of the problem.

The DB2 Operating Environment

The performance of a DB2 transaction or query is dependent not only on the performance of the DB2 subsystem, but also on the performance of the transaction manager, such as CICS(R) or IMS(TM), and the MVS(TM) system itself. Therefore the environment in which the DB2 subsystem is operating should be tuned before DB2 is tuned.

For example, if the MVS system is overloaded, tuning a DB2 subsystem is unlikely to improve DB2 system performance. DB2 performance can only be improved by reducing or balancing the load of the MVS system.

Specialized tools are available to monitor the different system components:

- CICSplex System Manager for CICS
- IMS/VS DC Monitor or IMSPARS for IMS
- RMF(TM) for MVS.

The relationship between the different systems and performance tools is complex and it is not within the scope of this book to describe them. Refer to the *IBM DB2 Universal Database Server for OS/390 Version 6 Administration Guide* for more information about them. For the purposes of this book it is assumed that the environment in which the DB2 subsystem is operating is well tuned.

Performance Objectives and Exception Processing

Before you can start monitoring the system, you should define your performance objectives on the basis of the business needs, the workload for the system, and the resources available. Typically, the objectives would include acceptable response times, average throughput, and system availability.

These objectives are usually formalized in service-level agreements between the users and the data processing groups in an organization. The agreements can include expectations of, for example, query response times and transaction throughput.

With DB2 PM, you can monitor how well these objectives are being met.

The most efficient way to do this is to set limits, exception thresholds, for key fields that reflect your performance objectives using exception processing.

Exception profiling can assist you in establishing exception thresholds. This facility sets exception thresholds automatically based on your application configuration. For reports, the accounting TOP option is also useful in determining accounting exception thresholds.

You can, for example, monitor response times by setting exception thresholds for class 1 and class 2 elapsed times to reflect the acceptable response times for your environment. Class 1 elapsed time shows the thread time (from thread creation to thread termination) and class 2 time shows the time DB2 spent processing SQL statements.

Monitoring

The key to effective performance monitoring is in identifying unusual situations and thereby limiting the amount of data that needs to be examined. In addition to exception processing, DB2 PM offers various other ways of filtering the data and highlighting potential problems.

The following are available in Batch reporting:

- Filtering data by date and time (FROM/TO)
- Filtering data by identifiers such as user ID (INCLUDE/EXCLUDE)
- Filtering data by resource usage (TOP)
- Ordering data on reports by interval (INTERVAL)
- Summarizing and sorting data on SQL reports
- Tailoring report layouts for your own needs (UTR).

The following are available in the Online Monitor:

- Qualify and sort functions
- History data collection with qualifications.

Monitoring Using Reports

You can filter the data shown on reports by using the INCLUDE/EXCLUDE and FROM/TO filters to show, for example, information only for certain plans, authorization IDs, or locations within specified times.

Another way to limit the data that needs to be examined is to use the *accounting TOP option* to obtain a high water mark type of reporting on resource usage. The TOP lists, printed at the end of an accounting report or trace, identify, for example, the threads or users that have required the most use of the resources specified in the TOP option. Alternatively, you can use the *TOP ONLY option* to filter entries based on resource usage and produce a report showing only entries with the highest resource usage.

By ordering your accounting and statistics reports by *interval* you can summarize data for certain periods. It can be useful, for example, to summarize data for the peak periods during the day.

When you produce SQL activity reports and traces, potential problems can be highlighted by *sorting* and *summarizing* the information within the report and trace entries by various criteria. For example, a problem cursor can be identified by

Monitoring DB2

summarizing SQL activity by cursor and ordering the cursors by TCB times. The sorted entries provide an easy way to identify SQL statements that might be causing performance problems.

You can tailor your own report and trace layouts using the user-tailored reporting feature (UTR). This function gives you full control over the volume, contents, and layout of your traces and reports.

Monitoring Using the Online Monitor

The Online Monitor qualify and sort functions can help you limit and prioritize the threads listed on the Thread Summary panel.

Use the *qualify function* to filter threads by DB2 PM identifiers, thread status, and thread type, and to effectively reduce the amount of data that needs to be examined. For example, if you want to view the active threads in lock wait status only, you can qualify the threads by selecting the *In lock wait* field on the DB2 Thread Qualification Parameters window.

Use the *sort function* to specify the order in which the threads are listed. For example, if you want to view the threads that are spending the most time within DB2, you can sort the threads by class 2 time in descending order. Threads in exception status are automatically sorted to the top of the list.

Observing Trends

You can use DB2 PM reports and graphs to summarize data over periods of several days, weeks, or months to observe trends in performance.

In monitoring trends, you should pay special attention to peak periods of activity, both for new applications and for the system as a whole. During peak periods, constraints and response-time problems are most evident.

Some trends to look for are:

- Increases in response times, number of I/Os, resource contention, and CPU usage
- Changing workload patterns over a period
- Changes in the transaction distribution and frequency
- Changes in the SQL activity pattern.

Determining Problems

When you find that there are performance problems when you are monitoring the system, you can use various panels and reports to investigate the cause of the problems.

Problems Detected in Periodic Exception Processing

If you are using periodic exception processing in the Online Monitor and you are notified about a problem, the best way to find out what caused it is to examine the thread activity panels, especially thread diagnosis, or statistics panels, depending on the type of problem (see Figure 2 on page 13).

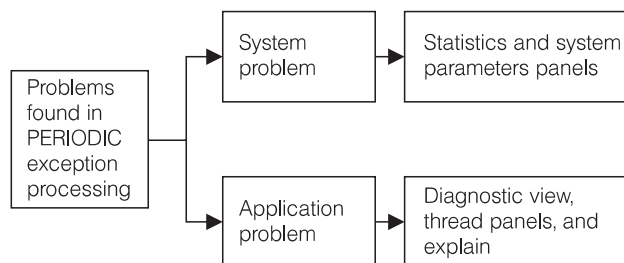


Figure 2. Problems Found in Periodic Exception Processing

To view the past events surrounding the problem online, you can use the HISTORY command. The amount of historical data available is determined by installation-defined options. Note, however, that the batch reports are more comprehensive than the Online Monitor panels. Therefore, if the panels do not provide enough information to solve a problem, the Online Monitor collect report data function should be used to gather information in a data set for input to the batch reports.

Problems Detected in Exception Event Processing

If you detect a problem using the online event exception processing and the Online Monitor panels do not provide sufficient information to determine the cause, then you should collect the appropriate trace data to produce locking reports, I/O activity reports, audit reports, or record traces. The following table shows you how to proceed when you analyze a specific event exception:

Exception	How to proceed
Deadlock or Timeout	If deadlocks or timeouts occur too often, generate a Lockout report to see which applications and objects are affected. Having identified the objects and applications causing the deadlocks or timeouts, use EXPLAIN to understand the locking behavior of the SQL statements or consider reorganizing the database.
EDM Pool Full	First check online or batch statistics to get more information about the EDM Pool situation. More details are provided in the I/O Activity EDM Pool report.
Authorization Failure	If authorization failures occur too often, generate an Audit authorization failure report for details.
Thread Commit Indoubt	Run Record Trace on the Statistics Class 4 IFCIDs to see details of communication problems. These are likely to be either VTAM(R) or DB2(R) internal problems.
Coupling Facility Rebuild	Use the COLLECT command to automatically start tracing IFCID 268 (CF rebuild end) when a coupling facility rebuild starts, and run Record Trace for this IFCID. You can get more details about coupling facility behavior from RMF reports.

Monitoring DB2

Problems Detected in Exception Reports

If you use the accounting and statistics exception reports to monitor your system, you can often detect the cause of a performance problem using the comprehensive information they offer without producing other reports. You should produce these reports using the TOP option in accounting or the INTERVAL option in both accounting and statistics so that you can immediately focus on potential problem areas. Sometimes, however, you require more detailed reports to determine the exact cause of a problem.

System Problems

If exception processing indicates problems in system-wide resource usage and a statistics trace does not clarify the reason for the problem, but points to EDM pool or logging activity, consider running I/O activity reports. Or, if the statistics trace indicates a problem with binds, you should generate utility activity reports. If the number of deadlocks is high, you should run locking reports. If none of these report sets offer adequate information to determine the cause of the problem, you can run a record trace to format the individual instrumentation records.

Application Problems

If exception processing indicates an application-related problem (usually an elapsed time problem for an application or a user), use explain reports to determine the access path of the suspected plan and, if necessary, generate accounting traces with the TOP option. If accounting and explain have not identified the reason for poor SQL performance, use SQL activity for detailed information on the specific statement such as scans or I/O per page set or sort specifics. If the accounting trace indicates a locking problem, run locking reports, or, if the problem seems to be with binds or DB2 utilities, run utility activity reports. As with system-related problem determination, you can run a record trace if none of these report sets provide adequate information to determine the cause of the problem.

Other Uses for DB2 PM

You can also use DB2 PM in application development and capacity planning.

The explain and the SQL activity reports can help you anticipate how an application will perform. The Online Monitor explain and source explain functions as well as some functions of thread activity can assist you in tuning your application's SQL online.

Accounting and statistics reports ordered by INTERVAL are useful in capacity planning. Use these reports to identify peak periods in system activity as well as the need to adjust system resources.

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Chapter 3. Using the Online Monitor

This chapter outlines the privileges and traces required to use the Online Monitor, shows you how to change parameters affecting the behavior of your Online Monitor session, describes the online help, default function key settings, moving between Online Monitor panels, issuing DB2 commands, global commands, and common errors encountered when using DB2 PM.

Authority

The following description applies only if you do not use the user authorization exit. If the user exit is active, the description about the user authorization exit provided in the *DB2 PM Installation and Customization* manual applies.

In order to use the Online Monitor, you must have the following authorities:

- Access to a DB2 Version 6, Version 5, or Version 4 subsystem
- EXECUTE authority on the Online Monitor plan (default plan name is DGOPMOM unless changed during installation)
- MONITOR1 privilege
- Display trace privilege.

You also need the DB2 authority for any DB2 commands you issue.

The following authorities are recommended:

- MONITOR2 or SYSADM privilege if you need access to the currently executing SQL statement
- DB2 privilege to start or stop a DB2 trace if you want to collect report data.

Important Note

Granting MONITOR2 privilege allows access to potentially sensitive data, that is, the SQL statement being executed.

Input Data

To use the DB2 PM Online Monitor, ensure that the DB2 monitor trace is active. Monitor trace class 1 is required for the Online Monitor to display data, but it is recommended that monitor trace classes 2, 3, 7, and 8 also be activated.

As long as the monitor trace is active, there is no need to activate DB2 statistics and accounting traces.

Monitor trace class 2 provides DB2 CPU and elapsed times for the thread activity panels and class 7 provides DB2 CPU and elapsed times for packages. Note that monitor trace class 2 is also required for class-1 TCB time to appear.

Monitor trace class 3 provides DB2 suspension times for the thread activity panels and class 8 provides DB2 suspension times for packages.

Using the Online Monitor

Note: The version and release numbers of the DB2 load library allocated to the Online Monitor session must match the version and release numbers of the DB2 subsystems being monitored.

To change the version of DB2 you are monitoring, exit from the Online Monitor and ISPF to reallocate the DB2 load library. For information on how to reallocate the DB2 load library at your site, consult your system programmer.

Accessing the Online Monitor

The DB2 PM Online Monitor is accessed from the IBM Database 2 Performance Monitor menu. To access this menu, select the required option to start your DB2 PM session from the TSO/ISPF environment.

The IBM Database 2 Performance Monitor menu is shown in Figure 3.

```
DGOFMENU                IBM Database 2 Performance Monitor

Select one of the following.

—  1. Create and execute DB2 PM commands
    2. Display and print graphs
    3. View online DB2 activity
    4. Maintain parameter data sets
    5. Customize DB2 PM report and trace layouts
    6. Exception profiling

IBM DB2 UDB Performance Monitor for OS/390 V6
Licensed Materials - Property of IBM
5645-DB2 (C) Copyright IBM Corp. 1985, 1998.
All rights reserved.
US Government Users Restricted Rights -
Use, duplication or disclosure restricted
by GSA ADP Schedule Contract with IBM Corp.

Command ==>
F1=Help      F2=Split    F3=Exit     F6=History  F9=Swap     F12=Cancel
F17=Collect
```

Figure 3. IBM Database 2 Performance Monitor Menu

From this menu, select option 3 (*View online DB2 activity*) to use the DB2 PM Online Monitor.

If the selected subsystem is part of a data sharing group, the group name and member name are displayed in the header of the panel. The header also shows the location name, the subsystem name, and the version of the DB2 subsystem you are connected to. See Figure 1 on page 4 for an example.

Moving between Panels

When you have entered a command on the command line, or have entered the information required to complete a panel, press **Enter**.

To go back to a previous panel or menu, press **F3** (Exit).

Each time you press **Enter** or **F3** (Exit), data entered on that panel is validated. If an error is detected, an error message is displayed and the cursor is positioned on the field in error. If no error is detected, processing continues.

To leave a panel without saving the entries and return to the previous panel, or to cancel all windows, press **F12** (Cancel).

You can move between various Online Monitor options by typing = followed by the Online Monitor main menu option number on the command line of any Online Monitor panel:

- =1 Jumps to display thread activity.
- =2 Jumps to display statistics.
- =3 Jumps to display system parameters.
- =4 Jumps to options.
- =5 Jumps to control exception processing.
- =6 Jumps to collect report data.
- =7 Jumps to IRF create and execute DB2 PM commands.
- =8 Jumps to IRF display and print graphs.
- =9 Jumps to IRF maintain parameter data sets.
- =10 Jumps to explain.
- =X Exits the Online Monitor.

Updating Values

To refresh thread activity, statistics, and system parameters panels with new data from DB2, press **Enter**. Values are not updated when:

- Any DB2 PM or ISPF command is entered on the command line
- Windows are selected for display
- Function keys are used
- Diagnosing a thread.

Note: The values shown on the Thread Summary and Threads Holding Resource panels are refreshed automatically each time the panels are displayed.

Leaving the Online Monitor

To exit the Online Monitor from the DB2 PM Online Monitor Main Menu, press **F3** (Exit) or **F12** (Cancel). From any other Online Monitor panel, type =X on the command line and press **Enter**.

If any asynchronous tasks are active when you exit the Online Monitor, you are notified by one of the Asynchronous Task Termination panels. If the data collector is not active, the tasks are terminated when you exit the Online Monitor. If the data collector is active, you have the choice of leaving the selected tasks active or not when you exit the Online Monitor. Refer to Figure 4 for an example of an Asynchronous Task Termination panel and to “Chapter 14. Data Collector Purpose and Function” on page 233 and the following chapters for a description of the data collector.

```
DGOMGP01      Asynchronous Task Termination

Press Enter to exit the Online Monitor or request Exit or Cancel to
return to the Online Monitor Main Menu.

Leaving the Online Monitor results in the termination of all
non-selected tasks as well as the stopping of all the DB2 traces started
by the collect report data facility.

  Exception/Collect tasks                Status
-----
_ Periodic Exception                    Active
_ Exception Event                       Active

Collect Task A                          Not active
Collect Task B                          Not active
Collect Task C                          Not active
Collect Task D                          Not active

Command ==> _____
F1=Help      F2=Split    F3=Exit    F9=Swap    F12=Cancel  F16=Look
F17=Collect
```

Figure 4. Asynchronous Task Termination Panel

To exit the Online Monitor from this window, press **Enter**. If the data collector is active, any tasks selected on this window remain active.

To return to the DB2 PM Online Monitor Main Menu, press **F3** (Exit) or **F12** (Cancel). All active tasks remain active.

Online Monitor Options

Use the options panels to change parameters affecting the behavior of your Online Monitor session. To display the Options menu, select option 4 (*Options*) from the DB2 PM Online Monitor Main Menu.

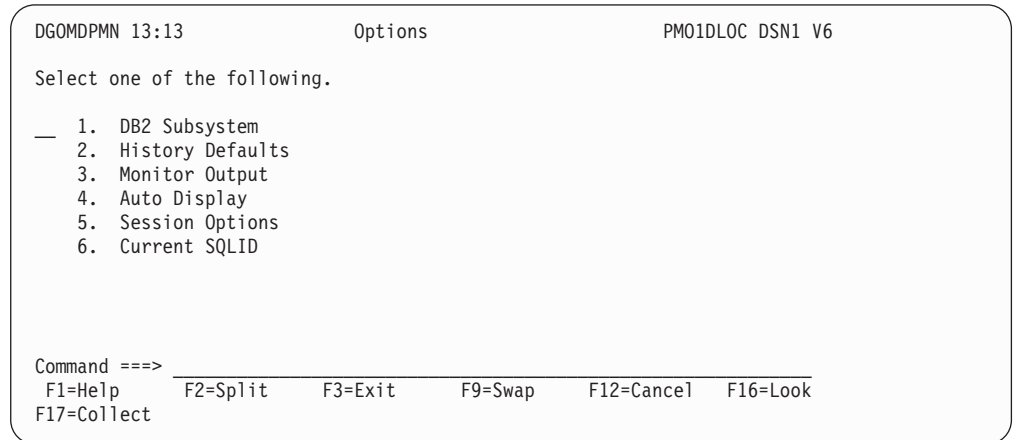


Figure 5. Options Menu

You can select one of the following options from this menu:

1. **DB2 Subsystem**

Select this option to display either the DB2 Subsystems List window or DB2 Subsystem window, where you can select the DB2 subsystem to be monitored.

2. **History Defaults**

Select this option to display the History Defaults window, where you can display the installation-specified history defaults. This option is available only if a data collector is active for the DB2 subsystem you are monitoring. Refer to “Chapter 14. Data Collector Purpose and Function” on page 233 and the following chapters for a description of the data collector.

3. **Monitor Output**

Select this option to display the Monitor Output window, where you can control the writing of monitor records to an output data set.

4. **Auto Display**

Select this option to display the Auto Display window, where you can set the default interval for the AUTO command.

5. **Session Options**

Select this option to display the Session Options window, where you can set various options controlling the environment of your IRF session.

6. **Current SQLID**

Select this option to display the Current SQLID window, where you can specify a different SQL authorization ID for qualifying the unqualified tables in the statements being explained.

Using the Online Monitor

DB2 Subsystem Windows

Use the DB2 Subsystems List window to select the DB2 subsystem to be monitored. Only the DB2 subsystems with data collectors started within the MVS system are listed on the DB2 Subsystems List window (refer to “Chapter 14. Data Collector Purpose and Function” on page 233 and the following chapters for a description of the data collector). If there are many listed, you can use **F7** (Up) and **F8** (Down) to browse the list.

To display this window, select option 1 (*DB2 Subsystem*) from the Options menu.

```
DGOMDWSL          DB2 Subsystems List          ROW 1 TO 3 OF 3

Select the Data Collector to use or specify a DB2 subsystem ID

DB2 Subsystem  DSN1

  Data Collector DB2 Location      DB2 Release
  -             -                -
  DSN9          PM01D611          V6
  -             -                -
  DSN1          PM01DLOC          V5
  -             -                -
  D411          PM01D411          V4
  ***** BOTTOM OF DATA *****

Command ==> _____ Scroll ==> CSR
F1=Help   F2=Split  F7=Up     F8=Down  F9=Swap  F12=Cancel
F16=Look  F17=Collect
```

Figure 6. DB2 Subsystems List Window

The *Data Collector* column shows the data collector identifier.

The *DB2 Location* column shows the location as obtained from the trace records for the data collector.

The *DB2 Release* column shows the DB2 release level.

To monitor a DB2 subsystem that has an active data collector running, enter any character in the input field beside a data collector DB2 location and press **Enter**.

To monitor a DB2 subsystem that does not have an active data collector running, enter the name of the DB2 subsystem in the *DB2 Subsystem* field and press **Enter**.

If there are no data collectors active on your MVS system, the window shown in Figure 7 is displayed instead.

Note: The version and release numbers of the DB2 load library allocated to the Online Monitor session must match the version and release numbers of the DB2 subsystems being monitored.

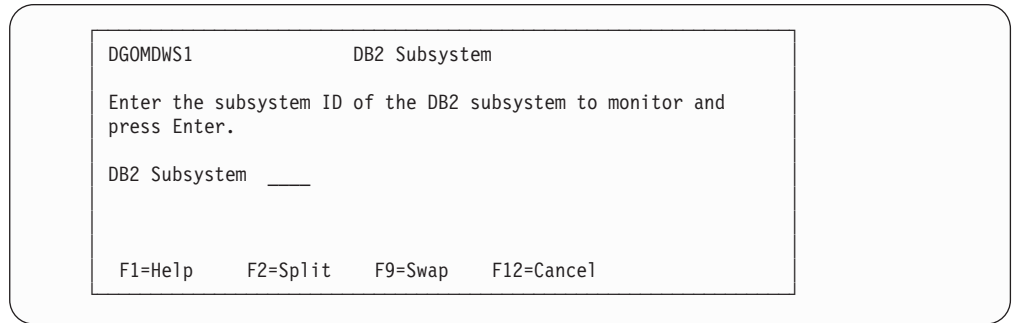


Figure 7. DB2 Subsystem Window

If the data collector is not installed at your site or the monitored DB2 subsystem does not have an active data collector running, the following Online Monitor functions are *not* available:

- Viewing past data
- Periodic exception processing while you are *not* logged on
- Exception event processing
- Collection of parallel tasks for query CP parallelism.

Changing DB2 subsystems terminates all asynchronous tasks that were started using the Online Monitor. If you change DB2 subsystems while an asynchronous task is active, you are notified by the Asynchronous Task Termination panel. Refer to Figure 8.

Note that if you are in split screen mode and you change the subsystem in one session, asynchronous tasks are terminated even if they were activated in the other session.

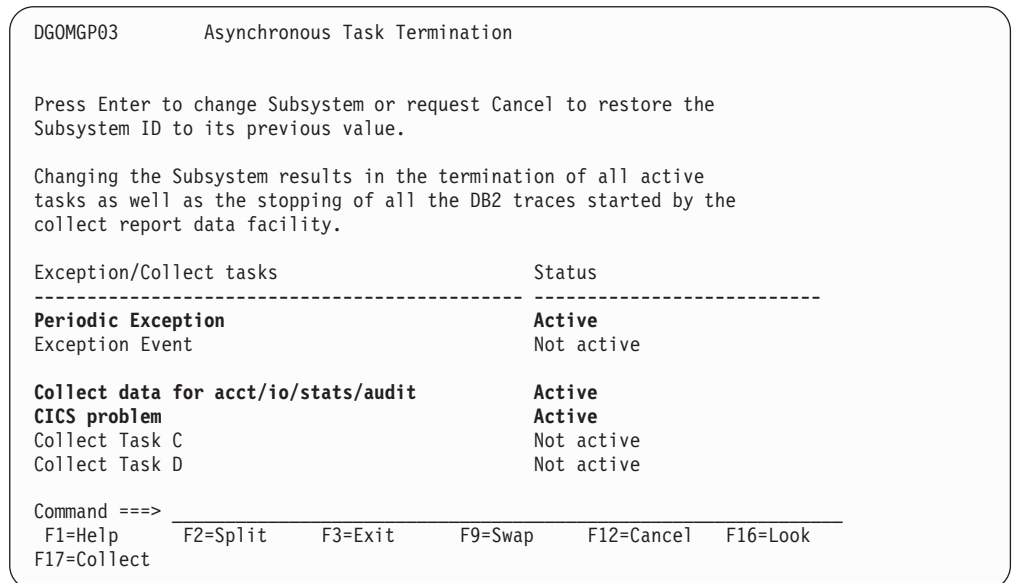


Figure 8. Asynchronous Task Termination Panel

To change DB2 subsystems, press **Enter**. All asynchronous tasks are terminated.

Using the Online Monitor

To return to the previous panel without changing DB2 subsystems, press **F3** (Exit) or **F12** (Cancel). All active asynchronous tasks remain active.

History Defaults Window

Use the History Defaults window to view the history parameters that are currently in effect.

To display this window, select option 2 (*History Defaults*) from the Options menu.

```
DGOMDWHD      History Defaults  ROW 1 TO 6 OF 6

History Collected . . . . . : YES
History Interval . . . . . : 10

History From . . . . . : 01/05/98 13:30:36
History To . . . . . : Present

_ Display Thread Qualifications

Data for which History is stored :
Statistics
System Parameters
Thread SQL Statement
Thread Summary
Thread Detail
Locked Resources
***** BOTTOM OF DATA *****

Command ==>
F1=Help      F2=Split    F3=Exit     F7=Up
F8=Down     F9=Swap    F12=Cancel  F16=Look
F17=Collect
```

Figure 9. History Defaults Window

With the HISTORY command, you can view thread activity, statistics, and system parameters data previously gathered by the data collector. Refer to “Chapter 5. Viewing Past Data” on page 43 for a complete description on how to view past performance data.

The *History Collected* field shows either “YES” or “NO” indicating whether there is any past data available.

The *History Interval* field indicates how often DB2 instrumentation data is being gathered by the data collector. This field is a numeric value in seconds.

The *History From* field shows the date and time of the earliest history data available.

The *History To* field shows the date and time of the most recent history data available.

Select the *Display Thread Qualifications* field to display the History Thread Qualification window shown in Figure 10, where you can view the history qualification settings and the times during which these qualifications were in effect.

The *Data for which History is stored* field lists the types of data gathered by the data collector. This list includes the data types specified at data collector startup and subsequent changes made by the administrator users. Statistics history keeps subsystem-wide statistical information for a DB2 subsystem. For thread activity, you can collect thread history individually in a summary format, in detail format, or in detail format with locking information, SQL statement, or both. System Parameters history keeps an overview of DSNZPARM values for a DB2 subsystem.

For more information about viewing past data, refer to “Chapter 5. Viewing Past Data” on page 43. For more information about data collector installation options, refer to *DB2 PM Installation and Customization*.

History Thread Qualification Window

Use the History Thread Qualification window to view a list of the history qualification settings and the times during which these settings were in effect. If there are many listed, you can use the scrolling keys **F7** (Up) and **F8** (Down) to browse the list.

To display this window, select *Display Thread Qualifications* from the History Defaults window.

```

DGOMDWTQ              History Thread Qualification              ROW 1 TO 4 OF 4

  Primauth   Plan Name   Connection ID   Correlation ID

01/10/98 16:42:33 to 01/10/98 22:45:54
USERT*      *           TSO                    *
01/10/98 16:42:33 to 01/14/98 09:27:03
*           H473J6      *                    *
01/14/98 09:27:03 to Present
*           DSNESP*     *                    *
01/14/98 09:27:03 to Present
*           H473J6      *                    *
***** Bottom of data *****

Command ==>
F1=Help    F2=Split   F3=Exit    F7=Up      F8=Down    F9=Swap
F12=Cancel F16=Look   F17=Collect

```

Figure 10. History Thread Qualification Window

With history thread qualification, you can filter the thread data gathered by the data collector. You can view this data using the HISTORY command. The qualifications are defined during installation or on the History Qualification window by the administrator user. Refer to “Data Collector Parameters Window” on page 235 and “History Qualification Window” on page 237 for more information.

Monitor Output Window

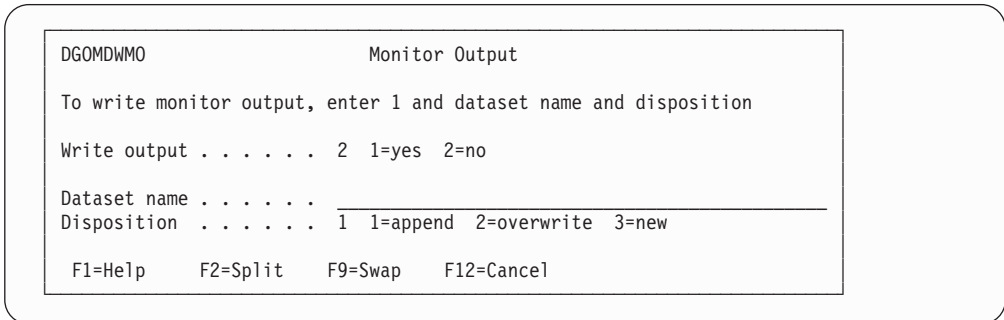
Use the Monitor Output window to enable or disable the writing of monitor output to a data set.

The main use of this option is to gather data for problem determination. Records in DPMOUT format that correspond to data shown on the Online Monitor panels are written to a data set whenever the display is updated. Output from the Statistics and

Using the Online Monitor

System Parameter panels can be used as input to the Batch statistics and system parameter reports respectively. The output from the Thread Display panels can only be processed by batch record trace.

To display this window, select option 3 (*Monitor Output*) from the Options menu.



```
DGOMDWMO                Monitor Output

To write monitor output, enter 1 and dataset name and disposition

Write output . . . . . 2 1=yes 2=no

Dataset name . . . . . _____
Disposition . . . . . 1 1=append 2=overwrite 3=new

F1=Help   F2=Split   F9=Swap   F12=Cancel
```

Figure 11. Monitor Output Window

The *Write output* field is used to specify whether you want monitor output written to a data set. Enter 1 in this field to enable the writing of monitor output to a data set.

The *Dataset name* field requires the name of the data set to which the data is to be written.

If you specify a disposition of 3 (new), the data set is dynamically allocated with the following attributes:

```
RECFM:      VBS
LRECL:      32 756
BLKSIZE:    6 233
```

Auto Display Window

Use the Auto Display window to set the auto-display refresh interval for data shown on the Online Monitor panels. When auto display is active, the values displayed on the current panel are updated periodically, as specified on the Auto Display window. If you activate auto-display mode while viewing past data, the panel is updated with subsequent past records at every auto-display interval. The time difference between these records is determined by the history interval when the data was collected, and not by the current auto-display interval.

To display this window, select option 4 (*Auto Display*) from the Options menu.

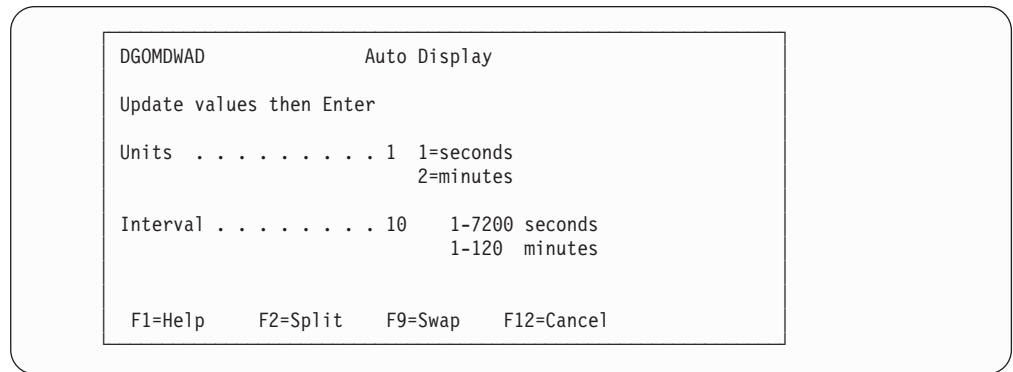


Figure 12. Auto Display Window

Use the *Units* field to specify the units of time for the value entered in the *Interval* field on this window.

Use the *Interval* field to specify how frequently the panels are refreshed when the AUTO command is issued.

To start auto-display mode, type AUTO on any thread activity or statistics panel command line and press **Enter**. To stop auto-display mode, press the **Attention** key. You cannot perform any other actions with your Online Monitor session while auto-display mode is running.

Session Options

Use the Session Options window to set various options controlling the environment of your IRF session.

To display this window, select option 5 (*Session Options*) from the Options menu, or type OPTIONS on any command line and press **Enter**.

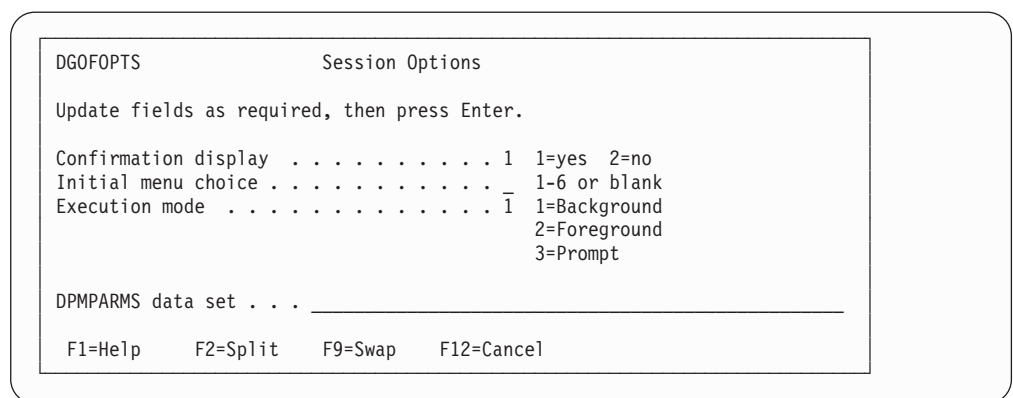


Figure 13. Session Options Window

The field values shown in Figure 13 are the default settings.

Use the *Confirmation display* field to specify whether or not you want to be prompted each time you issue a delete, replace, or reset request.

Using the Online Monitor

Use the *Initial menu choice* field to specify the panel you want to start on when entering the DB2 PM. Possible values for this field are:

- 1 To start at the Interactive Report Selections panel (DGOOMENU)
 - 2 To start at the Graphics Selection menu (DGOGMENU)
 - 3 To start at the DB2 PM Online Monitor Main Menu (DGOMMENU)
 - 4 To start at the Data Set Maintenance Menu (DGOPMENU)
 - 5 To start at the User-Tailored Report Layout Generation menu (DGOBMENU)
 - 6 To start at the Exception Profiling menu (DGOFEP00)
- Blank** To start at the IBM Database 2 Performance Monitor main menu (DGOFMENU).

The *Execution mode* field applies to the execution of batch jobs.

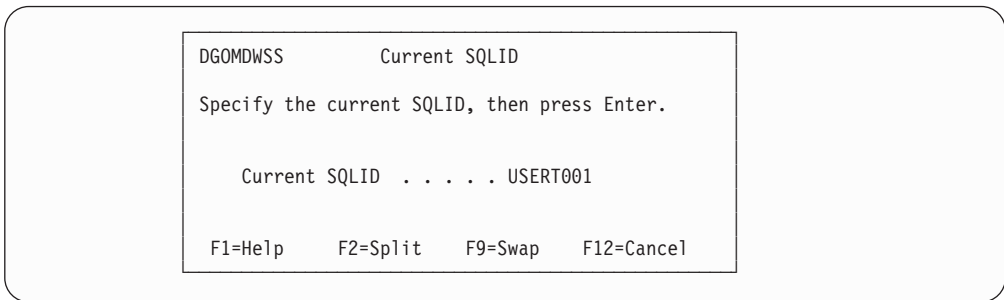
Use the *DPMPARMS data set* field to specify the DPMPARMS data set to be used by the Online Monitor. The DPMPARMS data set contains information about exception thresholds, customized report layouts, time zone specifications, correlation ID translation, and the MAINPACK identifier. Only the correlation ID translation part is used by the Online Monitor.

For more information about the DPMPARMS data set, refer to “Correlation ID Translation” on page 34 and to the *DB2 PM Report Reference*.

Current SQLID Window

Use the Current SQLID window to specify a different SQL authorization ID for qualifying the unqualified tables in the statements being explained if they do not belong to a plan or package. The Current SQLID window is also used to qualify the plan table to be accessed.

To display this window, select option 6 (*Current SQLID*) from the Options menu.



```
DGOMDSS          Current SQLID
Specify the current SQLID, then press Enter.

Current SQLID . . . . . USERT001

F1=Help   F2=Split   F9=Swap   F12=Cancel
```

Figure 14. Current SQLID Window

If the *Current SQLID* field on this window is not specified, it defaults to your user ID.

Online Help

Comprehensive panel help can be accessed from any Online Monitor panel, and field help can be accessed from fields on these panels. Panel help shows general information describing the purpose of the panel and the commands available from that panel, whereas field help shows a field description and system tuning information for that field if appropriate.

To view panel help, press **F1** (Help) on a panel. To view field help, move the cursor into the data area of the field and press **F1**.

To view help on the following topics, press **F1** (Help) on the Online Monitor main menu:

- General information about the Online Monitor
- Authority required
- Online Monitor input data
- Moving between panels
- Updating values
- Online Monitor commands
- Function key default settings.

Notes:

1. On some panels where lists are shown, field help is not available on the list. Help on these lists is provided in the panel help instead.
2. The online help follows the standard conventions for help in the ISPF environment. For a complete guide to ISPF help navigation, refer to the *OS/390 ISPF Dialog Developer's Guide and Reference* and the related ISPF documentation.

Function Key Default Settings

Use the function key default settings to help you perform the following with a single keystroke:

- View help.
- Move between panels.
- Access certain Online Monitor and ISPF functions.

Notes:

1. The DB2 PM Online Monitor is an ISPF application, and all normal ISPF behaviors apply.
2. The default function key settings on help panels follow the standard conventions for help in the ISPF environment.

Table 1 describes the Online Monitor function keys, their default settings, their functions, and the Online Monitor panels on which they are available.

Using the Online Monitor

Table 1. Function Key Default Settings

Function Key	Default Setting	Function	Online Monitor Panels
F1	HELP	Used to view help information on a panel or field.	All panels
F2	SPLIT	Used to divide the display into two logical displays separated by a horizontal line and starts another ISPF session, or changes the location of the horizontal line.	All panels
F3	EXIT	Used to validate and save the data entered on a panel, exit the panel, and return to the previous panel.	All panels containing a command line
F4	PROMPT	Used to view a list of possible values for a field. The prompt fields are followed by a + symbol.	Some collect report data panels and Exception Threshold Field Details panel
F5	AUTO	Used to refresh the data shown on the current panel periodically.	All thread and statistics panels
	ADD	Used to add a new exception threshold entry.	Exception Threshold Field Details panel
F6	HISTORY	Used for viewing historical data on panels. Note: If your installation has installed the Online Monitor without the data collector, this function is not available.	All thread activity, statistics, and system parameters panels
	DELETE	Used to delete an exception threshold entry.	Exception Threshold Field Details panel
F7	UP	Used to scroll toward the top of the data.	All scrolling panels
F8	DOWN	Used to scroll toward the bottom of the data.	All scrolling panels
F9	SWAP	Used to switch between ISPF sessions.	All panels
F10	QUALIFY	Used to filter the threads listed on the Thread Summary panel.	Thread Summary panel
	DELTA	Used to begin delta processing mode that calculates the statistics values between the last two times you pressed Enter .	All statistics panels
	PREVIOUS	Used to display the previous exception threshold entry for a field.	Exception Threshold Field Details panel
F11	SORT	Used to sort the threads listed on the Thread Summary panel.	Thread Summary panel
	INTERVAL	Used to establish a base point in time from which statistics are to be calculated.	All statistics panels
	NEXT	Used to display the next exception threshold entry for a field.	Exception Threshold Field Details panel
F12	CANCEL	Used to exit a panel without saving the entries, and return to the previous panel canceling all related panels.	All panels
F16	LOOK	Used to view the following exception information and authorization failures: <ul style="list-style-type: none"> • Periodic exceptions • Periodic exceptions messages • Display exceptions • Authorization failure summary • Exception event summary • Exception event messages. 	All panels (except LOOK and related panels)

Table 1. Function Key Default Settings (continued)

Function Key	Default Setting	Function	Online Monitor Panels
F17	COLLECT	Used to display the Collect Report Data panel, where you can collect specific DB2 instrumentation data and direct this data to a data set.	All panels (except collect report data panels)
F18	EXPLAIN	Used to explain the access path methods chosen by DB2 for a given SQL statement.	All thread diagnostic panels, and thread panels that show the SQL statement
F19	LEFT	Used to scroll toward the left.	Thread Summary panel
F20	RIGHT	Used to scroll toward the right.	Thread Summary panel
F22	PURGE	Used to purge a thread currently processing in the DB2 subsystem you are monitoring. You require the DB2 privilege to perform CANCEL THREAD.	All thread activity panels

The following ISPF commands can be used to alter the function key settings:

KEYLIST	Changes the function key settings.
FKA	Alternates between the function key long display format, short display format, and no function key display at all.
PFSHOW	Toggles on and off the display of function key settings.
PFSHOW TAILOR	Specifies how function keys are displayed.

All function keys correspond to a command entered on the command line. For example, typing the command CANCEL on the command line is the same as pressing the **F12** (Cancel) key.

You can use the command line with the function keys to enter function parameters. To do this, type the parameters on the command line and press the function key to activate the command.

You can use the ISPF PANELID command to choose whether to display a panel ID on the top line of the panels. To toggle the panel ID display, type PANELID on the command line and press **Enter**.

For a complete guide to ISPF commands, refer to the *OS/390 ISPF Dialog Developer's Guide and Reference* and the related ISPF documentation.

Issuing DB2 Commands

Use the command DB2 to execute any DB2 command during your Online Monitor session. This command can be entered on the command line of *any* Online Monitor panel.

The command syntax is:



Figure 15. Syntax of the DB2 command

The DB2 command accepts the following parameter:

command text The DB2 command you want to execute.

For example:

```
DB2 DISPLAY THREAD(*)
```

Type DB2 and the DB2 *command text* on the command line and press **Enter**. The DB2 Command Output window is overlaid on the current panel, where you can view the DB2 command output. An example of the DB2 Command Output window is shown in Figure 16.

DGOMTPLS 12:57 Thread Summary ROW 1 TO 5 OF 5

PM01DLOC DSN1 V6 GROUP001 MEMBER01

T DGOMCDCO DB2 Command Output ROW 1 TO 12 OF 12

DSNV401I _ DISPLAY THREAD REPORT FOLLOWS - s 2

DSNV402I _ ACTIVE THREADS - N/P

NAME	ST	A	REQ ID	AUTHID	PLAN	ASID	TOKEN
DB2CALL	T		3	USER030	USER030	DB2PMOM	002B 25
DB2CALL	T		5	USER001	USER001	DB2PMOM	002E 10
DB2CALL	T	*	6	USER023	USER023	DB2PMOM	0031 10
DB2CALL	T		10	USER027	USER027	DB2PMOM	0082 20
DB2CALL	T		5	USER040	USER040	DB2PMOM	0027 15
DB2CALL	T		50	USER009	USER009	DB2PMOM	002D 15
DB2CALL	T		4	USER009	USER009	DB2PMOM	002D 22

DISPLAY ACTIVE REPORT COMPLETE

DSN9022I _ DSNVDT '-DISPLAY THREAD' NORMAL COMPLETION

***** Bottom of data *****

Command ==> _____

F1=Help F2=Split F3=Exit F7=Up F8=Down F9=Swap

F12=Cancel F16=Look F17=Collect

Command ==> DB2 DISPLAY THREAD(*)

F1=Help F2=Split F3=Exit F5=Auto F6=History F7=Up

F8=Down F9=Swap F10=Qualify F11=Sort F12=Cancel F16=Look

F17=Collect F19=Left F20=Right F22=Purge

Figure 16. DB2 Command Output Window

If you issue the command DB2 without any parameters, the DB2 Command window is displayed.

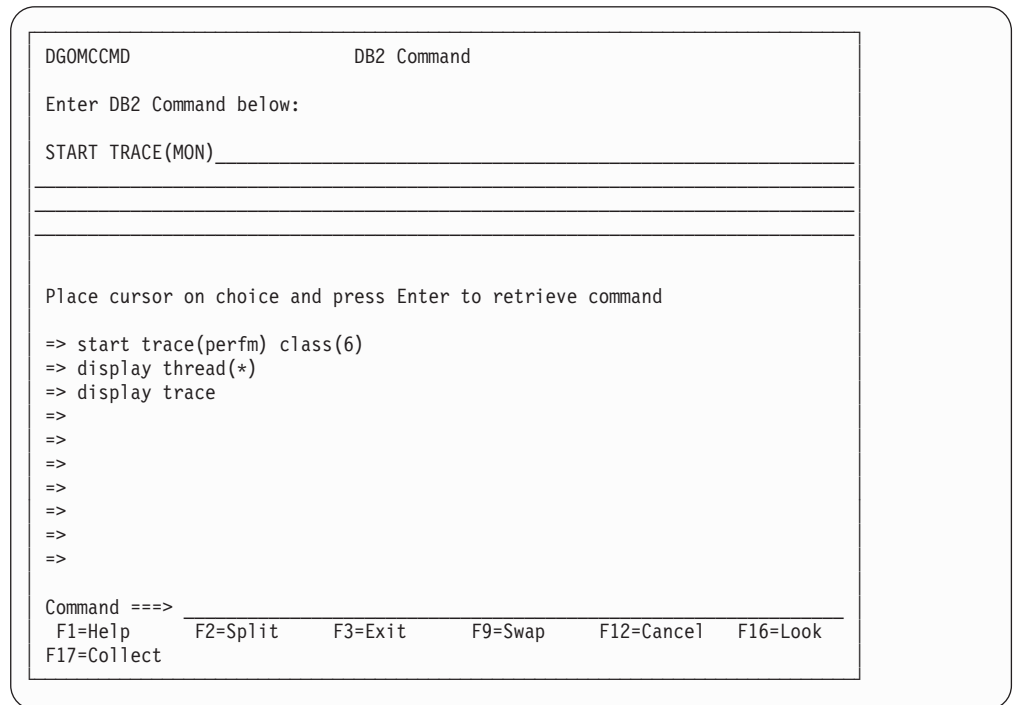


Figure 17. DB2 Command Window

This window displays command lines on which DB2 commands can be issued, and shows a list of the last ten DB2 commands that were entered.

You can retrieve a command stored in the list by positioning the cursor under the command and pressing **Enter**. The command then appears on the DB2 command line where you can edit and then submit the command by pressing **Enter** again.

If a new or modified command is submitted, the command is added to the top of the list. If the command was not edited before submission, or the command was not submitted at all, the list is not updated.

Note: You cannot abbreviate the command DB2.

COLLECT Command

Use the COLLECT command to display the Collect Report Data panel, where you can collect specific DB2 instrumentation data and direct this data to a data set.

The command syntax is:

```
▶▶—COLLECT—▶▶
```

Figure 18. Syntax of the COLLECT Command

Using the Online Monitor

To issue the COLLECT command, type COLLECT (or one of its abbreviations) on the command line and press **Enter**.

Note: COLLECT can be used in any truncated form beginning with a minimum of COL.

For full information on collecting report data, refer to the *DB2 PM Batch User's Guide*.

OPTIONS Command

Use OPTIONS to display the Session Options window, where you can set various options controlling the environment of your IRF session.

The command syntax is:

►—OPTIONS—◄

Figure 19. Syntax of the OPTIONS Command

To issue the OPTIONS command, type OPTIONS (or one of its abbreviations) on any command line and press **Enter**.

Note: OPTIONS can be used in any truncated form beginning with a minimum of OPT.

Correlation ID Translation

The correlation ID is a DB2 field that identifies the task executed by DB2. The correlation ID contains:

For batch jobs	Jobname
For TSO applications	Original authorization ID, that is, the logon user ID
For applications using the DB2 call attachment facility	Original authorization ID, that is, the logon user ID
For CICS transactions	Connection type, thread type, thread number, and the transaction ID
For IMS applications	PST number and PSBNAME of the application
For RRS applications	The character string provided by the application during signon.

Particularly for CICS and IMS it is useful to break the correlation ID into several parts, so that you can easily distinguish the transaction ID (for CICS threads) from the PSBNAME (for IMS threads).

DB2 PM provides this function by translating the correlation ID into two separate identifiers, the *correlation name* and the *correlation number*. Unless it was changed in your installation, this translation is based on the connection type of the thread and is done as follows:

Table 2. The 12-Byte Correlation ID Field and the Default Translation

Connection Type	1	2	3	4	5	6	7	8	9	10	11	12
Batch	Correlation name: job name								Correlation number: blank			
TSO, DB2 call attach	Correlation name: original authorization ID								Correlation number: blank			
CICS	Correlation number: pool thread				Correlation name: transaction ID							
IMS	Correlation number: application PSBNAME				Correlation name: application PST							
RRS	Correlation name: the first 8 characters of the correlation ID provided by the application during signon								Correlation number: the remaining 4 characters			

Changing the Default Translation

You can override this default translation using the IRF option for maintaining parameter data sets (option 4 on the DB2 PM main menu). The correlation translation information is kept in the CORRDATA member of the DPMPARMS data set.

Each record in the CORRDATA member specifies the translation to be used for a specific connection ID. Note that the connection ID is used here, not the connection type.

The translation is expressed as:

- Offset where the correlation name starts
- Length of the correlation name
- Offset where the correlation number starts
- Length of the correlation number.

If DB2 PM does not find the connection ID for a given thread in the CORRDATA member, the default translation is used.

To activate the tailored correlation translation, issue the OPTIONS command and specify the DPMPARMS data set in the Session Options panel.

How Large and Missing Values Are Displayed

Values shown on panels can be either total values or average values.

If there is insufficient space to display a value in a field, a rounded value is shown followed by one of the following letters to indicate magnitude:

K thousand (kilo — 10^3)
M million (mega — 10^6)
G billion (giga — 10^9)
T trillion (tera — 10^{12})

The letter is displayed directly after the number, without blank spaces. There can, however, be decimal places.

Using the Online Monitor

Examples of Displayed Values

- Valid conversions of 12 345 include:
 - 12K
 - 12.35K
 - 12.3K
- Valid conversions of 1 234 567 include:
 - 1M
 - 1.2346M
 - 1235K

N/C is displayed if the data cannot be calculated.

N/P is displayed if the data is not present.

N/A is displayed if the field is not applicable.

Elapsed Time Formats

Time values are presented in one of the following formats:

- *dd hh:mm:ss.ffffff*, where:
 - dd** represents days
 - hh** represents hours
 - mm** represents minutes
 - ss** represents seconds
 - ffffff** represents the fractions of a second up to 8 decimal places.

For example, a time value of 1:30:25.10 represents 1 hour, 30 minutes, and 25.1 seconds.

Some of the fields that use this format might not show days (*dd*) or hours (*hh*).

- *sssss.ffffff*, where:
 - sssss** represents seconds
 - ffffff** represents the fractions of a second up to 8 decimal places.

The actual number of decimal places varies from one field to another.

Some time fields can be rounded. If there is insufficient space to display a time value, the time is rounded by removing decimal places as required. For elapsed times, a rounded value is displayed.

Date Formats

The date format for the Online Monitor is taken from your ISPF environment, and is configured during ISPF installation.

Chapter 4. Common Errors Using DB2 PM

This chapter describes problems often encountered when using DB2 PM. If you come across a problem, read this chapter before contacting IBM service.

STEPLIB Missing from IRF-Generated JCL

Symptom: The STEPLIB DD statement is missing from the IRF-generated JCL.

Probable Cause: Wrong option selected while running DGOJVARs.

Explanation: DGOJVARs is an EXEC provided with DB2 PM that displays a panel for setting up certain DB2 PM defaults. One of the options on this panel specifies whether the DB2 PM load library is in the system LNKST concatenation. If this option is selected, then no STEPLIB DD statement is in the IRF-generated JCL.

Command Not Found

Symptom: Message IKJ56500I Command xxx not found is issued during the execution of DB2 PM.

Probable Cause: The Program Control Facility (PCF) was not updated with the list of DB2 PM modules that are started as TSO command processors.

Explanation: The PCF makes a security check on all commands to see if they are included in the PCF command list. See your system administrator to ensure that all necessary updates have been made. After the list has been updated, the commands can be used.

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Chapter 5. Viewing Past Data

You can recall and view statistics, thread activity, and system parameters data previously collected by the data collector. The data is gathered at installation-defined intervals. Refer to “Chapter 14. Data Collector Purpose and Function” on page 233 and the following chapters for a description of the data collector.

You can view past data by issuing the HISTORY command or pressing **F6** (History) on any panel that can display past data.

When viewing past data, the word HISTORY is displayed on the line following the heading of the current panel, as shown in Figure 20:

```
DGOMTPSM 11:57          Thread Detail          PM01DLOC DSN1 V6
                        GROUP001 MEMBER01 HISTORY 01/30/98 11:45:00
For details, place any character next to heading, then press Enter.
```

Figure 20. Thread Detail Panel Showing History Active

The date and time following the word HISTORY indicate when the data being displayed was collected.

Note: You can view past data only if the data collector is installed at your site.

Your installation can choose to collect data at the following levels:

- Thread Summary
- Thread Detail
- Thread Detail with locking information
- Thread Detail with SQL statement
- Thread Detail with locking information and SQL statement
- Statistics
- System Parameters.

Historical data is kept in either a VSAM data set or data space. The data is gathered by the data collector. When the data set or data space is full, the data is written to the beginning again, writing over the earliest data gathered.

The availability of the data is limited by the collection rate, the size of the data space or data set used, the amount of historical data to be maintained, and the thread history qualification definitions (all of these are defined in the data collector startup parameters). Refer to the *DB2 PM Installation and Customization* manual for details.

The data collector parameters can also be modified by the administrator user. Refer to “Chapter 15. Administrator User” on page 235 for more information.

Viewing Past Data

The syntax of the HISTORY command is:

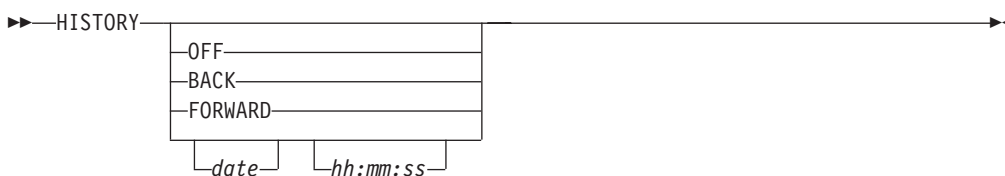


Figure 21. Syntax of the HISTORY Command

Note that the defined ISPF national format is used for the date and time format.

The HISTORY command accepts the following parameters:

- OFF** Returns the display to the current time.
- BACK** Displays data for the previous interval. If no more data is available, data from the earliest available interval is displayed.
- FORWARD** Displays information for the next available interval. If there are no further stored records, data from the current time is displayed and processing continues as if history were "OFF".
- date** The date of the required information. If no date is specified, today's date is assumed.
- hh:mm:ss** The time of the required information. If no time is specified, the time defaults to that of the earliest available history record for the specified date. The seconds do not need to be specified.

Note: HISTORY can be truncated to HIS.

If there is no data available for the specified date and time, the next available record is displayed.

When a panel is refreshed while viewing past data, the panel is updated with data from the next stored record, just as if you had entered HISTORY FORWARD on the command line.

If no parameters are specified, the History window is displayed.

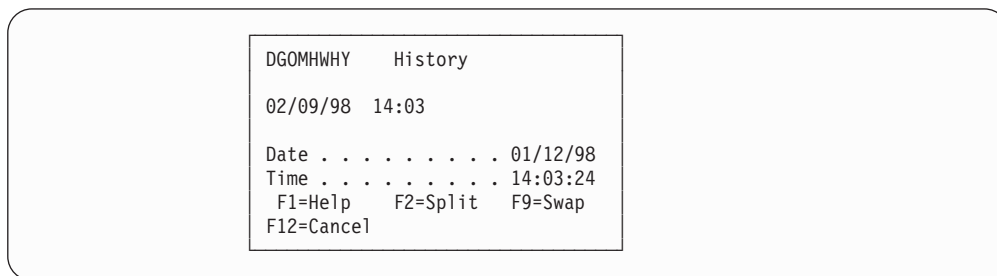


Figure 22. History Window

The current system date and time are the defaults for the History window.

Viewing Past Data

Note: When monitoring with HISTORY OFF, it is possible to view data that cannot be viewed with the HISTORY command. This occurs when the “current moment” does not coincide with the history collection interval. For example, when the history interval is 10 minutes in length and data is collected at 8:30 and 8:40, the data retrieved at 8:32 from DB2 is not subsequently retrievable using the HISTORY command.

Sample JCL is provided which unloads the history VSAM data sets created by the data collector so that you can use this data as input to the Batch Record Trace function for problem determination. This JCL is provided in the SDGOSAMP library as member DGOMMJCL. Note that this member is provided only as an example and may need to be modified as required by your installation. You can only unload the history data sets using this JCL.

Chapter 6. Exception Processing

Exception processing is the most effective way of using DB2 PM to identify performance problems. The first step in monitoring your DB2 system should always be to start thread and statistics exception processing.

Use Online Monitor exception processing to identify DB2 thread and statistics fields that contain values outside limits you have specified. This gives you better management of service levels by identifying problems in the DB2 subsystem and threads causing performance problems.

Using display and periodic exception processing, you can monitor and identify the following:

- Threads that might be experiencing problems
- Subsystem-wide DB2 conditions that might be causing performance problems.

Using exception event processing, you can monitor the following events:

- Deadlock
- Timeout
- EDM pool full
- Authorization failure
- Thread commit indoubt
- Coupling Facility (CF) rebuild/alter start
- CF rebuild/alter end
- Global trace started.

The threshold values for thread activity and statistics fields are specified in the exception threshold data set. When exceptions are detected during your monitoring session, you are notified so that appropriate action can be taken. In addition, you can activate a user exit that can automatically trigger any immediate reaction, for example, issue an alert to NetView.

You can view information about any of the exceptions using the Online Monitor LOOK command.

With exception processing, you can create the following two data sets for later analysis:

- The exception log file data set (to print a list of exceptions or to load exception data into DB2)
- The exception DPMOUT data set (records that had exceptions).

Exception Processing Modes

This section describes the three basic types of exception processing available: display exception processing, periodic exception processing, and exception event processing.

Display Exception Processing

Use display exception processing to monitor the occurrence of a specific exception. This exception processing mode operates in the foreground of Online Monitor processing. With display exception processing you can view thread activity

Exception Processing

exceptions, and statistics exceptions in interval or delta processing mode. Refer to “Statistics Processing Modes” on page 126 for an explanation of delta and interval processing.

With display exception checking, fields shown on the current panel are checked whenever the display is refreshed with new or historical data. Fields with exception conditions are shown in reverse video, and the color of the field indicates the level of the exception. *Warning* level exceptions are highlighted in yellow, while *Problem* level exceptions are highlighted in red. Note that these colors may differ if you have changed your ISPF default colors. Selection fields on the detail panels are also shown in reverse video if any of their lower level windows contain fields in exception status. The exception notifications are stored and can be examined using the LOOK command.

Periodic Exception Processing

Use periodic exception processing to periodically monitor both thread activity and statistics fields for exception conditions. This processing mode runs in the background of Online Monitor processing.

With periodic exception processing, data is tested for exception whenever the interval you specified has elapsed (whether or not you are viewing the relevant data). If any *Problem* level exceptions are detected, the Exception Notification window is displayed. If only *Warning* level exceptions are detected, a message is displayed to notify that a periodic exception has occurred. This window is overlaid on the current panel and shows the number of periodic exceptions detected during the interval. The exception notifications are stored and can be examined using the LOOK command.

If the data collector is active, periodic exception processing can continue when you exit the Online Monitor. When you next use the Online Monitor, any periodic exceptions detected while you were not logged on are displayed. Periodic exception processing is not terminated until you stop it or until the data collector itself is terminated. If the data collector is not active, periodic exception processing terminates when you exit the Online Monitor.

Exception Event Processing

Use exception event processing to monitor the DB2 subsystem for the occurrence of particular events. This processing mode runs in the background of Online Monitor processing. The following events can be monitored:

- Deadlock
- Timeout
- EDM pool full
- Authorization failure
- Thread commit indoubt
- CF rebuild/alter start
- CF rebuild/alter end
- Global trace started.

The events need to be specified with the EXCEPTIONEVENT data collector parameter or on the Data Collector Parameters window before exception event processing can be activated using the Exception Processor panel. Refer to the *DB2 PM Installation and Customization* manual and “Data Collector Parameters Window” on page 235 for more information.

When an exception event is detected, the Exception Notification window is displayed to notify you that an exception event has occurred. Exception event notifications are stored and can be examined using the LOOK command.

Past Data and Exceptions

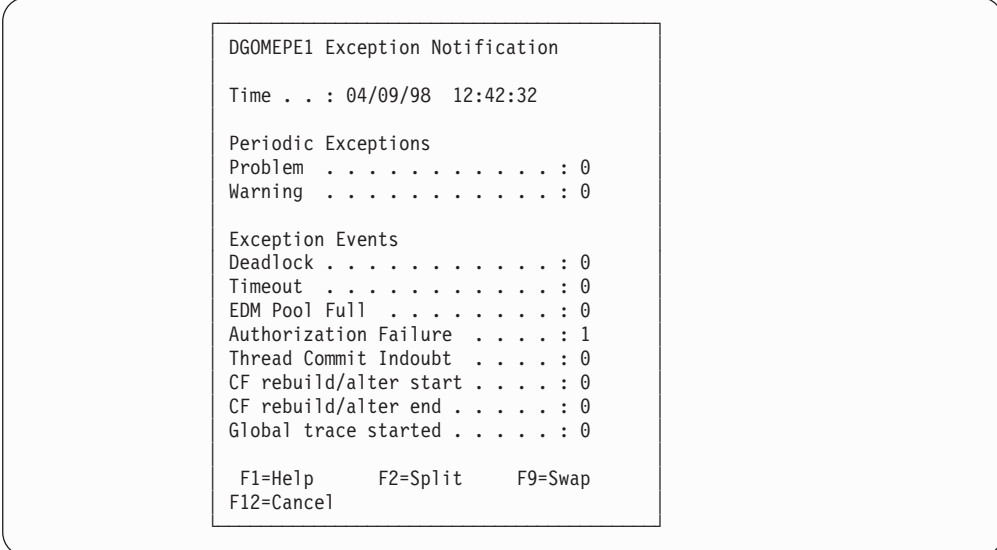
Display exception processing operates with past data just as if the data had been retrieved directly from DB2. Exceptions are shown in reverse video and logged as normal.

Periodic exception processing and exception event processing do not report on past data. They report on current data, whether or not past data is currently being displayed.

Exception Notification Window

The Exception Notification window is displayed whenever periodic exception or exception event processing is active and either a problem level exception or an event exception is detected. This window is overlaid on the current panel and shows the number of periodic *problem* and *warning* level exceptions, and the number of exception events that occurred since the last exception notification or since exception processing was started.

If exception event processing is active, the Exception Notification window appears as shown in Figure 23.



```
DGOMEPE1 Exception Notification
Time . . . : 04/09/98 12:42:32

Periodic Exceptions
Problem . . . . . : 0
Warning . . . . . : 0

Exception Events
Deadlock . . . . . : 0
Timeout . . . . . : 0
EDM Pool Full . . . . . : 0
Authorization Failure . . . . : 1
Thread Commit Indoubt . . . . : 0
CF rebuild/alter start . . . . : 0
CF rebuild/alter end . . . . . : 0
Global trace started . . . . . : 0

F1=Help      F2=Split    F9=Swap
F12=Cancel
```

Figure 23. Exception Notification Window (Exception Event Processing Active)

If exception event processing is *not* active, the Exception Notification window appears as shown in Figure 24.

Exception Processing

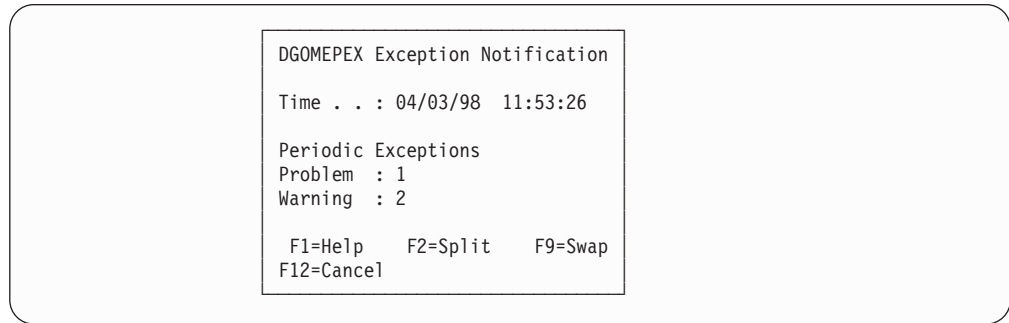


Figure 24. Exception Notification Window (Exception Event Processing Inactive)

To exit the Exception Notification window and return to the panel you were viewing, press **Enter** or **F12** (Cancel).

The *Periodic Exceptions* field shows the number of *Problem* and *Warning* level periodic exceptions that occurred since the last time you were notified of an exception.

The *Exception Events* section of this window shows the number of exception events that occurred for various events since the last time you were notified of an exception. This field categorizes the seven different classes of exception events that can occur.

Difference between Batch and Online Monitor Exception Processing

The fundamental difference between batch and Online Monitor exception processing is that the Online Monitor shows an active view of DB2 subsystem activity (active threads), whereas DB2 PM Batch shows activity that has been completed (threads that have ended). Therefore, the values shown by the Online Monitor and Batch are unlikely to match. For example, a thread shown to be in exception status in a Batch accounting trace is not necessarily in exception status in the Online Monitor.

How to Define Exception Threshold Values

Exception threshold values are defined in the exception threshold data set. You can specify these thresholds using the Exception Threshold Field Details panel, or calculate the thresholds using exception profiling (refer to “Chapter 12. Tailoring Exception Thresholds—Exception Profiling” on page 225). When exception processing is active, the DB2 instrumentation data is checked against values in the exception threshold data set. Fields containing values outside limits that you have specified are reported.

To provide you with a starting point, sample threshold member DGOETV41 has been provided in SDGODATA. This member is provided only as a sample and can be modified as required by your installation.

Note that some of the entries in this member contain asterisks (*) in their exception threshold fields. Values are substituted for these asterisks when exception profiling is performed. If you use this sample data set before performing exception profiling, the entries containing asterisks generate warning messages and are not processed, however, all other entries are processed in the normal manner.

Exception Processing

If you want to use a new exception threshold data set, it should be allocated using the following attributes:

```
RECFM:    VB
LRECL:    255
BLKSIZE:  5 104
```

Note: As the sample threshold member uses a record length that differs from the record length of the exception threshold data set, you are alerted that records are truncated when you copy DGOETV41 to your newly allocated data set. In this case you can ignore this warning.

To add or update exception thresholds, first display the Data Set Maintenance Menu by selecting option 9 (*IRF - Maintain parameter data sets*) from the Online Monitor main menu.

```
DGOPMENU                Data Set Maintenance Menu

Select one of the following.

1 1. Maintain exception thresholds
  2. Maintain correlation translations
  3. Maintain time zone information
  4. Maintain MAINPACK definitions

Exception data set
'SAMPLE.EXCEPT.DATASET'

DPMPARMS data set
_____

Command ==> _____
F1=Help      F2=Split    F3=Exit     F6=History  F9=Swap     F12=Cancel
F17=Collect
```

Figure 25. Data Set Maintenance Menu

Then define the threshold values in an exception threshold data set, by typing the name of the data set in the *Exception data set* field and selecting option 1 (*Maintain exception thresholds*) to display the Exception Threshold Category Selection window shown in Figure 26 on page 52.

Exception Processing

```
DG0PXDS1      Exception Threshold Category Selection

Select one or more categories, then press Enter.  Overtyping with space to
deselect any category.  Request EXIT when complete.

  Category
> Elapsed, CPU and Waiting Times per Plan Execution
> Elapsed, CPU and Waiting Times per Program Execution
> CPU Times per Address Space
- SQL Statements per Plan Execution
- SQL Statements per Program Execution
- SQL Statements per System
- Subsystem Events per Plan Execution
- Subsystem Events per System
- Locking Activity per Plan Execution
- Locking Activity per System
- RID List Processing per Plan Execution
- RID List Processing per System
- Query Parallelism per Plan Execution
- Query Parallelism per System
- Buffer Pools Activity per Plan Execution
S Buffer Pools Activity per System
- Distributed Activity per Location per Plan Execution

Command ==>
F1=Help  F2=Split  F3=Exit  F7=Up  F8=Down  F9=Swap  F12=Cancel
```

Figure 26. Exception Threshold Category Selection Panel

This panel lists the categories of exception threshold fields that you can choose from. The name of the category indicates the area where the exception applies: category names ending with *per Plan* or *per Program* refer to thread activity exception fields, and category names ending with *per System* or *per Address Space* refer to statistics exception fields. Use the scrolling keys **F7** (Up) and **F8** (Down) to browse the categories.

You can select any number of categories by typing a slash (/) or an S in the selection fields. Fields that have been previously selected are indicated by a greater-than symbol (>) and sorted to the top of the list.

You can also deselect categories by typing a space in the selection fields. Deselecting a category does not delete underlying selections within that category, it just ignores them during exception processing.

In the example shown in Figure 26, the *Buffer Pools Activity per System* field has been selected. When you press **Enter**, the Exception Threshold Field Selection panel is displayed, listing all fields belonging to that category, as shown in Figure 27 on page 53. If more than one category was selected, the Exception Threshold Field Selection panel is displayed repeatedly, once for each category.

```

DGOPXDS2      Exception Threshold Field Selection

Select only one field, then press Enter.  Overtyping with space to
deselect any field.  Request EXIT when complete.

Field category . . : Buffer Pools Activity per System

  FIELD      DESCRIPTION
  S SBRBUTP   Percentage buffer pages in use
  - QBSTCBA   Current active buffers
  - QBSTXFL   Unavailable buffer-virtual pool full
  - QBSTDSO   Number of data set opens
  - QBSTMIG   DFHSM migrated data sets
  - QBSTRTO   DFHSM recall timeouts
  - QBSTVPA   Successful vpool expansions/contrac.
  - QBSTHPA   Successful hpool expansions/contrac.
  - QBSTHPL   Buffers allocated for hiperpool
  - QBSTXFV   Vpool or hpool expansion failure
  - QBSTJIS   Prefetch I/O streams reduction

Command ==>
F1=Help   F2=Split  F3=Exit   F7=Up     F8=Down   F9=Swap   F12=Cancel

```

Figure 27. Exception Threshold Field Selection Panel

This panel displays all fields within the selected category. Use the scrolling keys **F7** (Up) and **F8** (Down) to browse the list of fields.

You can select any number of fields from this panel. As a result, Field Details panels are displayed for each selection.

Exception Processing

```

DGOPXDSB           Exception Threshold Field Details
Update fields as required, then Exit to save.                ENTRY 1 OF 1

Category . . . . . : Buffer Pools Activity per System
Field ID  . . . . . : SBRBUTP
Description . . . . . : Percentage buffer pages in use
                        DB2 PM ONLINE MONITOR FIELD ONLY

Active . . . . . _ 1=Yes 2=No                               More:  +
By . . . . . _ 1=Total 2=Minute 3=Second
                4=Commit 5=Thread

Compare operator . . . . . _ <=Less than >=Greater than
Warning threshold . . . . . _____
Problem threshold . . . . . _____

Local location . . . . . _____
Group name . . . . . _____
Member name . . . . . _____
Subsystem ID . . . . . _____
Requester location . . . . . _____
Connect . . . . . _____
Planname . . . . . _____
Corrname . . . . . _____
Corrnbr . . . . . _____
Primauth . . . . . _____
Buffer Pool ID . . . . . _____ +

Command ==>
F1=Help      F2=Split      F3=Exit      F4=Prompt    F5=Add      F6=Delete
F7=Up        F8=Down        F9=Swap      F10=Previous F11=Next    F12=Cancel
  
```

Figure 28. Exception Threshold Field Details Panel

Use the Exception Threshold Field Details panel to specify the threshold criteria in the exception threshold data set for the field selected from the Exception Threshold Field Selection panel.

The top right-hand side of this panel shows the entry number for this specification. You can specify more than one entry for the same exception field using different criteria. For example, you may wish to specify different exception thresholds for different plans. Or you may want to specify different threshold values for different environments (such as batch or online or CICS). To add an exception threshold entry, use the **F5** (Add) key. To view the different entries, use the **F10** (Previous) and **F11** (Next) keys. To delete an entry, use the **F6** (Delete) key.

The first three fields on the panel show the category of the selected exception field, the field identifier, and the description of the field.

In this panel you can specify:

- Whether or not you want this exception threshold entry to be *active* during exception processing. Specify 2 (No), if you do not want to use this entry during exception processing, and you do not want to delete the entry.
- How you want the field value to be calculated before it is checked against the exception threshold entry (*By*). If you want the value in the field used as is, without any calculation, specify *total*. Alternatively, you can specify that the value

Exception Processing

for the field is divided by *minutes*, by *seconds*, or by the number of *commits*, or you can specify that the exception threshold is checked for the average value per *thread* (which is useful in reports).

- The comparison *operator*. This field determines whether the value should be greater than or less than the threshold for an exception condition.
- The thresholds. You can specify two kinds of thresholds for a field: *warning* and *problem* thresholds. Specify a warning threshold value to alert you about potential problems and a problem threshold value to indicate a more serious condition.
- Use the fields on the bottom section of this panel to specify additional criteria for qualifying the thread data that you want checked during exception processing for an exception threshold entry.

These criteria are useful when you want to specify different exception threshold values depending on the environment. For example, you might want to specify different elapsed time thresholds for online transactions and batch jobs, in which case you would supply a specific connection ID for this entry, press **F5** (Add), and specify a different connection ID for the second entry. You can specify a generic name using an asterisk (*).

Usage Notes:

- Specify the time value in seconds, for example, 90 to specify a threshold of 1 minute and 30 seconds.
- Do not enter 2 or 3 in the *By* field for time values. Specifying “by minutes” or “by seconds” only makes sense for fields that are not time-related.

Notes on Matching Instrumentation and Records

During exception processing, instrumentation data records are tested against matching thresholds in the exception threshold data set. When a record matches more than one threshold, DB2 PM chooses the best matching threshold of those detecting an exception.

The key fields of a record are: *Location*, *Group*, *Subsystem ID*, *Member*, *Requesting Location*, *Connection*, *Plan Name*, *Correlation Name*, *Correlation Number*, and *Primary Authorization ID*. DB2 PM compares these key fields with the corresponding fields in the thresholds, and chooses the threshold that best matches the record. This is done by comparing the *Location* of the record with the *Location* field of the matching thresholds first. A key field *not* containing an asterisk is considered a better match than one containing asterisks. If two thresholds are found to match the record equally, then the *Group* fields are compared with the record. If these fields *also* match the record equally, the *Subsystem ID* fields are compared with the record, and so on for the *Member*, *Requesting Location*, *Connection*, *Plan Name*, *Correlation Name*, *Correlation Number*, and *Primary Authorization ID* fields.

How to Start Exception Processing

Exception processing is started from the Online Monitor Exception Processor panel.

All exception processing functions are activated from this panel.

Exception Processor Panel

Use the Exception Processor panel to activate and deactivate various exception processes by selecting exceptions under *Activate/Deactivate Exception Processing*.

To display this panel, select option 5 (*Control Exception Processing*) from the DB2 PM Online Monitor Main Menu.

```
DGOMEPO2                Exception Processor                PM01DLOC DSN1 V6

For any field enter any character to activate

Activate/Deactivate Exception Processing
- Display thread summary
- Display thread detail
- Display statistics detail
> Periodic                > User Exit
- Exception event notification

Options
Periodic units . . . . . 2      1=Seconds
                                2=Minutes
Periodic interval . . . . . 10  1-7200 Seconds
                                1-120 Minutes

> Disable auto-display for problem exceptions
> Sound alarm for exception warnings
- Log file data set output needed
- DPMOUT data set output needed

Exception threshold data set
Name . . . . . _____

Command ==>
F1=Help      F2=Split    F3=Exit     F7=Up       F8=Down     F9=Swap
F12=Cancel   F16=Look     F17=Collect
```

Figure 29. Exception Processor Panel

The *Periodic units* field is used to specify whether the *Periodic interval* field value is in seconds or minutes. This field is only required for periodic exception processing.

The *Periodic interval* field specifies how often DB2 instrumentation data is gathered, examined for exceptions, and reported if an exception condition occurs. All periodic exception messages are gathered periodically as specified by this field, and reported when the display is next refreshed. After the elapsed period, if any periodic exceptions have occurred, the Exception Notification window is displayed showing the number of warning and problem exceptions. This field is only required for periodic exception processing.

You can request a log file data set or DPMOUT data set to be written by selecting *Log file data set output needed* or *DPMOUT data set output needed* from the Exception Processor panel, respectively. If a log or DPMOUT file is requested, the Exception Output Data Sets window is displayed. Refer to “Exception Output Data Sets Window” on page 58 for details.

Exception Processing

Previously selected fields are indicated by a greater-than symbol (>).

The *Exception threshold data set* field contains the name of the exception threshold data set used as input to the exception processor. The data set is built using the Exception Threshold Field Details panel. The Online Monitor exception processor uses the information in this data set to test fields for exception conditions.

Note: A valid exception threshold data set needs to be specified on the Exception Processor panel before activating display exception, periodic exception, or exception event processing.

DB2 PM supports a user exit to enhance the exception processing capabilities. This exit can handle both periodic exceptions and event exceptions. Therefore, you can start the exception user exit for periodic processing, event processing, or both, depending on which kind of exception processing you have activated on the Exception Processor panel.

You can activate the user exit together with periodic exception processing, event exception processing, or both. But you can also activate it when periodic exception processing, event exception processing, or both are already active.

To activate the user exit, type any character in the *User Exit* field. To deactivate the user exit, enter a blank in this field. Note that the *User Exit* field is displayed only if the data collector is active.

Several users can invoke periodic exception processing or event exception processing simultaneously using different threshold data sets. The users can start or stop this user exit independently. The user exit routine can check for the user ID, the exception field name, the field value, or other characteristic items to select individual paths of processing.

DB2 PM provides a sample of the exception processing exit, called DGOMUPXT, which issues a message to the operator. The message text varies depending on whether the situation is an event exception or a periodic exception. For a description of the different formats of this message, see message number DGOV0100I in the *DB2 PM Messages* manual.

You can modify DGOMUPXT according to your needs, for example, to examine the type of exception and perform any action necessary to handle the situation.

For more details on user exits, refer to the *DB2 PM Installation and Customization* manual.

Exception Processing

Exception Output Data Sets Window

The Exception Output Data Sets window is displayed whenever a log file or DPMOUT data set is requested on the Exception Processor panel.

```
DGOMEPO3          Exception Output Data Sets

Specify the data set(s) to be used, and press Enter

Display log file data set
Name . . . . . _____
Disposition . . 1 1=append 2=overwrite 3=new

Display DPMOUT data set
Name . . . . . _____
Disposition . . 1 1=append 2=overwrite 3=new

Periodic log file data set
Name . . . . . _____
Disposition . . 1 1=append 2=overwrite 3=new

Periodic DPMOUT data set
Name . . . . . _____
Disposition . . 1 1=append 2=overwrite 3=new

F1=Help   F2=Split  F7=Up    F8=Down   F9=Swap   F12=Cancel
```

Figure 30. Exception Output Data Sets Window

Use this window to enter the names of the exception log file and DPMOUT data sets you want the exception processor to write to. If the data collector is active for your current subsystem, make sure that it is authorized to write to these data sets. Different data sets are used for display exceptions and periodic exceptions.

For data sets selected on the Exception Processor panel, a valid name is required. Do not specify a name for those data sets that were not selected. Therefore, if a LOG data set was selected but not a DPMOUT data set, then you must enter a valid name for the exception LOG data set but not for the DPMOUT data set.

You can enter the name of an output log file data set (to which exception conditions are written). There is an entry written to the data set for each exception condition detected by the exception processor. This data set can subsequently be used as input to the DB2 load utility, or printed using the DB2 PM exception log print utility. Refer to “Printing the Exception Log File Data Set” on page 68 for more information. For the layout of the exception log file data set, refer to “Appendix B. Exception Log File Output Record” on page 273.

You can enter the name of an output DPMOUT data set (to which DPMOUT-formatted records containing exception conditions are written). This data set can be used as input to Batch record trace or statistics trace for a more detailed analysis of exception conditions. Refer to the *DB2 PM Report Reference* for information on the layout of DPMOUT-formatted records.

The *Disposition* fields specify how the data is to be written to the data sets. Enter 1 (append) to append the data, 2 (overwrite) to overwrite the old data, or 3 (new) to dynamically allocate a new data set.

Press **Enter** to initialize exception processing and activate the selected functions. If there are any errors during this process, a panel is displayed showing the errors.

Starting Display Exception Processing

Display exception processing is started from the Exception Processor panel under *Activate/Deactivate Exception Processing* (refer to Figure 29). Enter any character in the following fields to activate display exception processing for the appropriate panels:

- *Display thread summary*
- *Display thread detail*
- *Display statistics detail*

Starting Periodic Exception Processing

Periodic exception processing is started from the Exception Processor panel under *Activate/Deactivate Exception Processing* (refer to Figure 29). Enter any character in the *Periodic* field and specify the periodic exception units and interval under the *Options* field to activate periodic exception processing.

Starting Exception Event Notification

Exception event notification is started from the Exception Processor panel under *Activate/Deactivate Exception Processing* (refer to Figure 29). Enter any character in the *Exception event notification* field to activate exception event notification.

Note that the events need to be specified with the EXCEPTIONEVENT data collector parameter or on the Data Collector Parameters window of the administrator user dialog before exception event processing can be activated using the Exception Processor panel. Refer to the *DB2 PM Installation and Customization* manual and “Data Collector Parameters Window” on page 235 for more information.

How to Restart Exception Processing

If the values in the exception threshold data set are changed during an Online Monitor session, the exception processor needs to be restarted (reinitialized) to load and use the new values. Exception processing initialization occurs when you start display or periodic exception processing using the options on the Exception Processor panel as shown in Figure 29.

You can reinitialize exception processing in the following ways:

- Stop and then start exception processing using the Exception Processor panel.
- Restart the exception processor using the REINIT command.

Exception Processing

REINIT Command

The REINIT command restarts the exception processor using the latest values in the exception threshold data set.

The command syntax is:



```
▶—REINIT—▶
```

Figure 31. Syntax of the REINIT Command

Type REINIT (or a valid abbreviation) on any command line (except on the Asynchronous Task Termination panel) as long as exception processing is active and press **Enter**.

REINIT can be used in any truncated form beginning with a minimum of REI.

Examining Exception Messages

This section describes how to examine exception messages issued during exception processing using the LOOK command.

Whenever an exception occurs, an exception message is written to the appropriate exception list where it can be examined using the LOOK command.

The command syntax is:



```
▶—LOOK—▶  
  1  
  2  
  3  
  4  
  5  
  6
```

Figure 32. Syntax of the LOOK Command

The LOOK parameters 1 to 6 correspond with the options on the Look Selections menu. Refer to Figure 33.

To display the Look Selections menu, type L00K and press **Enter** on any command line, or press **F16** (LOOK) on any panel.

```
DGOMLMSP 03:35   Look Selections

Subsystem: PM01DLOC           DSN1 V6

Select one of the following displays

—  1. Periodic Exceptions
    2. Periodic Exceptions Messages
    3. Display Exceptions
    4. Authorization Failure Summary
    5. Exception Event Summary
    6. Exception Event Messages

Command ==> _____
F1=Help      F2=Split   F3=Exit    F6=History  F9=Swap    F12=Cancel
F17=Collect
```

Figure 33. Look Selections Menu

Use the Look Selections menu to access panels that display exception messages and the status of exception processes. The list panels display the last 500 exceptions and authorization failures that occurred during your Online Monitor session. When this limit is reached, the oldest entries in the list are discarded as new entries are added. When these windows are first displayed, the bottom of the list is displayed showing the most recent exceptions that occurred.

Following are descriptions of the windows that can be accessed from the Look Selections menu.

Exception Processing

Examining the Periodic Exceptions List

To display the Periodic Exceptions List window, select option 1 (*Periodic Exceptions*) from the Look Selections menu or type L00K 1 and press **Enter** on any command line.

```
DGOMLAXP                Periodic Exceptions List                Row 499 to 500 of 500

Periodic Interval started . . . . . : 01/30/98 08:52:04.10
Last Interval . . . . . : 01/30/98 08:53:35.85

   Time      Location      Group  Subsystem  Member  Corrname
   Field     Reqloc      Primauth Planname  Connect Corrnmbr
   Descr
-----
- 08:35:36 PM01DLOC      GROUP001 N/P      MEMBER01
   N/P      N/P      N/P
SLRSUSP 100      >      0      Problem Total
TOTAL ALL SUSPENSIONS

- 13:21:28 PM01DLOC      GROUP001 N/P      MEMBER01
   N/P      N/P      N/P
ADRECETT 0.0      <      100      Problem Commit
ELAPSED TIME IN APPLICATION (CLASS 1)
***** Bottom of data *****

Command ==>
F1=Help   F2=Split  F3=Exit   F7=Up     F8=Down   F9=Swap
F12=Cancel
```

Figure 34. Periodic Exceptions List Window

Use this window to view the most recent periodic exceptions that have occurred. You can use the scrolling keys **F7** (Up) and **F8** (Down) to browse the list.

Select any of the entries listed on this window to display either the Thread Detail panel or DB2 Statistics Detail panel as appropriate, where you can examine the field causing the exception. Pressing **F3** (Exit) or **F12** (Cancel) on either of these panels returns you to the Periodic Exceptions List window. If the selected exception was caused by a thread that is no longer active, past data is automatically retrieved if available to display the thread. For more information on history, refer to “Chapter 5. Viewing Past Data” on page 43.

This list is cleared if you exit the Online Monitor without an active data collector running.

Examining Periodic Exception Messages

To display the Periodic Exception Messages window, select option 2 (*Periodic Exceptions Messages*) from the Look Selections menu or type L00K 2 and press **Enter** on any command line.

```

DGOMLAMP                Periodic Exception Messages                ROW 1 TO 2 OF 2
Message
DGOM944 Periodic Exception Processor started at 01/30/98 08:52:04.100
DGOM945 Periodic Exception Processor stopped at 01/30/98 08:53:07.290
***** BOTTOM OF DATA *****

Command ==> _____
F1=Help   F2=Split   F3=Exit   F7=Up     F8=Down   F9=Swap
F12=Cancel

```

Figure 35. Periodic Exception Messages Window

Use this window to view messages issued by the periodic exception processor. You can use the scrolling keys **F7** (Up) and **F8** (Down) to browse the list.

This list is cleared when you exit the Online Monitor.

Exception Processing

Examining the Display Exception List

To display the Display Exception List window, select option 3 (*Display Exceptions*) from the Look Selections menu or type L00K 3 and press **Enter** on any command line.

```
DGOMLSXP                Display Exception List                Row 499 to 500 of 500

Time   Location            Group  Subsystem  Member  Corrname
  Reqloc  Primauth Planname  Connect Corrnmbr
Field  Value      Compare Threshold Type      By
Descr
-----
08:35:36 PM01DL0C      GROUP001 N/P      MEMBER01
          N/P          N/P      N/P
SLRSUSP 100          >        0        Problem Total
TOTAL ALL SUSPENSIONS

13:21:28 PM01DL0C      GROUP001 N/P      MEMBER01
          N/P          N/P      N/P
ADRECELT 0.0        <        100     Problem Commit
ELAPSED TIME IN APPLICATION (CLASS 1)

***** Bottom of data *****

Command ==>
F1=Help   F2=Split  F3=Exit   F7=Up     F8=Down   F9=Swap
F12=Cancel
```

Figure 36. Display Exception List Window

Use this window to view information about the latest display exceptions that have occurred during your Online Monitor session. You can use the scrolling keys **F7** (Up) and **F8** (Down) to browse the list.

This list is cleared when you exit the Online Monitor.

Examining Authorization Failure Summary

To display the Authorization Failure Summary window, select option 4 (*Authorization Failure Summary*) from the Look Selections menu or type L00K 4 and press **Enter** on any command line.

```

DGOMLAFS          Authorization Failure Summary          ROW 1 TO 3 OF 3

Reporting Started . . . . . : 01/30/98 08:52:04
Last Interval . . . . . : 01/30/98 09:01:23

For details, place any character next to date and press Enter

   Date      Time      Authorization ID
  _ 01/30/98  08:52:04  USER300
  _ 01/30/98  08:52:34  USER300
  _ 01/30/98  08:53:07  USER300

***** BOTTOM OF DATA *****

Command ==>
  F1=Help   F2=Split   F3=Exit    F7=Up      F8=Down    F9=Swap
  F12=Cancel

```

Figure 37. Authorization Failure Summary Window

Use this window to view a list of authorization failures. You can select any item from the list to display the Authorization Failure Detail window, where the authorization failure can be examined in greater detail. You can use the scrolling keys **F7** (Up) and **F8** (Down) to browse the list.

Exception Processing

Examining Exception Event Summary

To display the Exception Event Summary window, select option 5 (*Exception Event Summary*) from the Look Selections menu or type L00K 5 and press **Enter** on any command line.

```

DGOMLEXP                               Exception Event Summary          ROW 1 TO 3 OF 3

Reporting Started . . . . . : 01/30/98 08:52:04
Last Interval . . . . . : 01/30/98 09:01:23

   Date      Time      IFCID
  _ 01/30/98 08:52:50 172
                                  Deadlock
  _ 01/30/98 08:53:06 267
                                  CF rebuild/alter started
  _ 01/30/98 08:54:11 090
                                  Global trace started
***** BOTTOM OF DATA *****

Command ==>
F1=Help   F2=Split  F3=Exit   F7=Up     F8=Down   F9=Swap
F12=Cancel
```

Figure 38. Exception Event Summary Window

Use this window to view the most recent exception events that occurred during your Online Monitor session. You can use the scrolling keys **F7** (Up) and **F8** (Down) to browse the list.

Select any event listed on the Exception Event Summary window for closer examination. When an exception event is selected, one of the following windows is displayed as determined by the type of event:

- EDM Pool Full Data window
- Deadlock Data window
- Timeout Data window
- Coupling Facility (CF) Rebuild/Alter Start Event window
- CF Rebuild End Event window
- CF Alter End Event window
- Unformatted Record panel (thread commit indoubt)
- Global trace started.

Examining Exception Event Messages

To display the Exception Event Messages window, select option 6 (*Exception Event Messages*) from the Look Selections menu or type LOOK 6 and press **Enter** on any command line.

```

DGOMLEMP                Exception Event Messages                ROW 1 TO 4 OF 4
-----
DGOM953 Exception event processor started at          01/30/98 08:52:04.100
DGOM954 Exception event processor stopped at         01/30/98 08:52:10.100
***** BOTTOM OF DATA *****

Command ==>
F1=Help   F2=Split  F3=Exit   F7=Up     F8=Down   F9=Swap
F12=Cancel

```

Figure 39. Exception Event Messages Window

Use this window to view messages issued by the exception event processor. You can use the scrolling keys **F7** (Up) and **F8** (Down) to browse the list.

Exception Processor Output Data Sets

Exception processing output data can be written to data sets. Use these data sets for further analysis of exception conditions.

Note: Always write monitor, trace, exception log file, and exception DPMOUT data to separate data sets.

Exception Log File Data Set

You can specify a particular exception log file data set to which information about exceptions is written. The contents of the exception log file data set can be either printed or loaded into a DB2 table for further investigation.

To retain log file data on the same data set across multiple Online Monitor sessions, specify APPEND for the disposition.

To dynamically allocate a new exception log file data set with the following attributes, specify NEW for the disposition:

```

RECFM:      VB
LRECL:      512
BLKSIZE:    4 096

```

The data set contains an entry for each field found in exception status.

Refer to “Appendix B. Exception Log File Output Record” on page 273 for the layout of the exception log file data set.

Exception Processing

Printing the Exception Log File Data Set

You can print the contents of the exception log file data set using the exception log file print utility.

To use this utility, submit the sample member DGOMEJCL found in the SDGOSAMP library. Note that this member is provided only as an example and can be modified as required by your installation.

Performance Database

Exception data can be loaded into DB2 PM's performance database. The CREATE TABLE DDL, LOAD, CREATE VIEW statements, and sample SQL queries can be found in the SDGOSAMP library. Note that you can modify the table structure according to your needs.

Following are the names of the provided members in SDGOSAMP:

CREATE TABLE statement:

DGOECFIL

LOAD utility control statements:

DGOELFIL

Sample CREATE VIEW statement:

DGOEVFIL

Sample SQL query:

DGOEQFIL

Exception DPMOUT Data Set

You can specify a particular exception DPMOUT output data set. This data set holds the DB2 instrumentation records that contain at least one field in exception status, in DPMOUT format. You can use this data set as input to batch record trace or statistics trace for a more detailed analysis of exception conditions.

To retain DPMOUT data on the same data set across multiple Online Monitor sessions, specify APPEND for the disposition.

To dynamically allocate a new DPMOUT data set with the following attributes, specify NEW for the disposition:

RECFM: VBS

LRECL: 32 756

BLKSIZE: 6 233

Refer to the *DB2 PM Report Reference* for information on the layout of the DPMOUT record.

Stopping Exception Processing

The different types of exception processing can be stopped using the Exception Processor panel by deselecting the appropriate fields under *Activate/Deactivate Exception Processing* (refer to Figure 29).

If an exception task is active when you exit the Online Monitor, you are notified by one of the Asynchronous Task Termination panels. You can either keep selected tasks active (if the data collector is active) and exit the Online Monitor, or return to the Online Monitor main menu keeping all asynchronous tasks active. Refer to “Leaving the Online Monitor” on page 20 for more information.

If an exception task is active when you change DB2 subsystems, you are notified by one of the Asynchronous Task Termination panels. You can either change DB2 subsystems and terminate all asynchronous tasks, or return to the previous panel keeping all asynchronous tasks active. Refer to “DB2 Subsystem Windows” on page 22 for more information.

Note that if you are in a split screen mode and you change the subsystem in one session, periodic exceptions are terminated even if they were turned on in the other session.

Chapter 7. Displaying Thread Activity

Tuning DB2

This chapter identifies and describes the specific DB2 data which is reported for the purpose of tuning DB2. For general tuning advice on DB2, refer to the DB2 Administration Guide 'Performance, Monitoring, and Tuning' chapters for the specific release of DB2.

All thread activity fields up to and including DB2 V5 are supported by thread activity display. To view new fields introduced with DB2 V6, use the DB2 PM workstation online monitor.

Use the thread activity panels to examine information about the current activity of all active threads connected to a DB2 subsystem.

From the Thread Summary panel, you can view key values for all connected threads (qualified and sorted as you require). You can select any thread listed on the Thread Summary panel to display the Thread Detail panel for further investigation of the thread.

The Thread Detail panel provides an overview of all thread information categories and also presents some values that are more detailed. By selecting a category, you get a window that shows all the information pertaining to this category.

Panels

The following table lists all the thread activity panels shown in this chapter.

Thread Activity Panels		
Thread Summary panel	...	Figure 41 on page 76
Thread Detail panel	...	Figure 45 on page 80
Thread Identification window	...	Figure 46 on page 82
Requester Correlation Data window	...	Figure 47 on page 84
Current Package/DBRM window	...	Figure 48 on page 85
Thread Times window	...	Figure 50 on page 89
Locking (IRLM) Activity window	...	Figure 51 on page 91
Locked Resources window	...	Figure 52 on page 94
Threads Holding Resource window	...	Figure 53 on page 95
RID List Processing window	...	Figure 54 on page 96
SQL Activity window	...	Figure 55 on page 97
Buffer Manager Activity window	...	Figure 56 on page 99
Buffer Pool Detail window	...	Figure 57 on page 100
SQL Statement and Package window	...	Figure 58 on page 101
Distributed Data window	...	Figure 59 on page 102
Distributed Location Detail window	...	Figure 60 on page 103
Distributed Conversation Detail window	...	Figure 61 on page 104
IFI (Class 5) and Data Capture window	...	Figure 62 on page 105
Query Parallelism Data window	...	Figure 63 on page 106
Data Sharing Locking Activity window	...	Figure 64 on page 109
Group Buffer Pools Activity window	...	Figure 65 on page 110
Group Buffer Pool Detail window	...	Figure 66 on page 111
Stored Procedures window	...	Figure 67 on page 112
DB2 Thread Qual. Parameters window	...	Figure 76 on page 118
DB2 Thread Sort Specification window	...	Figure 79 on page 122

Display Thread Activity Overview

The Thread Summary panel shows a summary of all connected DB2 threads qualified and sorted as defined by the QUALIFY and SORT commands.

Individual threads can be selected from the Thread Summary panel, Threads Holding Resource window, or the Periodic Exceptions List panel for viewing. Selecting a thread results in all currently displayed windows being removed and the Thread Detail panel being displayed for the newly selected thread. This thread then becomes the monitored thread for further examination using the thread activity panels. From the Thread Detail panel, you can view specific information about the monitored thread in greater detail. To do this, type any character in the selection field next to the corresponding headings and press **Enter**.

Data displayed on the current panel is refreshed whenever you press **Enter** *without* selecting a particular category to be displayed or executing a command.

Before you start displaying thread activity, make sure that the appropriate DB2 monitor trace classes are set on. At least monitor class 1 must be set on, but it is a

good practice to also set on class 2 and class 3. If you also want to get class 5, 7, or 8 information, you must switch on the corresponding monitor trace class.

If display exception processing is active, any fields in exception status are shown in reverse video. If you are using a color terminal, fields in *warning* status are highlighted in yellow, while fields in *problem* status are highlighted in red. Furthermore, a pop-up window shows the number of display exceptions detected.

You can purge a thread currently processing in a DB2 subsystem from any thread activity panel using the PURGE command. You require the DB2 privilege to perform CANCEL THREAD. Refer to “PURGE Command” on page 115 for more information on purging a thread.

For a DB2 thread exploiting parallelism, DB2 PM reports aggregate values across all parallel tasks created to execute SQL statements within the thread. Therefore, and because of the nature of parallel work, some counters (particularly CPU and suspension fields) may show unexpected large values, which do not necessarily indicate problems. In some cases these values can be even larger than the entire wall-clock elapsed time. Besides query parallelism DB2 PM also reports DB2 utility parallelism. Further details are described in the following paragraph.

Accounting Times

Accounting times are usually the prime indicator of a performance problem and most often should be the starting point for analysis.

DB2 times are classified as follows:

- Class 1 time shows the time the application spent since connecting to DB2, including time spent outside DB2.
- Class 2 elapsed time shows the time spent in DB2. It is divided into CPU time and waiting time.
- Class 3 elapsed time is divided into various waits, such as the duration of suspensions due to waits for locks and latches or waits for I/O.

Figure 40 shows the relationship between the different accounting times.

Thread Activity

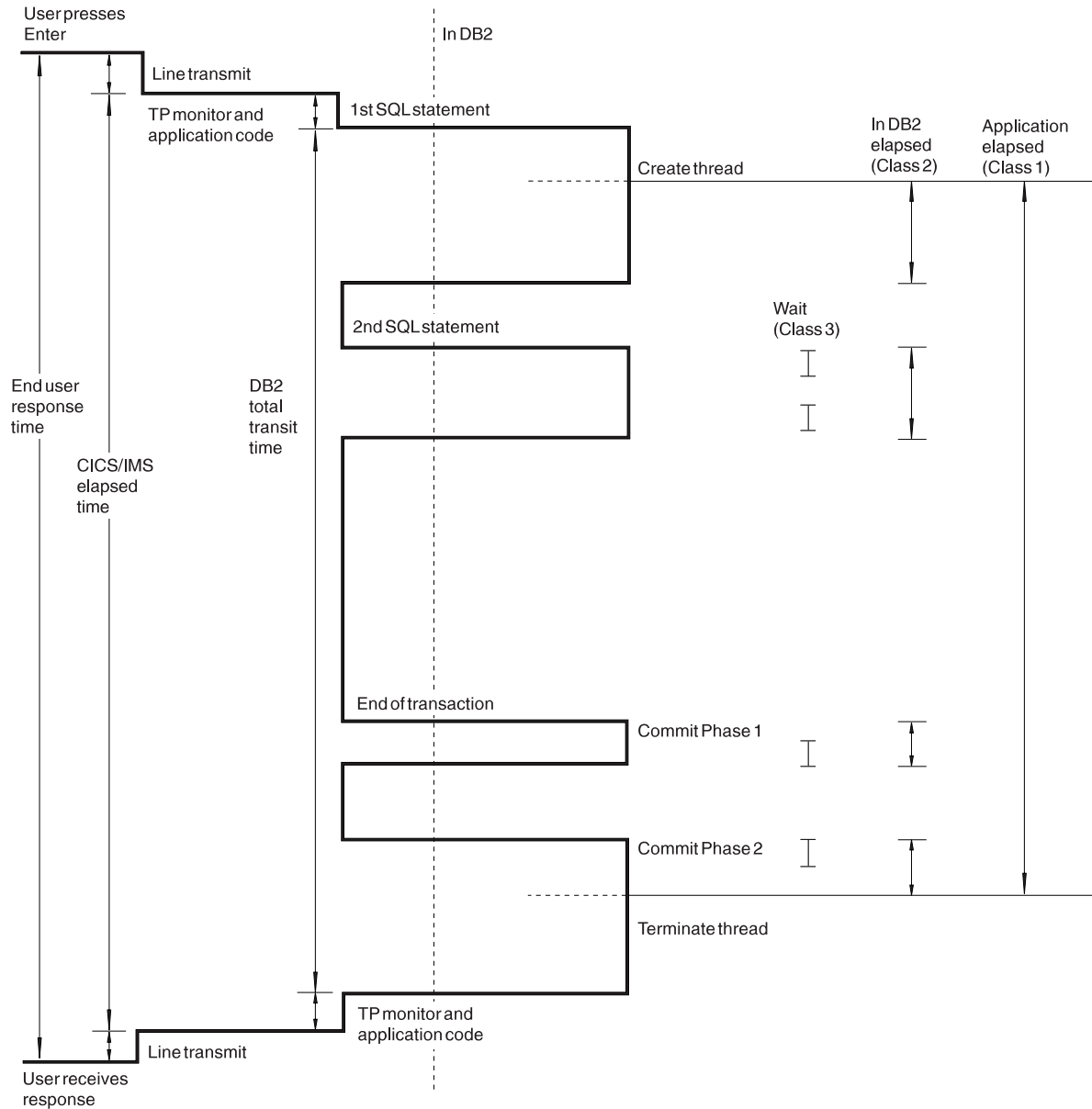


Figure 40. Accounting Times

Parallelism Considerations

This section applies to threads exploiting CP parallelism or utility parallelism.

If a thread exploits parallelism, several tasks (called parallel tasks) are scheduled to perform the parallel work. For each of these tasks an accounting record is generated, which contains counters and timers for the work performed by the particular task. In addition, the accounting record for the thread contains the details on non-parallel work within the thread as well as some parallel work-related data.

DB2 PM summarizes all accounting records generated for such a thread and presents them as one logical accounting record. Table 3 on page 75 describes which values are a combination of the originating task's and parallel tasks' values and which are taken from the originating task only.

Thread Activity

To avoid incorrect time values, the data collector must be active with CCP=YES switched on if query parallelism or utility parallelism is used. In this case, the data collector can collect data of parallel tasks that have already terminated.

For Sysplex parallelism, thread activity information is only shown for the originating task and for those parallel tasks that are executing on the same member as the originating task. Parallel tasks that are executing on different members of the Sysplex group are ignored. Sysplex parallelism threads are marked with ***S*** next to the program name on the Thread Summary panel.

Especially interesting is the relationship between elapsed, CPU, and suspension times in the case of query parallelism or utility parallelism. The elapsed time is taken from the originating record while CPU and suspension times are calculated from all the parallel and originating records. Consequently, both CPU time and suspension times can be larger than the elapsed time. Therefore, you can only get the full picture of the response time distribution if the times for each participating task are known. Produce a long record trace for IFCID 3 using the Batch reporting facilities, especially if you suspect that the CPU times or suspension times for a thread where query parallelism or utility parallelism is used are large for other reasons than the times being added for several tasks. In a long record trace, all accounting records for parallel and originating threads are reported separately.

Table 3. Query Parallelism Related Data

Accounting Data	Derivation
Identifiers (PRIMAUTH, PLANNAME, and so on)	Originating task
Class 1 elapsed time	Originating task
Class 1 TCB times	Separate counters for originating task and sum of all parallel tasks
Class 2 elapsed time	Originating task
Class 2 TCB times	Separate counters for originating task and sum of all parallel tasks
Class 7 elapsed time	Originating task
Class 7 TCB times	Separate counters for originating task and sum of all parallel tasks
Class 2 and class 7 DB2 entry/exit events	Originating task
Class 3 and class 8 times	Separate counters for originating task and sum of all parallel tasks
Class 3 and class 8 events	Sum of originating task and all parallel tasks
Class 5 times	Originating task
SQL counters	Originating task
RID List counters	Sum of originating task and all parallel tasks
Query Parallelism counters	Originating task
Locking (including data-sharing-specific) counters	Sum of originating task and all parallel tasks
RLF data	Originating task

Thread Activity

Table 3. Query Parallelism Related Data (continued)

Accounting Data	Derivation
Buffer Pools counters	Sum of originating task and all parallel tasks
Group Buffer Pools counters	Sum of originating task and all parallel tasks
DDF counters	Originating task
Data Capture counters	Originating task

Thread Summary Panel

Use the Thread Summary panel to view a list of active threads connected to the DB2 subsystem.

To display the Thread Summary panel, select option 1 (*Display Thread Activity*) from the DB2 PM Online Monitor Main Menu.

When the Thread Summary panel is initially displayed, class 1 and class 2 elapsed times are shown. Additional information is available to the right of the screen. You can press **F20** (Right) to view the portions of the panel that are not displayed. Figure 41, Figure 42, Figure 43, and Figure 44 show the Thread Summary panel with all its possible fields.

```

DGOMTPLS 17:11          Thread Summary  SORT QUALIFY  ROW 1 TO 2 OF 2
PM01DLOC          DSN1 V6  GROUP001 MEMBER01

To display a thread, place any character next to it, then press Enter.

   Primauth  Planname  Program  Connection  Status  ----- Elapsed -----
  _ USERT003  DSNESPCS  DSNESM68  DB2CALL  *DB2    19.664838  0.6458763
  _ USERT004  DSNUTILS  DSNESM68  DB2CALL  I/O     3.345235  0.2131145
-- End of Thread list --

Command ==>
  F1=Help    F2=Split    F3=Exit    F5=Auto    F6=History  F7=Up
  F8=Down    F9=Swap     F10=Qualify F11=Sort   F12=Cancel  F16=Look
  F17=Collect F19=Left    F20=Right  F22=Purge

```

Figure 41. Thread Summary Panel

Thread Activity

```
DGOMTPLS 17:11          Thread Summary  SORT QUALIFY  ROW 1 TO 2 OF 2
PM01DLOC                DSN1 V6   GROUP001 MEMBER01

To display a thread, place any character next to it, then press Enter.

   Primauth  Planname  Program      --- Elapsed ---  ----- CPU -----
   _ USERT003 DSNESPCS  DSNESM68      1.567556      0.004357      0.001148
   _ USERT004 DSNUTILS  DSNESM68      1.910917      0.006301      0.003724
-- End of Thread list --

Command ==>>>
F1=Help      F2=Split    F3=Exit      F5=Auto      F6=History   F7=Up
F8=Down      F9=Swap     F10=Qualify  F11=Sort     F12=Cancel   F16=Look
F17=Collect  F19=Left    F20=Right    F22=Purge
```

Figure 42. Thread Summary Panel (scrolled right once)

```
DGOMTPLS 17:11          Thread Summary  SORT QUALIFY  ROW 1 TO 2 OF 2
PM01DLOC                DSN1 V6   GROUP001 MEMBER01

To display a thread, place any character next to it, then press Enter.

   Primauth  Planname  Program      Request Connection  Correlation
   _ USERT003 DSNESPCS  DSNESM68      Count Type          ID
   _ USERT004 DSNUTILS  DSNESM68      4 DB2CALL           USERT003
   _ USERT004 DSNUTILS  DSNESM68      4 DB2CALL           USERT004
-- End of Thread list --

Command ==>>>
F1=Help      F2=Split    F3=Exit      F5=Auto      F6=History   F7=Up
F8=Down      F9=Swap     F10=Qualify  F11=Sort     F12=Cancel   F16=Look
F17=Collect  F19=Left    F20=Right    F22=Purge
```

Figure 43. Thread Summary Panel (scrolled right twice)

Thread Activity

```

DGOMTPLS 17:11          Thread Summary  SORT QUALIFY  ROW 1 TO 2 OF 2

PM01DLOC          DSN1 V6  GROUP001 MEMBER01

To display a thread, place any character next to it, then press Enter.

   Primauth  Planname  Program          Requesting      Collection
   _USERT003 DSNESPCS  DSNESM68        DSNAPC7        N/P
   _USERT004 DSNUTILS  DSNESM68        DSNAPC7        N/P
-- End of Thread list --

Command ==>>>
F1=Help      F2=Split    F3=Exit        F5=Auto        F6=History    F7=Up
F8=Down      F9=Swap     F10=Qualify   F11=Sort       F12=Cancel    F16=Look
F17=Collect  F19=Left    F20=Right     F22=Purge

```

Figure 44. Thread Summary Panel (scrolled right three times)

When the data collector is active, the Thread Summary panel shows also threads initiated by DB2 PM besides other threads. Threads are collected for data collector tasks and for each Host Online Monitor user and Workstation Online Monitor user.

If there are many active threads, you can use **F7** (Up) and **F8** (Down) to browse the list.

You can filter threads from being displayed on this panel using the QUALIFY command (refer to “QUALIFY Command” on page 116). You can also specify the order in which the threads are listed using the SORT command (refer to “SORT Command” on page 120).

The *Status* field displays one of the following values:

- DB2** The thread is currently processing within DB2.
- I/O** The thread is performing I/O activity within DB2.
- LOCK** The thread is engaged in locking activity within DB2.
- EOT** The thread is in end-of-task processing.
- APPL** Processing is taking place within the application.
- I/S** The thread is in identify or signon state.
- QUE** The value specified for MAXUSERS on the DB2 install panel DSNTIPE has been met and the thread creation is queued until an available slot is found.
- SP** The thread is running a stored procedure and is currently processing within DB2.
- SPA** The thread is running a stored procedure, and processing is taking place outside DB2 (in stored procedure application code).
- SPW** The thread is waiting for a stored procedure to be scheduled within DB2.

NTCB Recoverable Resource Manager Services Attach Facility (RRSAF) agent has no TCB.

The identifier fields *Primauth*, *Planname*, *Package* or *DBRM*, *Connection ID*, and *Status* are highlighted in yellow when the status is DB2. Threads that are in I/O, Lock, SP, or SPW status are also highlighted in yellow because these are subsets of the DB2 status. The other fields on the Thread Summary panel are highlighted in reverse video when they are in exception status.

An asterisk (*) appears to the left of the *Status* field if the thread type is 'ALLIED DISTRIBUTED' or 'DBAT'.

When display exception processing is active, the exception fields displayed on the Thread Summary panel are checked for an exception condition each time the panel data is refreshed.

If you are filtering the threads listed on this panel, only the listed threads are checked for exception conditions. Threads in exception also have an impact on the sort sequence. They are sorted to the top of the display, with *problem* level exceptions first and *warning* level exceptions second.

From the Thread Summary panel, you can select any thread to display the Thread Detail panel, where the thread can be examined in greater detail.

Thread Detail Panel

Use the Thread Detail panel to view detailed information on the thread being monitored. From the Thread Detail panel, you can access the category windows showing selected information about the monitored thread in greater detail.

To display the Thread Detail panel, select any active thread listed on the Thread Summary panel, Threads Holding Resource window, or the Periodic Exceptions List panel.

Note: The Thread Detail panel displayed at your site may have been tailored by your installation and consequently may not necessarily match the panel example shown in this book.

Thread Activity

```

DGOMTPSM 16:36                               Thread Detail                               PMO1DL0C DSN1 V6
                                           GROUP001 MEMBER01
For details, place any character next to heading, then press Enter.
More: - +
- Thread Identification
Primauth . . . . . : USERT003           Correlation name . . . : USERT003
Planname . . . . . : DB2PMPLN          Connection type . . . . : DB2CALL
Connection ID . . . : DB2CALL           Type . . . . . : ALLIED
Requesting Location: DSNAPC6           Status . . . . . : DB2
- Current Package . . . . . : N/P
- Times
Class 1 . . . . . : 32.426923           Elapsed              CPU
Class 2 . . . . . : 0.000142           0.000092             0.000092
Class 3 . . . . . : N/P                 N/P                  N/A
Class 7 . . . . . : N/P                 N/P                  N/P
Class 8 . . . . . : N/P                 N/P                  N/A
- Locking Activity
Timeouts . . . . . : 0
Deadlocks . . . . . : 0
Suspensions . . . . . : 1
Lock escalations . . . . . : 0
Maximum page locks held . . . . . : 0
- Locked Resources
RID List Processing
- Unsuccessful - any reason . . . . . : 0
SQL Activity, Commits and Rollbacks
DML . . . : 0 Commit . . . . . : 0
DCL . . . : 0 Rollback . . . . . : 0
DDL . . . : 0 Changes/Commit . . . : 0.0
- Buffer Manager Activity
Getpage requests . . . . . : N/P
Buffer updates . . . . . : N/P
Prefetch reads . . . . . : N/P
Synchronous I/O . . . . . : N/P
SQL Statement and Package . . . . . : N/P
- Distributed Data
Requester elapsed time . . . . . : N/P
- IFI (Class 5) and Data Capture
- Query Parallelism Data
- Data Sharing Locking Activity
- Suspensions . . . . . : N/A
- Group Buffer Pools Activity
- Stored Procedures

Command ==>
F1=Help      F2=Split    F3=Exit     F5=Auto     F6=History  F7=Up
F8=Down      F9=Swap     F12=Cancel  F16=Look    F17=Collect F22=Purge

```

Figure 45. Thread Detail Panel

If you have enabled display exception processing, all fields in exception are shown in reverse video, and the color indicates the level of the exception. *Warning* level exceptions are highlighted in yellow, while *problem* level exceptions are highlighted in red. Categories that can be selected from this panel are shown in reverse video when their next level windows contain fields in exception status.

If DBRM is used, the *Current Package* field displayed on the Thread Detail panel is shown as *Current DBRM* instead.

The following list describes some of the important fields shown on this panel, and how to interpret the values contained in these fields.

Type The type of the thread being monitored. This field can contain one of the following values:

ALLIED The thread is not involved in any distributed activity.

- A-DIST** The thread is initiated by a DB2 attach and requests data from one or more server locations.
- DBAT** The thread is initiated by, and performing work on behalf of, a remote (requester) location.
- D-DIST** Distributed database access thread, both a DDF server and requester.

It is important to know if the thread is involved in distributed activity, since this can affect the fields you should monitor. For example, if the thread is involved in distributed activity, the class 1 elapsed time is higher than it would be if there was no distributed activity, since this time includes network time.

Class 1 Times

This field shows the elapsed time and the CPU time for the processing performed and includes the time spent not only in DB2 but also in the application.

CPU time is the sum of:

- The agent's CPU (TCB) time
- The CPU time spent in stored procedures
- The accumulated processing time of the parallel tasks (if query parallelism or utility parallelism is used).

Class 2 Times

This field shows the elapsed time and the CPU time for the processing performed in DB2 only. Elapsed time includes wait times.

CPU time is the sum of:

- The agent's CPU (TCB) time
- The CPU time spent in stored procedures
- The accumulated processing time of the parallel tasks (if query parallelism or utility parallelism is used).

Note that for threads exploiting query parallelism or utility parallelism, class 2 CPU time can be larger than class 2 elapsed time because the CPU time includes the execution time of all parallel threads. To separate the agent's CPU time from the sum of all parallel tasks' CPU times, select *Times*, which displays the Thread Times window. See also the discussion at the beginning of "Accounting Times" on page 73.

Class 3 Times

This field shows the total time spent waiting due to class 3 suspensions. Note that for threads exploiting query parallelism or utility parallelism, wait times are summed for the originating task and all parallel tasks. See also the discussion at the beginning of "Accounting Times" on page 73.

Suspensions

This field includes all types of lock suspensions.

Getpage requests

This field shows the number of GETPAGE requests. Reducing GETPAGE requests reduces CPU usage and improves performance. Fewer GETPAGE requests also result in fewer synchronous reads, because fewer pages that are not in the buffer pool must be fetched.

Prefetch reads

This includes number of prefetch reads done because of sequential prefetch, list prefetch, and dynamic prefetch.

Thread Activity

Synchronous I/O

This includes both synchronous reads and synchronous writes.

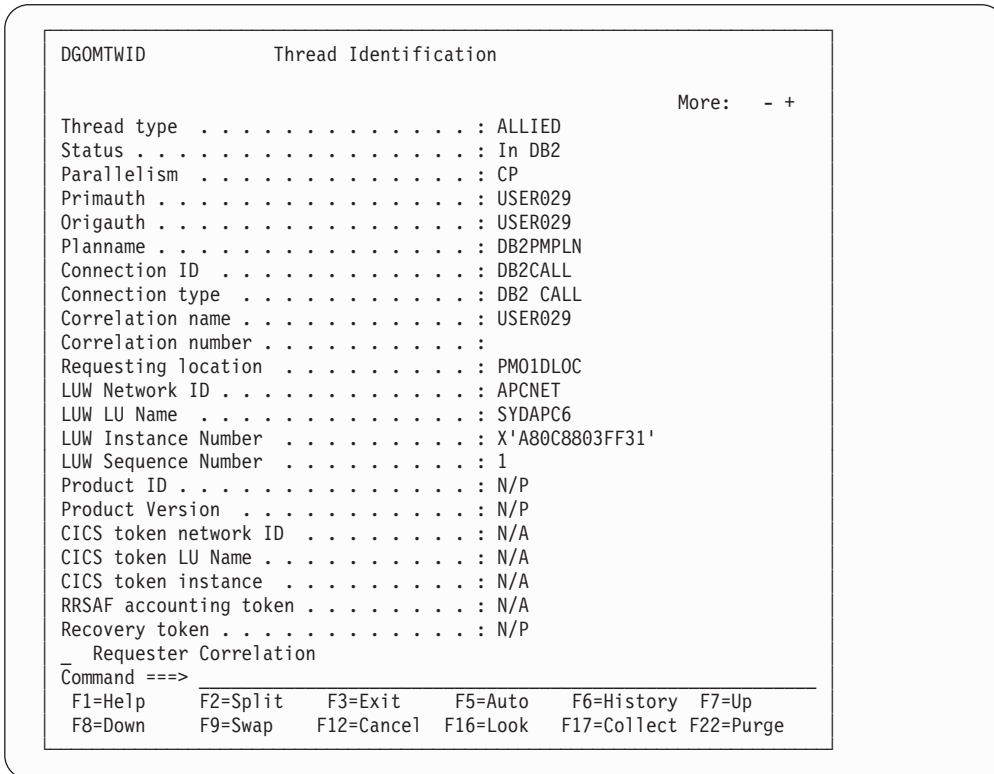
Thread Activity Windows

Following are descriptions of the windows that can be accessed from the Thread Detail panel. To access a window, type any character in the space beside the desired heading. Several windows can be accessed simultaneously. The windows are overlaid on the Thread Detail panel. To leave the current window and proceed with the next window, press **F3** (Exit). To cancel all windows and return to the Thread Detail panel, press **F12** (Cancel).

Thread Identification Window

Use the Thread Identification window to examine all the identification data about the thread being monitored.

To display this window, select *Thread Identification* from the Thread Detail panel.



```
DGOMTWID          Thread Identification

Thread type . . . . . : ALLIED
Status . . . . . : In DB2
Parallelism . . . . . : CP
Primauth . . . . . : USER029
Origauth . . . . . : USER029
Planname . . . . . : DB2PMLN
Connection ID . . . . . : DB2CALL
Connection type . . . . . : DB2 CALL
Correlation name . . . . . : USER029
Correlation number . . . . . :
Requesting location . . . . . : PM01DLOC
LUW Network ID . . . . . : APCNET
LUW LU Name . . . . . : SYDAPC6
LUW Instance Number . . . . . : X'A80C8803FF31'
LUW Sequence Number . . . . . : 1
Product ID . . . . . : N/P
Product Version . . . . . : N/P
CICS token network ID . . . . . : N/A
CICS token LU Name . . . . . : N/A
CICS token instance . . . . . : N/A
RRSAF accounting token . . . . . : N/A
Recovery token . . . . . : N/P
_ Requester Correlation
Command ==>
F1=Help   F2=Split  F3=Exit   F5=Auto   F6=History F7=Up
F8=Down   F9=Swap   F12=Cancel F16=Look  F17=Collect F22=Purge
```

Figure 46. Thread Identification Window

From the Thread Identification window, you can select *Requester Correlation* to display the Requester Correlation Data window.

The following list describes some of the important fields shown on this window, and how to interpret the values contained in these fields.

Status

The status of the thread. If Parallelism is 'CP', the status 'In DB2' means that the originating task is in DB2.

Primauth

The primary authorization ID from connection or signon. This is SYSOPR for MVS operator commands and DB2 system internal agents. The connection authorization exit and the signon authorization exit can change the primary authorization ID so that it is not the same as the original primary authorization ID. Distributed authorization ID translation can also change the primary authorization ID.

Planname

The name of the plan produced during the bind process and used by DB2 to process SQL statements encountered during statement execution. Some examples are DSNUTIL for utility, DSNBIND for bind activity, DISTSERV for remote unit of work, and the application plan name for CICS and IMS.

Correlation Name

The correlation name for the thread.

For further details, see "Correlation ID Translation" on page 34.

Correlation Number

The correlation number for the thread.

For further details, see "Correlation ID Translation" on page 34.

LUW Network ID

The logical unit of work ID (LUWID), consisting of the network ID, LU name, instance number, and sequence number, identifies a thread within a network and is used to correlate local and remote activity for a single distributed transaction.

LUW LU Name

See LUW Network ID.

LUW Instance Number

See LUW Network ID.

LUW Sequence Number

See LUW Network ID.

RRSAF accounting token

This field shows the accounting token as defined during signon for a thread using the RRS attachment facility.

Recovery token

This field is used to correlate Online Monitor display with a CICS inquire task display.

Requester Correlation Data Window

Use the Requester Correlation Data window to view information on the correlation data belonging to the originator (initial requester) of the distributed transaction. One of four different Requester Correlation Data windows is displayed depending on the requester type.

Figure 47 shows an example of a Requester Correlation Data window.

Thread Activity

```
DGOMTWMV          Requester Correlation Data

Primauth . . . . . : USER029
Plan Name . . . . . : DSNESPCS
Connection ID . . . . . : TSO
Connection type . . . . . : BATCH
Correlation name . . . . . : USERT003
Correlation number . . . . . :
Location . . . . . : PM01DLOC
Product ID . . . . . : DB2
Product Version . . . . . : V5 R1 M0
Network ID . . . . . : APCNET
LU Name . . . . . : SYDAPC5
MVS Accounting token

D01M300

Command ==>
  F1=Help   F2=Split   F3=Exit   F5=Auto   F6=History  F9=Swap
  F12=Cancel F16=Look   F17=Collect F22=Purge
```

Figure 47. Requester Correlation Data Window for a DB2 Requester

Current Package/DBRM Window

To display this window, select *Current Package* or *Current DBRM* from the Thread Detail panel. One of two possible windows is displayed depending on whether the thread currently uses a package or a DBRM.

DGOMTWPK Current Package

More: - +

```

Location . . . . . : PM01DLOC
Collection ID . . . . . : TEST_COLLECTION_XX
Program name . . . . . : CUSTINQR
Consistency token . . . . . : 'A2B984F82EA779093'X

DB2 entry/exit events . . . . . : 13
SQL statements issued . . . . . : 6

                                     Total      Current
                                     Execution  Execution
Elapsed time (Class 7) . . . . . : 13.000000 10.000000
CPU time . . . . . : 2.000000 N/A
  TCB . . . . . : 1.500000 N/A
  Parallel tasks . . . . . : 0.500000 N/A
Waiting time . . . . . : 11.500000 N/A
Suspension time (Class 8) . . . . . : 10.000000 N/A
  TCB . . . . . : 10.000000 N/A
  Parallel tasks . . . . . : 0.000000 N/A
Not accounted . . . . . : 1.500000 N/A

                                     Elapsed time  Events
Suspensions (Class 8) . . . . . : 10.000000 760
  Locks and latches . . . . . : 5.000000 200
  Synchronous I/O . . . . . : 2.000000 100
  Other read I/O . . . . . : 1.000000 50
  Other write I/O . . . . . : 0.500000 9
  Services task switch . . . . . : 0.500000 400
  Archive log (quiesce) . . . . . : 0.000000 0
  Archive log read . . . . . : 1.000000 1
  Drain lock . . . . . : 0.000000 0
  Claim release . . . . . : 0.000000 0
  Page latch . . . . . : 0.000000 0
  Stored procedures . . . . . : 0.000000 0
  Notify messages . . . . . : 0.000000 0
  Global contention . . . . . : 0.000000 0

Command ==>
F1=Help      F2=Split    F3=Exit     F5=Auto     F6=History
F7=Up        F8=Down    F9=Swap     F12=Cancel  F16=Look
F17=Collect  F22=Purge
    
```

Figure 48. Current Package Window

Use the Current Package window to view information about the location, identification, and execution times of various functions performed by or on the current package.

Thread Activity

DGOMTWDB		Current DBRM		
		More: - +		
Program Name	:	CUSTINQR		
DB2 entry/exit events	:	13		
SQL statements issued	:	6		
		Total	Current	
		Execution	Execution	
Elapsed time (Class 7)	:	13.000000	10.000000	
CPU time	:	2.000000	N/A	
TCB	:	1.500000	N/A	
Parallel tasks	:	0.500000	N/A	
Waiting time	:	11.500000	N/A	
Suspension time (Class 8)	:	10.000000	N/A	
TCB	:	10.000000	N/A	
Parallel tasks	:	0.000000	N/A	
Not accounted	:	1.500000	N/A	
		Elapsed time	Events	
Suspensions (Class 8)	:	10.000000	760	
Locks and latches	:	5.000000	200	
Synchronous I/O	:	2.000000	100	
Other read I/O	:	1.000000	50	
Other write I/O	:	0.500000	9	
Services task switch	:	0.500000	400	
Archive log (quiesce)	:	0.000000	0	
Archive log read	:	1.000000	1	
Drain lock	:	0.000000	0	
Claim release	:	0.000000	0	
Page latch	:	0.000000	0	
Stored procedures	:	0.000000	0	
Notify messages	:	0.000000	0	
Global contention	:	0.000000	0	
Command ==>				
F1=Help	F2=Split	F3=Exit	F5=Auto	F6=History
F7=Up	F8=Down	F9=Swap	F12=Cancel	F16=Look
F17=Collect	F22=Purge			

Figure 49. Current DBRM Window

Use the Current DBRM window to view information about the identification and execution times of various functions performed by or on the current DBRM.

Refer to “Accounting Times” on page 73 for a discussion of how to interpret the time values for threads exploiting query parallelism or utility parallelism. These considerations apply to class 7 times (for elapsed times and CPU times) and to class 8 times (for suspension times).

The following list describes some of the important fields shown on the Current Package and Current DBRM windows, and how to interpret the values contained in these fields.

Not accounted

This is derived as *Waiting time - Suspension time (Class 8) TCB*. It includes CPU wait times, paging, and open/close activity.

Suspensions (Class 8)

If *Waiting time* and *Suspension time (Class 8)* are almost the same, then examine the reasons for suspensions which caused the wait. Otherwise, look at the *Not accounted* field in the Thread Times window.

Locks and latches

This field shows the duration of suspensions resulting from a lock or latch not being available immediately on request. If the suspension time is high, examine the Locking (IRLM) Activity window.

Synchronous I/O

This field shows the accumulated I/O elapsed wait time for I/O performed under this thread. This field is for synchronous I/O only. It includes synchronous read and write I/O. If the time per I/O is high, one typical problem is an interference by prefetch or deferred write I/O.

Other read I/O

This field includes waits caused by read I/O performed under another thread, for example, sequential prefetch, list prefetch, or dynamic prefetch.

If the value in this field is high, the problem could be an I/O bound query using prefetch or an I/O contention. If it is an I/O bound query, DEGREE ANY could drastically improve elapsed time of such a query. The application is accessing data from a busy data set/volume/control unit and is continually being suspended. The DBA and the MVS system programmer should be consulted.

Other write I/O

This field includes waits caused by write I/O performed under another thread, for example, asynchronous write.

If the value in this field is high, the problem could be I/O contention. The application is accessing data from a busy data set/volume/control unit and is continually being suspended. The DBA and the MVS system programmer should be consulted to resolve possible data set placement problems.

Too small a buffer pool for sort and other updated data could also cause this problem.

Services task switch

Included here are waits due to OPEN/CLOSE data set, SYSLGRNX update, COMMIT PHASE II for UPDATE threads, HSM recall for data set, data space manager services, DEFINE, EXTEND, and DELETE data set, and the log I/Os for COMMIT and UPDATE processing.

Wait times in COMMIT are reported in the following fields:

TSO/CAF/Batch single phase commit:

SER.TASK SWTCH

CICS/IMS phase 1 commit:

SYNCHRON. I/O

CICS/IMS phase 2 commit:

SER.TASK SWTCH

This means, for example, that an IMS COMMIT used to have 2 synchronous I/O suspensions, whereas now it has 1 synchronous I/O suspension and 1 service task suspension.

Both single and dual logs result in the same count.

There is no overlap between the elapsed time reported in this field and the other class 3 elapsed times. Since DB2 Version 4, if service task suspensions overlap other types of suspensions, the other types of suspensions are ignored. Previously the service task time was ignored.

Thread Activity

Preformatting the data sets is probably most important in terms of service task suspension.

Archive log (quiesce)

Included here are waits due to processing of the ARCHIVE command (not the time for the ARCHIVE command to complete).

Avoid issuing ARCHIVE LOG QUIESCE during peak periods.

Archive log read

Accumulated wait time for archive reads (from tape).

Drain lock

The time spent waiting due to drain lock suspensions. If the value in this field is large, it may indicate that execution of a utility impacted the SQL.

Claim release

The time spent waiting for claims to be released.

Page latch

The time spent waiting for page latch contentions.

Thread Times Window

Use the Thread Times window to investigate the response times of different actions performed by the thread. Refer to “Accounting Times” on page 73 for a discussion on how to interpret the time values for threads exploiting query parallelism or utility parallelism.

To display this window, select *Times* from the Thread Detail panel.

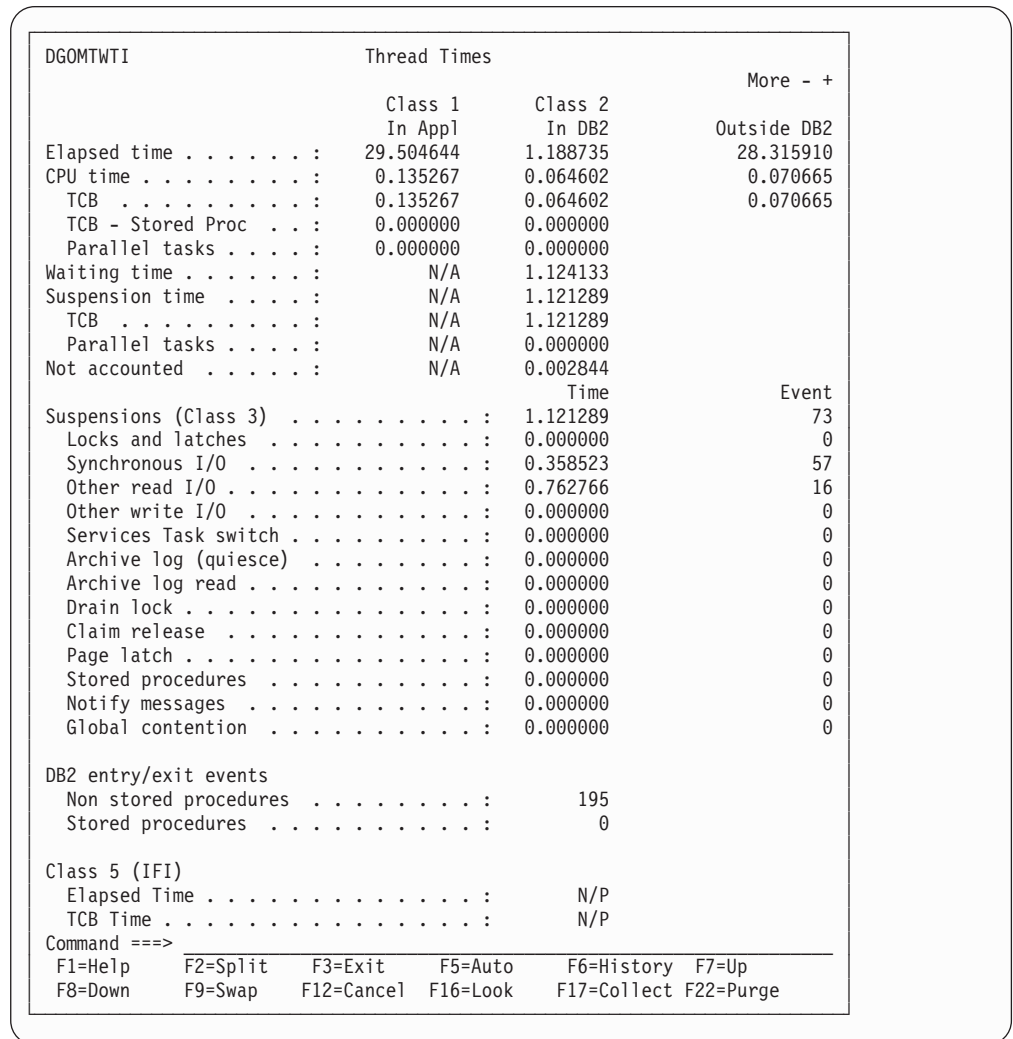


Figure 50. Thread Times Window

Class 1, 2, and 3 times can help guide your investigation into application performance and tuning.

DB2 class 2 and 3 times are reported only if monitor trace classes 2 and 3, respectively, are active.

Class 2 and 3 times are not updated until the thread completes its current call to DB2. For example, during execution of a long running SQL statement, class 2 and 3 times are not updated until after the SQL process has ended. Consequently, class 2 and 3 times are estimated when the thread is in DB2.

The following list describes some of the important fields shown on this window, and how to interpret the values contained in these fields.

Suspensions (Class 3)

Total time spent waiting because of various suspensions covered by monitor trace class 3.

Locks and latches

This field shows the duration of suspensions resulting from a lock or latch

Thread Activity

not being available immediately on request. If the suspension time is high, examine further the locking block in accounting.

Synchronous I/O

This field shows the accumulated I/O elapsed wait time for I/O performed under this thread. This field is for synchronous I/O only. It includes synchronous read and write I/O. If the time per I/O is high, one typical problem is an interference by prefetch or deferred write I/O. The I/O scheduling enhancement in DB2 Version 3 should reduce this problem by assigning higher I/O priority to synchronous I/O over asynchronous I/O.

Other read I/O

This field includes waits caused by read I/O performed under another thread, for example, sequential prefetch, list prefetch, or dynamic prefetch.

If the value in this field is high, the problem could be an I/O bound query using prefetch or an I/O contention. If it is an I/O bound query, DEGREE ANY could drastically improve elapsed time of such a query. The application is accessing data from a busy data set/volume/control unit and is continually being suspended. The DBA and the MVS system programmer should be consulted.

Other write I/O

This field includes waits caused by write I/O performed under another thread, for example, asynchronous write.

If the value in this field is high, the problem could be I/O contention. The application is accessing data from a busy data set/volume/control unit and is continually being suspended. The DBA and the MVS system programmer should be consulted to resolve possible data set placement problems.

Too small a buffer pool for sort and other updated data could also cause this problem.

Archive log (quiesce)

Included here are waits due to processing of the ARCHIVE command (not the time for the ARCHIVE command to complete).

Avoid issuing ARCHIVE LOG QUIESCE during peak periods.

Archive log read

Accumulated wait time for archive reads (from tape).

Drain lock

The time spent waiting due to drain lock suspensions. If the value in this field is large, it may indicate that execution of a utility impacted the SQL.

Claim release

The time spent waiting for claims to be released.

Page latch

The time spent waiting for page latch contentions.

Locking (IRLM) Activity Window

Use the Locking (IRLM) Activity window to view information on locking activity for the thread being monitored.

To display this window, select *Locking Activity* from the Thread Detail panel.

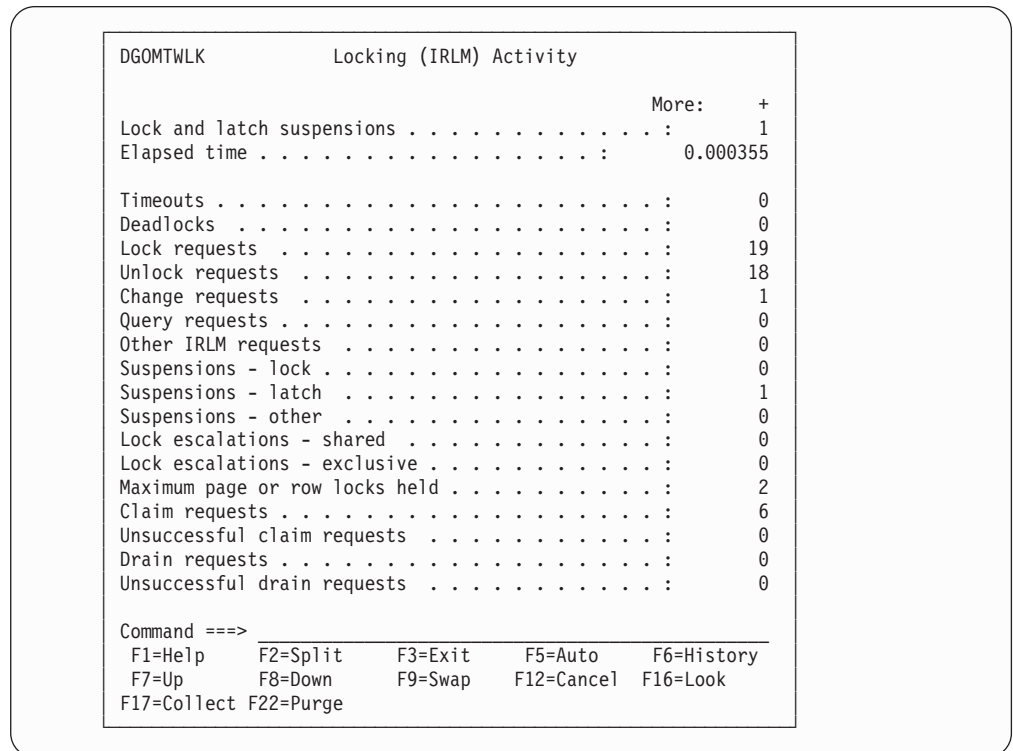


Figure 51. Locking (IRLM) Activity Window

Deadlocks and timeouts displayed on this window can indicate the existence of locking problems. These problems can be further investigated using the Locked Resources window to examine resources that are either locked by or, in case they are locked by another thread, unavailable to, the monitored thread.

The following list describes some of the important fields shown on this window, and how to interpret the values contained in these fields.

Timeouts

Number of times lock suspension ultimately resulted in a timeout. This happens when a requester for a lock on a resource has waited longer than the installation-specified RESOURCE TIMEOUT limit on the DB2 install panel DSNTIPI.

Deadlocks

Number of times lock suspension ultimately resulted in a deadlock. This happens when two or more application processes each hold locks on resources that the others need, without which they cannot proceed. A single process accessing data through an unclustered index can sometimes experience a deadlock between a data page and an index page. If deadlocks are not very frequent, they may not impact performance.

Lock requests

Number of times a lock on a resource was requested.

Change requests

Number of times a lock change was requested, for example, to promote a shared page lock to exclusive lock.

Suspensions - lock

Number of resource conflicts. A suspension is a wait for a lock, and each of

Thread Activity

these waits may adversely affect application performance. The suspension might ultimately result in normal resumption, timeout, or deadlock. The number of lock suspensions is a function of the lock requests. Lock suspensions (or conflicts) can occur on either lock requests or change requests.

The ratio of suspensions to lock requests is largely application dependent.

Lock escalations - shared

Count of lock escalations to shared mode. Number of times the LOCKS PER TABLE(SPACE) parameter on the DB2 Install panel DSNTIPJ was exceeded and the table space lock was promoted from a page lock (IS) to a table space lock (S) for this thread. Escalation can cause unpredictable response times. The lock escalation to shared mode should only happen on an exception basis. For example, if a REPEATABLE READ application references most pages in a table.

Lock escalations - exclusive

Count of lock escalations to exclusive mode. Number of times the LOCKS PER TABLE(SPACE) parameter on the DB2 Install panel DSNTIPJ was exceeded and the table space lock was promoted from a page lock (IX) to a table space lock (X) for this thread. Escalation can cause unpredictable response times. The lock escalation to exclusive mode should happen rarely, for example, if an application updates many pages in a table without issuing commits.

Check the event exception display for deadlocks occurring against the agent that causes the lock escalation. In a transaction processing environment, a moderate level of lockout is tolerable. If many escalations cause deadlocks and timeouts, then the recommendation is to change the escalation threshold value. Use of ANY is extremely desirable to prevent unnecessary and expensive page locks, for example locking all pages in a tablespace.

Lock escalations, shared or exclusive, should not be expected in a transaction environment.

In DB2 Version 4, the method of controlling Lock Escalation has changed. The escalation rules and locking hierarchy have changed to cater for the ROW level locking. If escalation occurs when LOCKSIZE ROW is specified, the lock is escalated to the table level for a segmented tablespace and to the tablespace level for a nonsegmented tablespace. This is the same as for LOCKSIZE PAGE prior to DB2 Version 4.

A new clause LOCKMAX has been added to the CREATE TABLESPACE statement. This provides for control of the maximum number of locks for an individual tablespace in addition to the system-wide NUMLKTS parameter currently provided.

The default is LOCKMAX 0 to make sure that PAGE level locking is consistent with previous releases of DB2. If LOCKSIZE ANY is specified, DB2 chooses LOCKSIZE PAGE LOCKMAX SYSTEM. Prior to DB2 Version 4, specifying LOCKSIZE PAGE prevented lock escalation.

Escalation is now possible with PAGE locking by specifying the LOCKMAX clause. This provides for initial PAGE level locking with escalation to table or tablespace locking for segmented and nonsegmented tablespaces respectively, based on the number of locks specified on the LOCKMAX clause. To disable escalation, specify LOCKMAX 0.

For high volume updates where contention is an issue, use type-2 indexes and specify one of the following:

- LOCKSIZE PAGE
- LOCKSIZE ROW for the high contention tables to improve concurrency. However, LOCKSIZE ROW should be considered only as an exceptional case, because of a potential for significant overhead. In fact, it is even possible that LOCKSIZE ROW causes deadlocks, which would not happen with LOCKSIZE PAGE.

Omitting LOCKMAX results in LOCKMAX 0, which disables escalation. If escalation is to be allowed, users should carefully consider the threshold at which it should take place for each individual table.

Maximum page or row locks held

Count of the maximum number of page or row locks concurrently held against all table spaces by a single thread during its execution. This count cannot exceed the value of the 'LOCKS PER USER' DB2 installation parameter (panel DSNTIPJ). Once the limit is reached, the next attempt to obtain a lock results in a RESOURCE UNAVAILABLE return code, and the SQL request is not processed.

Locking Considerations

The following aspects should be considered if concurrency is an issue:

- Consistent data access sequence in applications
- The mix of concurrent processing types (batch and transaction)
- IRLM startup procedure options and DB2 installation options
- DDL LOCKSIZE
- DDL LOCKMAX
- BIND parameters.

Refer to *IBM DB2 Universal Database Server for OS/390 Version 6 Administration Guide* for detailed information.

Locked Resources Window

Use the Locked Resources window to view the list of thread resources that are either locked by or, in case they are locked by another thread, unavailable to, the monitored thread. If there are many resources listed, you can use the scrolling keys **F7** (Up) and **F8** (Down) to browse the list.

The resources are listed in the following sequence:

1. Resources that cause this thread to be suspended
2. Resources that cause other threads to be suspended
3. Resources that are held by more than one thread
4. Resources that are held only by this thread.

To display this window, select *Locked Resources* from the Thread Detail panel.

Thread Activity

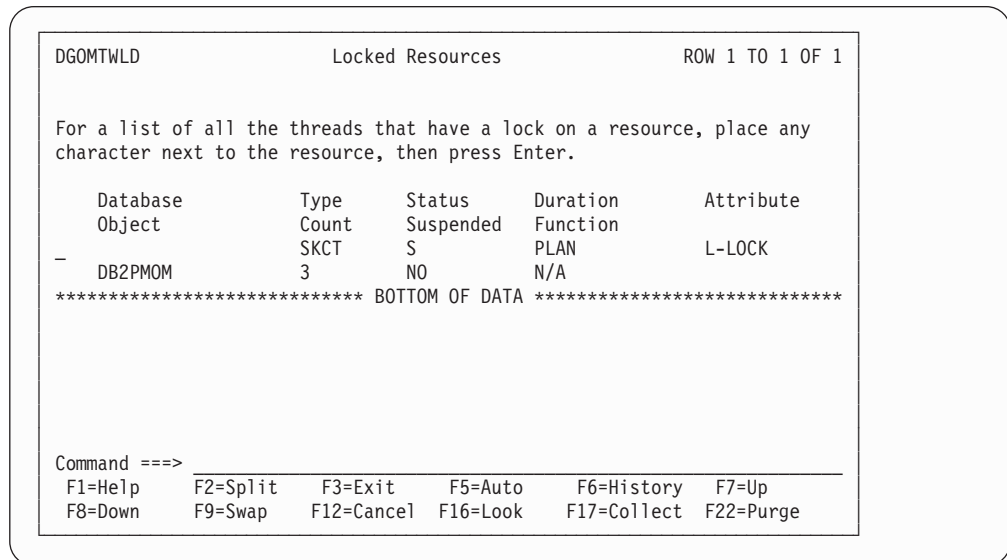


Figure 52. Locked Resources Window

From this window you can display all holders and requesters of any DB2 resource listed. Select any locked resource from this window to display the Threads Holding Resource window, where you can examine a list of threads competing for the resource. Refer to “Threads Holding Resource Window” for more information.

The Locked Resources window is used in conjunction with the Threads Holding Resource window for examination of potential timeouts and deadlocks and for determining whether DB2 resource contention is the cause for long running threads. Whenever a long class 3 lock/latch elapsed time is indicated on the Thread Detail or Thread Times panels, the Locked Resources window can be used to check for suspensions.

The following list describes one of the important fields shown on this window, and how to interpret the values contained in this field.

Type This field shows the resource involved.

PAGESET indicates that the object is either a tablespace or index. The ACQUIRE and RELEASE parameters for the plans, and the RELEASE parameter for the packages involved should be investigated if the lock is suspended.

DATAPAGE/ROW indicates the object is an actual page of data. Check the ISOLATION level for the plans and packages if the lock is suspended.

INDEX indicates the object is an index page or a subpage. The number of subpages per page in the index should be investigated if the lock is suspended.

PAGE indicates the object is a data page. In this case the request type is always LATCH indicating a page latch request.

Threads Holding Resource Window

Use the Threads Holding Resource window to view information about the locked resource selected from the Locked Resource window. The Threads Holding

Resource window displays a list of all holders and requesters of the locked resource. If there are many threads listed, you can use the scrolling keys **F7** (Up) and **F8** (Down) to browse the list.

To display the Threads Holding Resource window, select any locked resource listed on the *Locked Resources* window. The Threads Holding Resource window is then displayed. To leave the window and return to the Locked Resources window, press **F3** (Exit). To leave the window and return to the Thread Detail panel, press **F12** (Cancel).

The appearance of the Threads Holding Resource window differs depending on the type of resource being held by the monitored thread. Figure 53 shows an example of a Threads Holding Resource window.

```

DGOMTWR5          Threads Holding Resource          ROW 1 TO 2 OF 2
Command ==> _____

To display a new thread, place any character next to it, then press Enter.
The Thread Detail will be displayed.

Resource type . . . . . : DBD PLCK Database . . : DSND806

   Primauth   Corname      Status      Subsystem
   Planname   Connection    Suspended   Duration
- TRIONA     TRIONA         IS          N/P
  DB2PMOM    DB2CALL        NO          ALLOCATION
- N/P        N/P            IS          DSN1
  N/P        N/P            NO          N/P
***** BOTTOM OF DATA *****

F1=Help   F2=Split   F3=Exit   F5=Auto   F6=History  F7=Up
F8=Down   F9=Swap   F12=Cancel F16=Look  F17=Collect F22=Purge

```

Figure 53. Threads Holding Resource Window

You can display the Thread Detail panel for any of the threads listed on these windows by typing any character in the selection field beside the thread and pressing **Enter**.

Use the Threads Holding Resource window in conjunction with the Locking (IRLM) Activity window to examine timeout or deadlock situations or to determine whether DB2 resource contention is the cause for long running threads.

RID List Processing Window

Use the RID List Processing window to view information about the number of successful and unsuccessful RID (Record ID) list processing operations performed. This information can help you determine the maximum number of RID blocks to allocate for optimum system performance.

To display this window, select *RID List Processing* from the Thread Detail panel.

Thread Activity

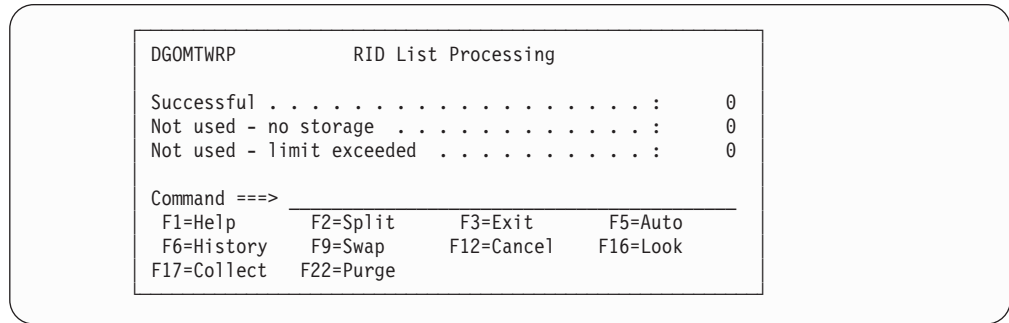


Figure 54. RID List Processing Window (Thread Activity)

The following list describes some of the important fields shown on this window, and how to interpret the values contained in these fields.

Successful

A nonzero value in this field indicates that DB2 has used list prefetch activity. If you are looking at a transaction and list prefetch is used, you may want to look into the access path selection.

Not used - no storage

Number of times RID list processing was terminated due to insufficient storage.

This failure occurs when a RID list was not used for a given RID list process involving one or more indexes because no storage was available to hold the list of RIDs.

Not used - limit exceeded

Number of times RID list processing was terminated due to one or more internal limits exceeded.

The cause of the failure should be investigated, either from statistics record or from performance trace, before increasing the RID list storage size. Without proper investigation, merely increasing the RID list storage size may not solve the problem.

SQL Activity Window

Use the SQL Activity window to view the number of executions of SQL statements during the processing of a DB2 application, for the monitored thread.

To display this window, select *SQL Activity, Commits, and Rollbacks* from the Thread Detail panel.

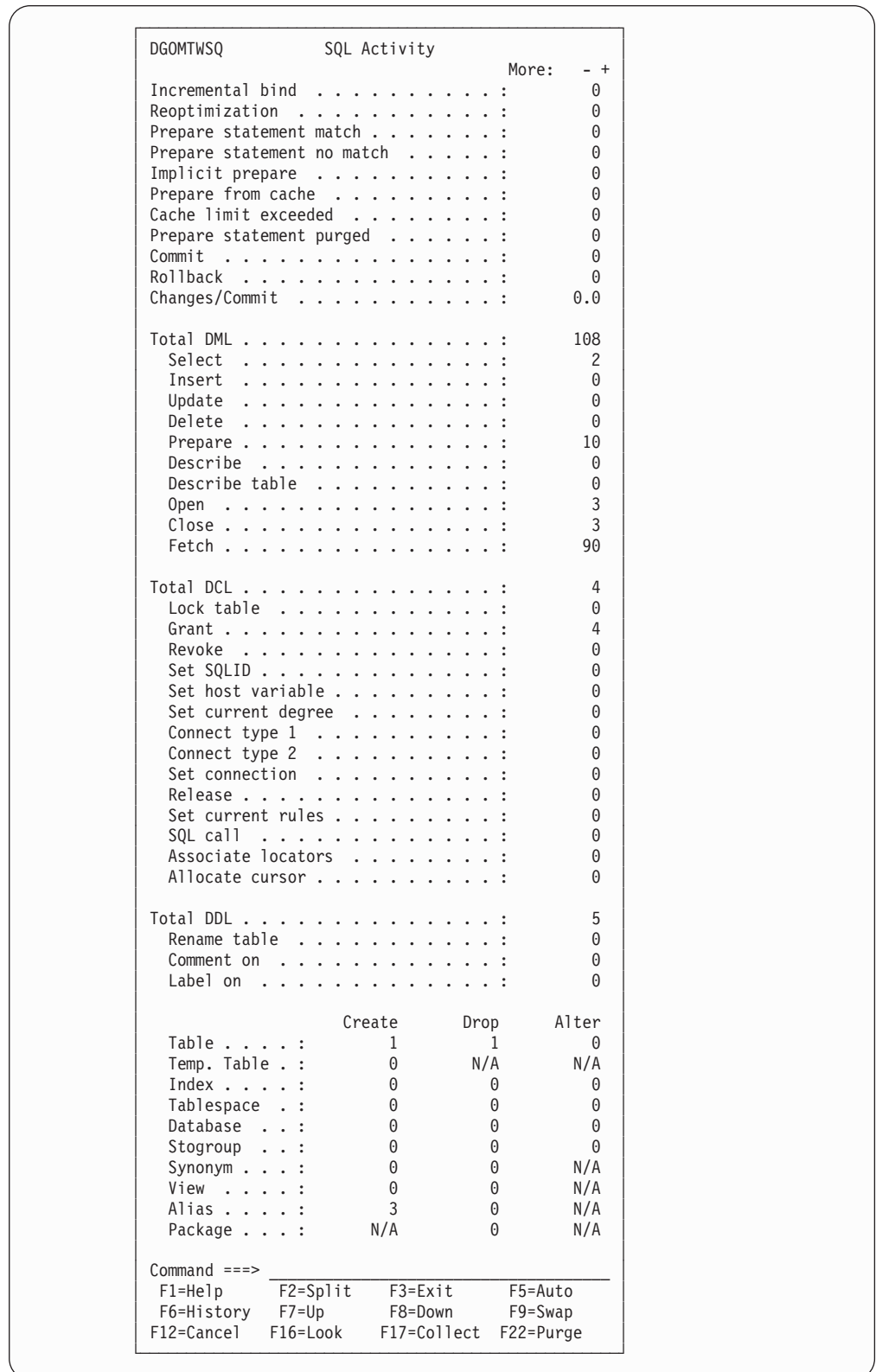


Figure 55. SQL Activity Window (Thread Activity)

This information displays the number of times specific SQL statements were executed for the thread being monitored.

Thread Activity

The SQL Activity window consists of the following sections:

Total DML

This section shows the number of executions performed by various SQL statements concerning the manipulation of data.

Total DCL

This section shows the number of executions performed by various SQL statements concerning the controlling of various activities.

Total DDL

This section shows a table containing the number of executions performed by various DDL SQL statements for each of the applicable object types. These SQL statements are used to *create*, *drop*, and *alter* objects.

If you are looking at a transaction and there are nonzero values for *Describe*, *Describe Table*, or *Prepare*, it is an indication that the transaction is involved in dynamic SQL activity. However, this is unlikely and you may want to investigate further.

If you are looking at a transaction, it is unlikely that you would see any SQL DCL or SQL DDL activity. However, if there is any SQL DDL activity, be sure to use frequent commits to minimize DB2 catalog contention.

The following list describes some of the important fields shown on this window, and how to interpret the values contained in these fields.

Incremental bind

The number of incremental binds that took place.

If a plan is bound with VALIDATE(RUN), DB2 performs validity checks at bind time and rechecks any failures at run time. This can result in catalog contention and degraded application performance, depending on the number of statements flagged and how many times they are executed. Avoid VALIDATE(RUN) as much as possible. Ensure that all objects are created and all privileges are granted before bind, and select the VALIDATE(BIND) option.

In addition to plans bound with VALIDATE(RUN), this counter is incremented for plans using DB2 private protocol.

Reoptimization

The total number of times reoptimization of the access path for static and dynamic SQL queries occurred during execution time.

Reoptimization can be triggered by the option REOPT(VARS) for BIND and REBIND PLAN and PACKAGE. Reoptimization is intended for statements with host variables, parameter markers, and special registers with access paths that are so inappropriate that the performance improvement of the reoptimized path outweighs the overhead caused by the reoptimization.

Commit

The number of commit phase 1, commit phase 2, read only commit and single phase commits (syncs) that completed successfully.

Changes/Commit

This ratio shows the inserts, updates, and deletes per commit and rollback.

This ratio is useful in monitoring the frequency of commits. Too many updates per commit means a long running unit of recovery, which degrades IRLM performance and may prolong recovery in case of a failure. Too few

updates per commit hampers performance, since log writes are involved. If necessary, look into the application to establish commit points appropriately.

The commit frequency can vary between online transactions and batch jobs.

Buffer Manager Activity Window

Use the Buffer Manager Activity window to view all buffer pools used by the thread.

To display this window, select *Buffer Manager Activity* from the Thread Detail panel.

```

DGOMTWBM          Buffer Manager Activity          ROW 1 TO 4 OF 4

For additional details, type any character next to Buffer Pool ID,
then press Enter.

  Buffer Pool   Getpage   Buffer Pool   Synchronous   Buffer Updates
  ID           Requests   hit ratio    Read I/O
- BP0          111        75.7         0              50
- BP7          200        33.2         0              125
- BP32K7       311        47.3         0              25
- Total        622        47.8         0              200
--- End of Buffer Pool List ---

Command ==>>
F1=Help      F2=Split    F3=Exit     F5=Auto     F6=History
F7=Up        F8=Down    F9=Swap     F12=Cancel  F16=Look
F17=Collect  F22=Purge
  
```

Figure 56. Buffer Manager Activity Window

You can select any buffer pool ID listed on this window to display the Buffer Pool Detail window, where you can view information on read and write activity both to and from that particular buffer pool, or select *Total* to view information on all of the listed buffer pools combined.

By examining buffer pool read and write activity, you can determine the buffer pool sizes for optimum system performance.

Buffer Pool Detail Window

Use the Buffer Pool Detail window to view information on the buffer pool selected from the Buffer Manager Activity window. These statistics show read and write activity both to and from that buffer pool. If *Total* was selected from the Buffer Manager Activity window, this window displays the combined statistics of all the buffer pools used by the thread.

To display this window, select a buffer pool ID or *Total* from the Buffer Manager Activity window.

Thread Activity

```

DGOMTWBD      Buffer Pool Detail

Buffer pool ID . . . . . : BP0
Buffer pool hit ratio (%) . . . . . : 41.3
Getpage requests . . . . . : 111
Buffer updates . . . . . : 50
Sequential prefetch requests . . . . . : 14
List prefetch requests . . . . . : 1
Dynamic prefetch requests . . . . . : 1
Synchronous read I/O . . . . . : 27
Synchronous writes . . . . . : 0
Successful hiperpool reads . . . . . : 2
Unsuccessful hiperpool reads . . . . . : 3
Successful hiperpool writes . . . . . : 4
Unsuccessful hiperpool writes . . . . . : 5
Asynchronous pages read . . . . . : 0
Pages moved from hiperpool . . . . . : 0

Command ==>
F1=Help      F2=Split    F3=Exit     F5=Auto
F6=History   F9=Swap     F12=Cancel  F16=Look
F17=Collect  F22=Purge

```

Figure 57. Buffer Pool Detail Window (Thread Activity)

Note: For enhanced system performance, ensure that buffer pools are large enough to store frequently used data in virtual storage, which can reduce the number of I/O operations necessary.

The following list describes some of the important fields shown on this window, and how to interpret the values contained in these fields.

Buffer pool hit ratio (%)

The total number of GETPAGE operations, minus the number of pages read from DASD (both synchronously and using prefetch), divided by the total number of GETPAGE operations, multiplied by 100.

Getpage requests

Number of GETPAGE requests.

Buffer updates

Number of buffer updates. A nonzero value indicates either SQL INSERT, UPDATE, DELETE activity, merge scan join, and/or activity on the workfiles because of internal sort.

Sequential prefetch requests

Number of times sequential prefetch reads were requested. Table space scans and nonmatching index scans generally use sequential prefetch.

List prefetch requests

Number of times list prefetch reads were requested. List prefetch is always used to access data in multiple index access, and to access data from the inner table during a hybrid join. List prefetch is usually employed with a single index when the index has a cluster ratio lower than 80%. List prefetch is sometimes used on indexes with a high cluster ratio if the amount of data estimated to be accessed is too small to make sequential prefetch efficient, but large enough that more than one synchronous read is needed.

Dynamic prefetch requests

Number of times dynamic prefetch reads were requested. Dynamic prefetch is typically used for a SELECT or UPDATE that is run repeatedly, accessing the index for each access.

Synchronous read I/O

Number of synchronous read I/O operations.

Synchronous writes

Total number of immediate writes for a page. Although an immediate write should be rare, a small nonzero value is always expected. A large value indicates that the system needs tuning.

SQL Statement and Package Window

Use the SQL Statement and Package window to view information about the current SQL statement being executed or the last SQL statement that was executed, by the thread. For the last SQL statement executed, it is shown whether it is currently executing or has ended.

To display this window, select *SQL Statement* from the Thread Detail panel. One of two possible windows is displayed depending on whether the thread is using a package or a DBRM. Only the SQL Statement and Package window is shown here in this section.

```

DGOMTWCS          SQL Statement and Package          ROW 1 TO 1 OF 1

Location . . . . . : PM01DLOC
Collection ID . . . . . : DSNESPCS
Program Name . . . . . : DSNESM68
Consistency Token . . . . . : X'128C2637049FB9B0
Version
  VER 6

Stored procedure . . . . . : STOREPROCEDURE0001
Statement type . . . . . : CLOSE
Statement number . . . . . : 137
Thread status . . . . . : In application

SQL Statement
SELECT * FROM SYSIBM.SYSTABLES
***** BOTTOM OF DATA *****

Command ==>
  F1=Help   F2=Split  F3=Exit   F5=Auto   F6=History F7=Up
  F8=Down   F9=Swap   F12=Cancel F16=Look  F17=Collect F18=Explain
  F22=Purge

```

Figure 58. SQL Statement and Package Window

The SQL statement is displayed regardless of whether the agent is currently executing in DB2.

The SQL statement is displayed only if you have MONITOR2 or SYSADM privilege. If the SQL statement text is long, you can use the scrolling keys **F7** (Up) and **F8** (Down) to browse the text.

Note: The maximum number of bytes on the SQL statement text that can be viewed is 2 KB. Any text exceeding this limit is not fully displayed. If the

Thread Activity

agent is processing an SQL CALL statement, the name of the stored procedure is shown in the *Stored procedure* field.

You can examine the access paths and processing methods chosen by DB2 for the SQL statement shown on this window. To do this, press **F18** (Explain) or type EXPLAIN and press **Enter** on the command line. Refer to “Chapter 9. Monitoring the Access Path—Explain” on page 177 for more information.

Distributed Data Window

Use the Distributed Data window to view a list of serving locations that are communicating with the thread. If there are many locations listed, you can use the scrolling keys **F7** (Up) and **F8** (Down) to browse the list.

To display this window, select *Distributed Data* from the Thread Detail panel.

```
DGOMTWDD          Distributed Data

For additional details, type any character next to location, then
press Enter.

      Location          Messages          Messages          Requester
                   Sent          Received          Elapsed
_ DSNAPC0              66              66              7.5908
_ DSNAPC9            12345             12345             6.2222
-- End of Distributed Data --

Command ==>
F1=Help    F2=Split    F3=Exit    F5=Auto    F6=History
F7=Up      F8=Down    F9=Swap    F12=Cancel F16=Look
F17=Collect F22=Purge
```

Figure 59. Distributed Data Window (Thread Activity)

The Distributed Data Facility (DDF) enables an application process connected to one RDB (Relational Database) subsystem to access data residing on other RDB subsystems.

From the Distributed Data window and its lower level windows, you can examine any serving location communicating with the thread, and view any conversations sent between the thread and that serving location in detail. Select any serving location listed on this window to display the Distributed Location Detail window for further examination.

The combination of the Buffer Manager Activity window, SQL Statement and Package/DBRM window, and Distributed Data window can provide a picture of where allied-distributed thread time is spent.

Note: This window does not apply to allied threads.

Distributed Location Detail Window

Use the Distributed Location Detail window to view information on the serving location selected from the Distributed Data window. This window displays a list of

conversations between the thread and this serving location. If there are many conversations listed, you can use the scrolling keys **F7** (Up) and **F8** (Down) to browse the list.

To display this window, select any serving location listed on the Distributed Data window.

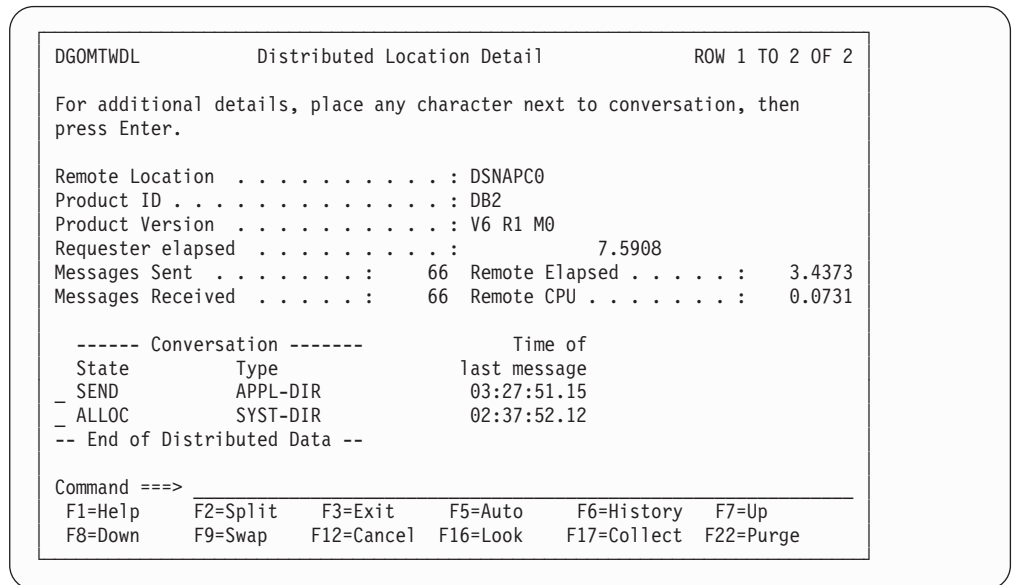


Figure 60. Distributed Location Detail Window

From this window you can select any conversation listed to display the Distributed Conversation Detail window, where the conversation can be examined in greater detail.

The following list describes some of the important fields shown on this window, and how to interpret the values contained in these fields.

Requester elapsed

This field shows the amount of elapsed time spent at the requester between the sending of the SQL statement and the receipt of the answer from the server. This includes the processing time in DB2, VTAM, and the network.

If this value is large, it could indicate block fetch may not have been used.

Messages Received

This field shows the count of the messages the requester location received from the server location.

More messages might be sent from the server location than are received by the requester location due to the manner in which distributed SQL statements are processed internally.

Remote Elapsed

This field shows the amount of elapsed time spent at the server between the actual receipt of the SQL statement and until the answer is sent to VTAM.

This is not applicable to DRDA(R) protocol

Thread Activity

Comparison of this time with elapsed time (class 2) reveals how much time is spent by the allied distributed thread in remote processing.

Remote CPU

This field shows the amount of CPU time spent at the server from the actual receipt of the SQL statement until the answer is sent to VTAM.

This is not applicable to DRDA protocol

Distributed Conversation Detail Window

Use the Distributed Conversation Detail window to examine the conversation selected from the Distributed Location Detail window. This window displays information on just one of the conversations sent between the monitored thread and the serving location selected from the Distributed Data window.

To display this window, select any conversation listed on the Distributed Location Detail window.

```
DGOMTWDC      Distributed Conversation Detail

State . . . . . : SEND
Conversation active flag . . . . . : SUSPENDED IN DB2
Type . . . . . : SYST-DIR
Time of last message . . . . . : 03:27:51.15
Conversation ID . . . . . : X'7F6B9398'
Connection ID . . . . . : X'0073F492F7A184B8'
Network connection type . . . . . : TCP/IP

Command ==>
F1=Help   F2=Split   F3=Exit   F5=Auto   F6=History
F9=Swap   F12=Cancel  F16=Look  F17=Collect F22=Purge
```

Figure 61. Distributed Conversation Detail Window

The following list describes some of the important fields shown on this window, and how to interpret the values contained in these fields.

Conversation active flag

This field indicates one of the following:

- DB2 has transferred control of the thread to the network on this conversation.
- The agent is suspended in DB2 and is waiting for notification from the network that the event is completed (asynchronous requests).
- None of the above.

Connection ID

This 64-bit string uniquely identifies the connection on which the conversation is executing.

For VTAM connections, this is the VTAM-defined session instance identifier of the session on which the conversation is executing.

For TPC/IP connections, this is the 32-bit IP address of the remote site, followed by DB2's 16-bit TCP/IP port number and the remote site's 16-bit TCP/IP port number.

Network connection type

This field indicates which type of network connection is used, TCP/IP or VTAM.

IFI (Class 5) and Data Capture Window

Use the IFI (Class 5) and Data Capture window to view the number of IFI calls made, the CPU time spent processing these calls, and to examine statistics on data capture activity for the thread.

To display this window, select *IFI (Class 5) and Data Capture* from the Thread Detail panel.

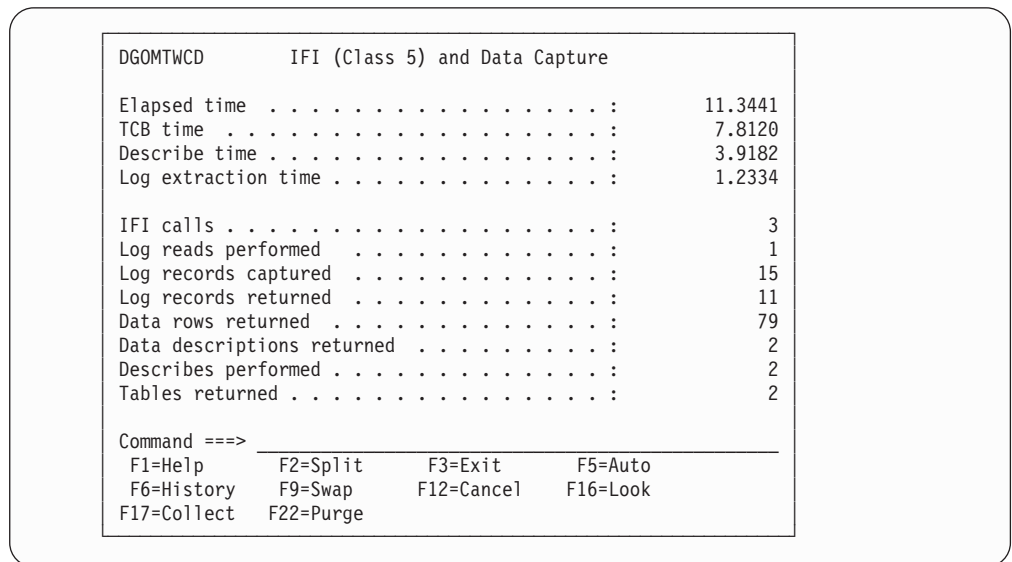


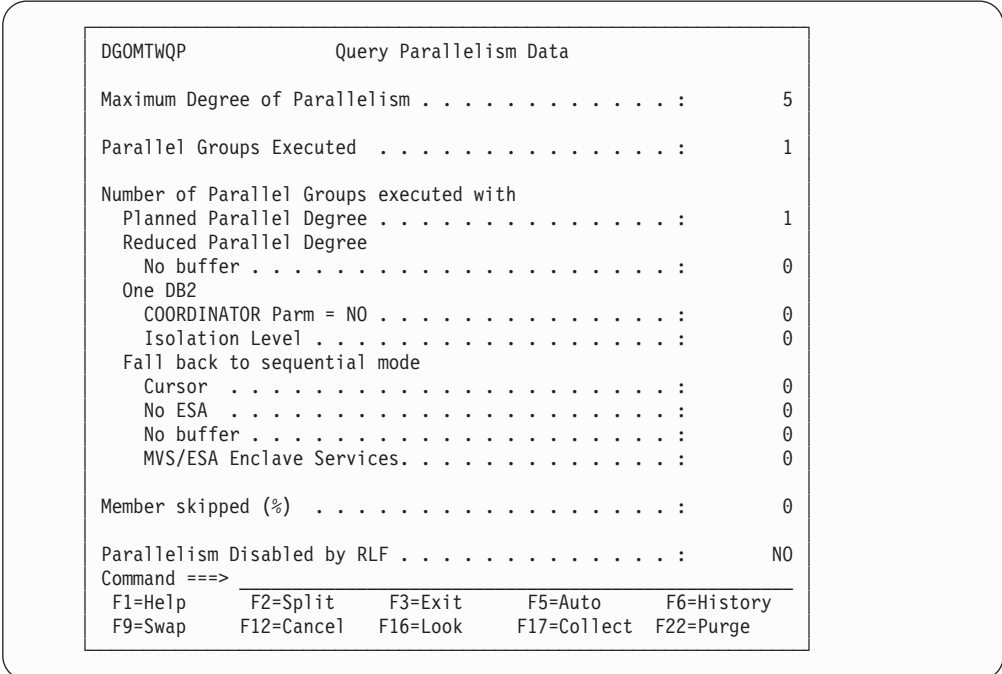
Figure 62. IFI (Class 5) and Data Capture Window

Thread Activity

Query Parallelism Data Window

Use the Query Parallelism Data window to view information on the number of parallel groups executed for the thread and to find out whether the type or degree of parallelism was changed at run time.

To display this window, select *Query Parallelism Data* from the Thread Detail panel.



```
DGOMTWQP          Query Parallelism Data

Maximum Degree of Parallelism . . . . . :      5

Parallel Groups Executed . . . . . :      1

Number of Parallel Groups executed with
Planned Parallel Degree . . . . . :      1
Reduced Parallel Degree
No buffer . . . . . :      0
One DB2
COORDINATOR Parm = NO . . . . . :      0
Isolation Level . . . . . :      0
Fall back to sequential mode
Cursor . . . . . :      0
No ESA . . . . . :      0
No buffer . . . . . :      0
MVS/ESA Enclave Services. . . . . :      0

Member skipped (%) . . . . . :      0

Parallelism Disabled by RLF . . . . . :      NO
Command ==>
F1=Help      F2=Split    F3=Exit     F5=Auto     F6=History
F9=Swap      F12=Cancel F16=Look    F17=Collect F22=Purge
```

Figure 63. Query Parallelism Data Window (Thread Activity)

The main objective of query parallelism is to improve query response times.

By examining the information displayed on this window, you can discover the number of parallel groups that have fallen back to sequential mode and determine the cause.

The following list describes some of the important fields shown on this window, and how to interpret the values contained in these fields.

Maximum Degree of Parallelism

Maximum degree of parallelism executed among all the parallel groups. This field indicates the extent to which query parallelism applies.

The degree can be set on the BIND and REBIND commands or the SET CURRENT DEGREE statement. The default is set by the CURRENT DEGREE installation parameter. If a query is I/O bound, I/O parallelism can help reduce the response time. If a query is CPU bound, query CP parallelism can reduce the response time. If both conditions apply, the benefits for the query can be very large.

Parallel Groups Executed

Total number of parallel groups that have been executed.

Planned Parallel Degree

Total number of parallel groups that executed to the planned parallel degree. This field is incremented by one for each parallel group that executed with the planned degree of parallelism (as determined by DB2).

Reduced Parallel Degree - No buffer

Total number of parallel groups that processed to a parallel degree less than planned because of a storage shortage or contention on the buffer pool. If this field is not zero, increase the size of the current buffer pool by using the ALTER BUFFERPOOL command, or use the ALTER TABLESPACE statement to assign table spaces accessed by this query to a different buffer pool.

One DB2 COORDINATOR Parm = NO

The total number of parallel groups scheduled for Sysplex query parallelism, but executed on a single DB2 due to the COORDINATOR subsystem value being set to NO. When the statement was bound, the COORDINATOR subsystem value was set to YES. This situation can also occur when a package or plan is bound on a DB2 subsystem with COORDINATOR=YES, but is run on a DB2 subsystem with COORDINATOR=NO.

One DB2 Isolation Level

The total number of parallel groups scheduled for Sysplex query parallelism, but executed on a single DB2 due to repeatable-read or read-stability isolation.

Cursor

Total number of parallel groups that fall back to sequential operation because of a cursor that can be used for update or delete.

No ESA

Total number of parallel groups that fall back to sequential operation because of a lack of MVS/ESA sort support.

No buffer

Total number of parallel groups which fall back to sequential mode because of storage shortage or contention on the buffer pool.

Member skipped (%)

The percentage of Sysplex parallel groups that were not distributed as planned.

This field indicates situations where a member has insufficient buffers and so the parallelism coordinator has to bypass a DB2 when distributing tasks.

Parallelism Disabled by RLF

This field indicates whether parallelism was disabled by RLF governing for dynamic SQL statements of this thread.

Query Parallelism Considerations

Query parallelism is suited to both *data-intensive* and *complex* queries. A query is *data-intensive* if it has a high ratio of I/O compared to CPU and *complex* if it requires a high use of CPU to resolve complex predicates and functions.

In general queries are suited to query parallelism when the following apply:

- Partitioned tablespace
- Fast n-way processor
- Adequate buffer space to cater for multiple parallel tasks
- Dedicated environment.

Query I/O parallelism works best when there is:

- High ratio of I/O time to CPU time
 - Large record size
 - Very large tables
 - Query which scans many rows but returns few
 - Tablespace scan rather than index scan.

Query CP processing works best when there is:

- High ratio of CPU time to I/O time
 - Complex or many predicates
 - Complex many level subqueries
 - Column and scalar functions
 - Multi-way joins
 - Grouping and ordering clauses
 - Type 2 Index access and tablespace scans.

Data Sharing Locking Activity Window

Use the Data Sharing Locking Activity window to view information on data sharing locking activity for the monitored thread.

To display this window, select *Data Sharing Locking Activity* from the Thread Detail panel. This selection is only available if the monitored DB2 subsystem is part of a data sharing group.

DGOMTWSL		Data Sharing Locking Activity	
		More:	- +
Global contention rate (%)	.....	:	N/C
False contention rate (%)	.....	:	N/C
			0
Lock requests	.....	:	0
Unlock requests	.....	:	0
Change requests	.....	:	0
Lock requests - XES	.....	:	0
Unlock requests - XES	.....	:	0
Change requests - XES	.....	:	0
Suspensions			
IRLM global contention	.....	:	0
XES global contention	.....	:	0
False contention	.....	:	0
Incompatible retained lock.	.....	:	0
Notify messages sent	.....	:	0
Command ==>			
F1=Help	F2=Split	F3=Exit	F5=Auto
F7=Up	F8=Down	F9=Swap	F12=Cancel
F17=Collect	F22=Purge		F16=Look

Figure 64. Data Sharing Locking Activity Window

The following list describes some of the important fields shown on this window, and how to interpret the values contained in these fields.

Lock requests

The number of lock requests for P-locks or locks that are acquired and owned by the DB2 subsystem. This means that P-locks are not owned by threads. A P-lock can be requested on behalf of the subsystem under a user TCB.

Lock requests - XES

The number of lock requests propagated to XES (L-lock or P-lock) synchronously (under the caller's execution unit). If the request suspends for any reason, this counter is not incremented.

The following four fields contain the global lock suspend counts for P-locks or L-locks:

IRLM global contention

The number of suspends due to IRLM global resource contention. IRLM lock states were in conflict.

Thread Activity

XES global contention

The number of suspends due to XES global resource contention, but no IRLM global resource contention. XES lock states were in conflict, but the IRLM lock states were not.

False contention

The number of false contentions. A false contention occurs when different resource names hash to the same entry in the XES lock table. XES detects a hash contention, but there is no actual resource contention.

Incompatible retained lock

The number of global lock or change requests denied or suspended due to an incompatible retained lock.

Group Buffer Pools Activity Window

Use the Group Buffer Pools Activity window to view all group buffer pools used by the thread. If there are many group buffer pools listed, you can use the scrolling keys **F7** (Up) and **F8** (Down) to browse the list.

To display this window, select *Group Buffer Pools Activity* from the Thread Detail panel. This selection is only available if the monitored DB2 subsystem is part of a data sharing group.

```
DGOMTWGB          Group Buffer Pools Activity          1 TO 4 OF 4

For additional details, type any character next to Group Buffer Pool
ID, then press Enter.

  Group Buffer      ----- Read (XI) -----
  Pool ID         Data Returned      No Data Returned
-   GBP0          15                      0
-   GBP2           6                      0
-   GBP32K7       3                      0
-   TOTAL        24                      0
-- End of Group buffer list --

Command ==>
F1=Help      F2=Split      F3=Exit      F5=Auto      F6=History
F7=Up        F8=Down       F9=Swap      F12=Cancel   F16=Look
F17=Collect  F22=Purge
```

Figure 65. Group Buffer Pools Activity Window

You can select any group buffer pool ID listed on this window to display the Group Buffer Pool Detail window, where you can view information on read and write activity both to and from that particular group buffer pool, or select *Total* to view read and write activity on all of the listed group buffer pools combined.

Group Buffer Pool Detail Window

Use the Group Buffer Pool Detail window to view information on the group buffer pool selected from the Group Buffer Pools Activity window. These statistics show read and write activity both to and from that buffer pool. If *Total* was selected from

the Group Buffer Pools Activity window, the Group Buffer Pool Detail window shows combined statistics on all the group buffer pools used by the thread.

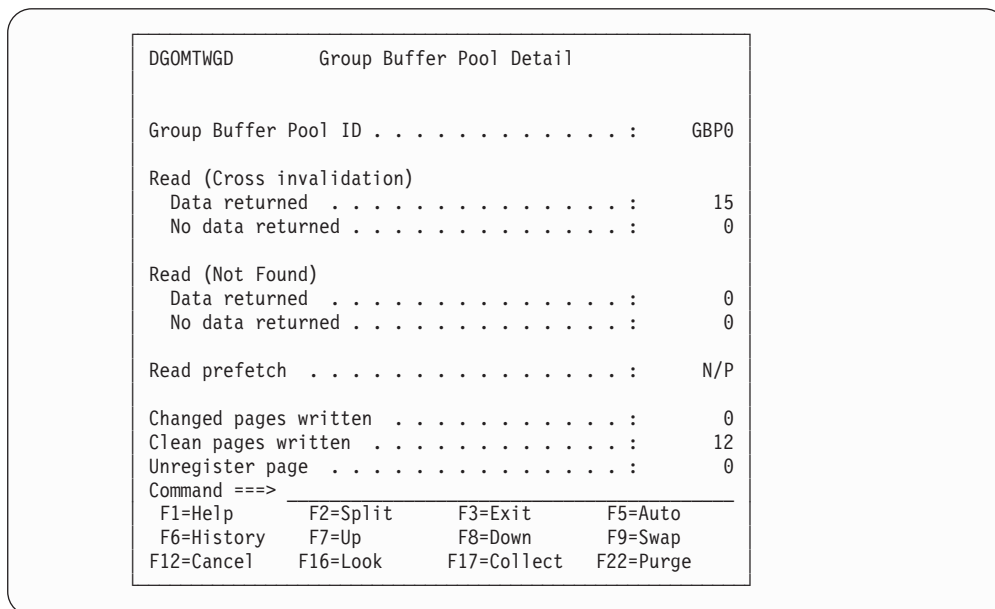


Figure 66. Group Buffer Pool Detail Window

The following list describes some of the important fields shown on this window, and how to interpret the values contained in these fields.

Data returned (Cross invalidation)

The number of synchronous coupling facility read requests caused by the page in the member's buffer pool that is marked *invalid*. Data is returned from the group buffer pool.

No data returned (Cross invalidation)

The number of synchronous coupling facility read requests caused by the page in the member's buffer pool that is marked *invalid*. Data is not returned from the group buffer pool but from DASD.

Data returned (Not Found)

The number of synchronous coupling facility read requests necessary because the requested page was not found in the buffer pool. Data was returned from the coupling facility.

No data returned (Not Found)

The number of synchronous coupling facility read requests necessary because the requested page was not found in the buffer pool. Data is not returned from the group buffer pool but from DASD.

Read prefetch

The number of pages read from the group buffer pool due to prefetch under the control of the agent.

Changed pages written

The number of changed pages synchronously written from the member's virtual pool to the group buffer pool.

Clean pages written

The number of clean pages synchronously written from the member's virtual pool to the group buffer pool.

Thread Activity

Unregister page

The number of coupling facility requests to unregister a page.

Stored Procedures Window

Use the Stored Procedures window to view the stored procedures activity for the thread being monitored.

To display this window, select *Stored Procedures* from the Thread Detail panel.

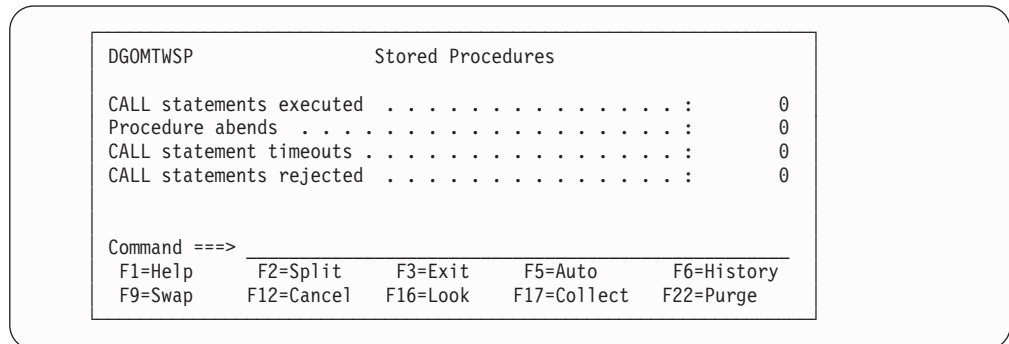


Figure 67. Stored Procedures Window

CALL statements executed

Total number of SQL CALL statements that were executed for the current thread.

Procedure abends

The number of times a stored procedure terminated abnormally.

CALL statement timeouts

The number of times an SQL CALL statement timed out while waiting to be scheduled.

CALL statements rejected

The number of times an SQL CALL statement was rejected due to the procedure being in the STOP ACTION(REJECT) state.

Thread Activity Commands

The following commands apply to thread activity panels. Commands are typed on a panel command line. Some commands are assigned to function keys. A list of active function keys is displayed at the bottom of each panel.

You can abbreviate commands down to three characters in length. For example, the AUTO command can be abbreviated to AUT.

AUTO Command

Use the AUTO command to refresh values displayed on panels without having to press **Enter**. When you activate auto-display mode, the displayed values are updated periodically, as specified by the AUTO command. You cannot perform any other tasks with your Online Monitor session while auto display-mode is running.

The command syntax is:



Figure 68. Syntax of the AUTO Command

Parameter Descriptions

The AUTO command accepts the following parameters:

integer	Optional. Specifies the auto-display interval. The valid ranges are: <ul style="list-style-type: none"> • 1 to 7 200 seconds • 1 to 120 minutes.
SECONDS	Optional. Specifies the auto-display unit in seconds. If no unit is specified, the default is seconds. If this parameter is specified, <i>integer</i> should also be specified.
MINUTES	Optional. Specifies the auto-display unit in minutes. If this parameter is specified, <i>integer</i> should also be specified.

If no parameters are specified, the values on the Auto Display window are used.

Starting Auto Display Mode

To start auto display mode, type AUTO (or one of its abbreviations) followed by any parameters on the command line and press **Enter**.

Note: The AUTO command can be abbreviated to AUT, the SECONDS to S, and the MINUTES to M.

To stop auto display, press the attention key.

Note: While the Online Monitor is executing a DB2 call (IFI or SQL), pressing the attention key might not stop the auto-display mode. An 'A' is displayed every time the key is pressed until attention processing is available again. For example, this is the case when the Online Monitor is issuing SQL statements to resolve names of locked resources.

AUTO Command Examples

- AUTO 5 refreshes the panel with updated values every 5 seconds
- AUTO 1 MIN refreshes the panel with updated values every minute
- AUTO 10 refreshes the panel with updated values every 10 seconds
- AUTO uses the values specified on the Auto Display window.

EXPLAIN Command

Use the EXPLAIN command to examine the access path methods chosen by DB2 for the currently executing SQL statement of a thread.

The EXPLAIN command can be executed from all thread diagnosis panels and the following thread activity windows:

- SQL Statement and Package
- SQL Statement and DBRM.

Thread Activity

Note: The EXPLAIN command can also be executed from the Thread Detail panel if it has been tailored to show the SQL statement text.

The command syntax is:

▶—EXPLAIN—▶

Figure 69. Syntax of the EXPLAIN Command

Invoking Explain

To examine the access path methods chosen by DB2 for an SQL statement shown on a thread activity panel, type EXPLAIN (or one of its abbreviations) on the command line and press **Enter**.

Note: The EXPLAIN command can be used in any truncated form beginning with a minimum of EXP.

For more information on how to explain an SQL statement, refer to “Chapter 9. Monitoring the Access Path—Explain” on page 177.

HISTORY Command

Use the HISTORY command to view past data that was previously collected by the data collector. The data is gathered at installation-defined intervals. The date and time on the panels supporting history indicate when the data being displayed was collected.

You can only view past data if the data collector is active for the subsystem you are monitoring and if it was started with the parameter HISTORY=YES. Refer to “Chapter 14. Data Collector Purpose and Function” on page 233 for information about the data collector.

The command syntax is:

▶—HISTORY—▶

—OFF—
—BACK—
—FORWARD—

└── date ─┘ └── hh:mm:ss ─┘

Figure 70. Syntax of the HISTORY Command

Note that the defined ISPF national format is used for the date and time format.

Parameter Descriptions

The HISTORY command accepts the following parameters:

- | | |
|----------------|--|
| OFF | Returns the display to the current time. |
| BACK | Displays data for the previous interval. If no more data is available, data from the earliest available interval is displayed. |
| FORWARD | Displays information for the next available interval. If there are no |

further stored records, data from the current time is displayed and processing continues as if history were 'OFF'.

date	The date of the required information. If no date is specified, today's date is assumed.
hh:mm:ss	The time of the required information. If no time is specified, the time defaults to that of the earliest available history record for the specified date. The seconds do not need to be specified.

If there is no data available for the specified date and time, the next available record is displayed.

If you do not specify any parameters, the History window is displayed (refer to Figure 22). The current system date and time are the defaults for the History window.

Viewing Past Data

To view past data, type HISTORY (or one of its abbreviations) followed by any parameters on the command line and press **Enter**.

Note: The HISTORY command can be used in any truncated form beginning with a minimum of HIS.

RESET Command

Use RESET to stop threads from being qualified and sorted on the Thread Summary panel.

The command syntax is:

▶—RESET—▶

Figure 71. Syntax of the RESET Command

Resetting Thread Display

To issue the RESET command, type RESET (or one of its abbreviations) on the command line of the Thread Summary panel and press **Enter**.

Note: The RESET command can be used in any truncated form beginning with a minimum of RES.

PURGE Command

Use the PURGE command to purge a thread currently processing in the DB2 subsystem you are monitoring. You must have the DB2 privilege to perform CANCEL THREAD.

The PURGE command can be executed from any thread activity panel.

The command syntax is:

►—PURGE—◄◄

Figure 72. Syntax of the PURGE Command

Purging a Thread

To purge a thread listed on the Thread Summary panel, type PURGE (or one of its abbreviations) on the command line, select the listed thread you want to purge, and press **Enter**.

To purge the thread being monitored from the Thread Detail panel or any of its lower level windows, type PURGE (or one of its abbreviations) on the command line and press **Enter**.

After issuing the PURGE command, the Purge Thread Confirmation window shown in Figure 73 is displayed.

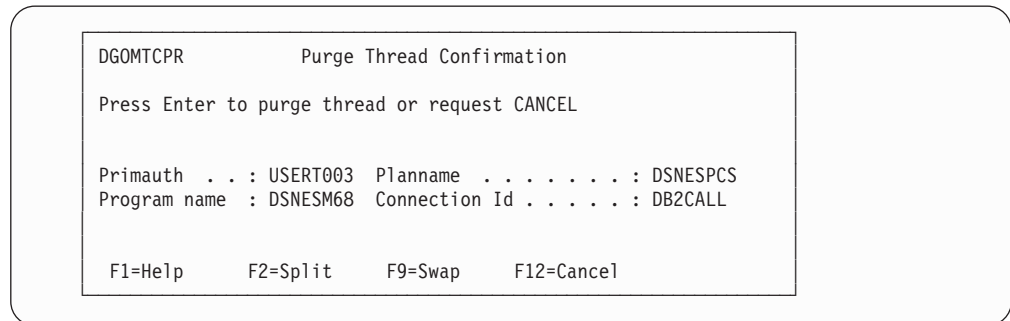


Figure 73. Purge Thread Confirmation

To confirm the purge request, press **Enter**. To cancel the request and not purge the thread, press **F12** (Cancel).

If you purge the thread currently being monitored from the Thread Detail panel or any of its lower level windows, you are returned to the Thread Summary panel.

Note: The PURGE command can be used in any truncated form beginning with a minimum of PUR.

QUALIFY Command

Use the QUALIFY command to filter the threads shown on the Thread Summary panel. When qualify is active, only the threads matching the DB2 PM identifiers specified on the DB2 Thread Qualification Parameters window are shown. The QUALIFY command can be used only from the Thread Summary panel.

Thread qualification remains active until deactivated either by a QUALIFY OFF command or the RESET command, even across Online Monitor sessions.

The command syntax is:



Figure 74. Syntax of the QUALIFY Command

Parameter Descriptions

The QUALIFY command accepts the following parameters:

- ON** Activates the qualify function based on values previously entered on the DB2 Thread Qualification Parameters window.
- OFF** Deactivates qualify.

If no parameters are specified, the DB2 Thread Qualification Parameters window is displayed.

Filtering Threads

To filter the threads shown on the Thread Summary panel, type QUALIFY (or one of its abbreviations) followed by any parameters on the Thread Summary panel command line and press **Enter**.

Note: The QUALIFY command can be used in any truncated form beginning with a minimum of QUA.

When qualify is active, the word QUALIFY is displayed on the Thread Summary panel header as shown in the following example:

DGOMTPLS 13:49	Thread Summary	QUALIFY	ROW 1 TO 1 OF 1
PM01DLOC	DSN1 V6	GROUP001	MEMBER01

Figure 75. Thread Summary Panel Showing Qualify Active

When the QUALIFY command is issued without parameters, the DB2 Thread Qualification Parameters window is displayed. The appearance of the window differs depending on the version of DB2 in use.

Thread Activity

```
DGOMTWQ5          DB2 Thread Qualification Parameters
Command ==>>> _____

Change values as desired:

                                                                More: - +
Primary Authorization ID . . . . . u**r*
Planname . . . . . planx

Package/DBRM
Location . . . . . *
Collection ID . . . . . *
Program name . . . . . *

Connection ID . . . . . *
Correlation ID . . . . . *
Requesting location . . . . . *
Connection type . . . . . *

To include threads, place any nonblank character next to status and type.

Thread Status:          Thread Type:
  I/S                    / Allied
  7 Queued                - Allied-distributed
  / In application        - Database access thread (DBAT)
  / In stored procedure
  / In DB2
  / In lock wait
  / In I/O
  / In stored procedure
  / In stored procedure wait
  / In EOT
  / RRS no TCB

F1=Help   F2=Split   F3=Exit   F7=Up     F8=Down   F9=Swap
F12=Cancel F16=Look   F17=Collect
```

Figure 76. DB2 Thread Qualification Parameters Window

Parameters entered on the DB2 Thread Qualification Parameters window are saved for subsequent sessions. The saved values are used until they are changed.

You can qualify threads by entering any character string in one or more fields on the DB2 Thread Qualification Parameters window. Only threads matching the values specified are displayed on the Thread Summary panel.

You activate qualify from the DB2 Thread Qualification Parameters window by pressing **F3** (Exit). To return to the Thread Summary panel without activating qualify, press **F12** (Cancel).

DB2 PM Identifiers

The identifier values can be specified in generic form. Place an asterisk (*) in the field to indicate that any value in that character position is valid. The following rules apply:

- An asterisk in the first character position, followed by blanks, processes all values in that field.
- An asterisk at the end of a character string processes all values beginning with that character string.
- An asterisk in the middle of a character string processes any value in that single character position.

Note: If you leave the value blank for the *Plan Name* or *Correlation ID* fields, only threads with blank values for these DB2 PM identifiers are displayed. If you leave the value blank for any of the other DB2 PM identifiers, an asterisk (*) is inserted by default and *all* values in that field are processed.

Thread Status

Place any character beside each status to be included in the threads displayed:

I/S	The thread is in identify or signon state
Queued	The thread is queued
In Application	Processing is taking place within the application
In Application Stored Procedure	The thread is running a stored procedure application
In DB2	The thread is currently processing within DB2
In Lock Wait	The thread is currently suspended waiting for a lock
In I/O	The thread is currently in input or output status
In DB2 Stored Procedure	The thread is running a stored procedure within DB2
In DB2 Stored Procedure Wait	The thread is waiting for a stored procedure to be scheduled within DB2
In EOT	The thread is currently in end-of-task processing.

Thread Type

Place any character beside each type of thread to be included in the Thread Summary panel:

Allied	The thread is only doing local processing.
Allied-Distributed	The thread is involved in distributed activity and is requesting data from a remote system.
Database Access Thread (DBAT)	The thread is doing work locally on behalf of an allied-distributed or DBAT-distributed thread created at another site.

DB2 Thread Qualification Parameters Window Example

This section describes the effects of various parameters entered on the DB2 Thread Qualification Parameters window in Figure 76 on page 118.

Primary Authorization ID **U**R***

This line of the window specifies that only threads with the following authorization IDs are shown:

- Beginning with U
- With any characters in positions 2 and 3
- With an R in position 4
- With any characters in positions 5 through 8.

Planname **PLANX**

This line of the window specifies that only threads with the DB2 plan name PLANX are shown.

Thread Activity

Package/DBRM
Connection ID
Correlation ID
Requesting location
Connection Type

These lines specify that all threads meeting the previous specifications are displayed, regardless of connection ID, correlation ID, requesting location, connection type, or package details.

Note: The *Requesting location* field applies to the requesting location for distributed threads, and applies to the local location for allied threads.

Thread Status

The thread status field selections specify that all threads meeting the previous specifications are displayed, except those in I/S status.

Thread Type

The thread type field selections specify that only allied threads meeting the previous specifications are displayed.

SORT Command

Use the SORT command to specify the order in which threads are listed on the Thread Summary panel. The threads can be sorted by one or more DB2 PM identifiers. This command can be used only from the Thread Summary panel.

The command syntax is:

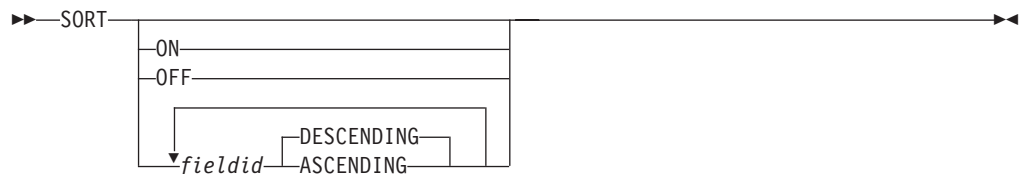


Figure 77. Syntax of the SORT Command

Parameter Descriptions

The SORT command accepts the following parameters:

- ON** Activates sort.
Values previously specified on the DB2 Thread Sort Specification window are used.
- OFF** Deactivates sort.
- fieldid** Identifies a field used for sorting threads and activates sort. You can sort by as many fields as you want. The threads are sorted by the field specified first, then by the field specified next, and so on.
- DESCENDING** Specifies that the threads are to be sorted in descending sequence. This parameter can be abbreviated to D. This is the default.

ASCENDING Specifies that the threads are to be sorted in ascending sequence. This parameter can be abbreviated to A.

Notes:

1. If only one field is specified in a SORT command, you do not need to specify the sequence. The sequence is descending by default.
2. If multiple fields are specified, the sequence (*ascending* or *descending*) needs to be specified for each field except the last one.
3. All parameters specified in the command are separated by a single space.

The following table lists all fields that can be used with the SORT command. The field identifiers can be truncated. Uppercase letters indicate the shortest valid abbreviation for each field identifier.

Table 4. Sort Fields

Field	Field ID
Primary Authorization ID	PRImauth
Plan Name	PLAnname
Package/DBRM Program name	PROgram
Package Collection ID	COLlection
Correlation ID	CORrelation
Connection ID	CONNect
Connection Type	CONNType
Thread Status	Status
Request Count	REQUests
Requesting Location	REQLoc
Class 1 elapsed time	C1Elapsed
Class 1 CPU time	C1Cpu
Class 2 elapsed time	C2Elapsed
Class 2 CPU time	C2Cpu
Class 3 time	C3elapsed

Sorting Threads

To sort the threads shown on the Thread Summary panel, type SORT (or one of its abbreviations) followed by any parameters on the command line of the Thread Summary panel and press **Enter**. When sort is active, the word SORT is displayed on the Thread Summary panel header as shown in the following example:

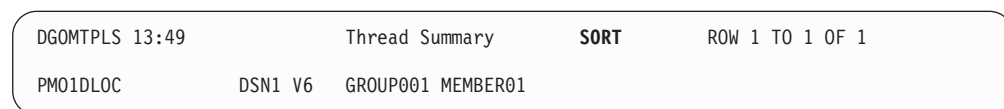


Figure 78. Thread Summary Panel Showing Sort Active

If sort is issued without any parameters, the DB2 Thread Sort Specification window is displayed. Parameters entered on this window are saved for subsequent sessions.

Thread Activity

Use the DB2 Thread Sort Specification window to specify a thread summary *SORT* profile. To activate sort from the DB2 Thread Sort Specification window, press **F3** (Exit). To return to the Thread Summary panel without activating sort, press **F12** (Cancel).

Sort Example 1

Figure 79 is an example of the DB2 Thread Sort Specification window.

Column	Order	Sequence
Prim Auth	—	—
Plan Name	—	—
Package/DBRM		
Collection ID	—	—
Program Name	—	—
Correlation	—	—
Connection ID	—	—
Connection type	1	1
Requesting location	—	—
Thread status	2	2
Request count	—	—
Class 1 times		
Elapsed	—	—
CPU	—	—
Class 2 times		
Elapsed	—	—
CPU	—	—
Class 3 time	—	—

Command ==> _____
F1=Help F2=Split F3=Exit F7=Up F8=Down F9=Swap
F12=Cancel F16=Look F17=Collect

Figure 79. DB2 Thread Sort Specification Window

In Figure 79, threads are sorted in the following sequence:

- First by *Connection Type* in ascending sequence
- Next by *Thread Status* in descending sequence.

Sort Example 2

Following is an example using the SORT command.

Command ==> **SORT PRI A C1E D S**

This command specifies the following:

1. The threads are sorted first by primary authorization ID in ascending sequence.
2. The threads are ordered next by class 1 elapsed time in descending sequence.

3. The threads are sorted next by thread status. The sequence is descending by default.

Thread Activity

Chapter 8. Viewing DB2 Statistics

Tuning DB2

This chapter identifies and describes the specific DB2 data which is reported for the purpose of tuning DB2. For general tuning advice on DB2, refer to the DB2 Administration Guide 'Performance, Monitoring, and Tuning' chapters for the specific release of DB2.

All statistics fields up to and including DB2 V5 are supported by thread activity display. To view new fields introduced with DB2 V6, use the DB2 PM workstation online monitor.

The Online Monitor statistics panels provide an overview of DB2 system activity. Use these panels to view important ratios and DB2 statistics values.

Most DB2 statistics field values accumulate while the DB2 subsystem is active. When DB2 is started, the accumulation process begins and continues until the DB2 subsystem is stopped. There are, however, certain fields that are not cumulative. Some are reported as "snapshot" values, and some are reported as "high water mark" values. A snapshot value is a current value, and is updated each time the statistics values are displayed. A high water mark is a maximum value since startup, and is updated each time the statistics values are displayed.

Fields that are not snapshot or high water mark values are known as delta values. They are derived differently for each of the statistics processing modes. They are calculated by the statistics display. For further details, see "Interval Processing Mode" on page 127 and "Delta Processing Mode" on page 127.

Statistics Panels

The following table lists all the statistics panels shown in this chapter.

Statistics Panels		
DB2 Statistics Detail panel	...	Figure 82 on page 131
EDM Pool window	...	Figure 83 on page 133
Buffer Manager window	...	Figure 84 on page 134
Buffer Pool window	...	Figure 85 on page 136
Locking Activity window	...	Figure 88 on page 141
Open/Close Management window	...	Figure 89 on page 143
Bind Processing window	...	Figure 90 on page 144
Plan and Package Allocation window	...	Figure 91 on page 145
Log Manager window	...	Figure 92 on page 146
Subsystem Service window	...	Figure 93 on page 148
SQL Activity window	...	Figure 94 on page 151
Query Parallelism Data window	...	Figure 96 on page 154
RID List Processing window	...	Figure 97 on page 155
Distributed Data window	...	Figure 98 on page 156
Remote Location window	...	Figure 99 on page 158
CPU Times and Other Data window	...	Figure 100 on page 159
DB2 Commands window	...	Figure 101 on page 160
DB2 Instrumentation window	...	Figure 102 on page 161
DB2 IFC Destinations window	...	Figure 103 on page 162
Data Capture window	...	Figure 104 on page 163
Data Sharing Locking Activity window	...	Figure 105 on page 164
Group Buffer Pool Activity window	...	Figure 106 on page 166
Group Buffer Pool Detail window	...	Figure 107 on page 167
Global Group Buffer Pool Stat. window	...	Figure 108 on page 170
Global GBP Statistics Detail window	...	Figure 109 on page 171
Stored Procedures window	...	Figure 110 on page 172

Statistics Processing Modes

There are three different modes of display available for the statistics panels: regular mode, interval mode, and delta mode. Interval mode and delta mode determine the time period over which delta values are accumulated. Deltas are not calculated in regular mode. Whenever *Display Statistics* is selected from the DB2 PM Online Monitor Main Menu, regular mode is activated.

To operate in either interval mode or delta mode, enter an INTERVAL or DELTA command on the command line of any statistics panel.

Statistics values are updated when:

- You press **Enter** on any statistics panel, with the command line blank and no windows selected.
- You issue an INTERVAL, DELTA, or RESET command.
- You activate auto-display mode, which updates values automatically at a time interval you can specify.

Note: The auto-display feature needs to be disabled before an INTERVAL, DELTA, or RESET command is issued. To stop auto-display, press the **Attention** key. The auto-display function can be activated again after the processing mode command is issued.

Regular Processing Mode

This is the default mode of operation whenever you select *Display Statistics* from the Online Monitor main menu. In this mode, the delta values displayed are accumulated since DB2 startup. No calculations are performed on the statistics values in this mode. You need to be in interval or delta processing mode to use display exception processing. Use the RESET command to return to regular mode.

Interval Processing Mode

To activate interval processing mode, type INTERVAL on the command line of any statistics panel and press **Enter**. In interval processing mode, the delta values displayed are accumulated since the last time the INTERVAL command was entered on the command line. When interval mode is activated while viewing past data, the values are accumulated between the history time shown when the INTERVAL command was issued and the current history time.

Use interval mode to isolate DB2 statistics activity beginning at a specified time. Interval processing can help indicate the existence of a problem when running with exception processing. When you select interval processing mode, all statistics field values (with the exception of the high water mark and snapshot fields) are cleared and begin the accumulation process from the start. The first values displayed after the INTERVAL command is issued represent the values from the newly-established base point to the first statistics record pair (IFCID 1 and IFCID 2) encountered after the INTERVAL command. Thereafter, the values are updated each time you press **Enter**. The auto-display feature can be activated with interval processing mode. Statistics values are then updated automatically at the time interval you specified. A new base point can be established by repeating the INTERVAL command.

When interval processing mode is activated, *all* statistics panels operate in interval mode. The time elapsed since the base point was established is displayed on the line under the heading of each statistics panel, as shown in the following example:

```

DGOMSPSM 12:07          DB2 Statistics Detail          PM01DLOC DSN1 V6
                        GROUP001 MEMBER01
                        INTERVAL 40.088
For details, type any character next to heading, then press Enter.

```

Figure 80. DB2 Statistics Detail Panel Showing Interval Active

Interval mode remains active until either it is turned off or you return to the main menu. You can deactivate interval mode using the RESET or DELTA command from any statistics panel. Use the RESET command to return to regular mode.

Delta Processing Mode

To activate delta processing mode, type DELTA on the command line of any statistics panel and press **Enter**. In delta processing mode, the values are accumulated between the last two times you pressed **Enter**. When delta mode is activated while

DB2 Statistics

viewing past data, delta processing uses the currently shown history time and the next available history snapshot to accumulate the values.

Use delta processing to isolate DB2 statistics activity taking place between two specified points in time. Delta mode operates similarly to the Batch statistics trace. When you initiate delta mode, DB2 statistics field values are reported in time slices. A new base point is established each time the displayed values are updated. With the exception of the high water mark and snapshot fields mentioned previously, all statistics field values reflect the activity that has occurred since the previous display update.

After delta is activated, *all* statistics panels operate in delta mode. The elapsed time since the last DELTA command was entered or since the last time **Enter** was pressed is displayed on the line under the heading as shown in the following example:

```

DGOMSPSM 12:07          DB2 Statistics Detail          PM01DLOC DSN1 V6
                        GROUP001 MEMBER01
                        DELTA 9.182
For details, type any character next to heading, then press Enter.
  
```

Figure 81. DB2 Statistics Detail Panel Showing Delta Active

Delta mode remains active until you deactivate it or you return to the main menu. You can turn off delta mode using the RESET or INTERVAL command from any statistics panel.

Snapshot Fields

The following table lists all the snapshot fields and their corresponding statistics panels.

Statistics Panel	Field	Panel ID
DB2 Statistics Detail	EDM Pool pages in use (%)	DGOMSPSM
EDM Pool	EDM Pool pages in use (%)	DGOMSWEP
	Pages in EDM Pool	
	Free pages in free chain	
	Pages used for CT	
	Pages used for SKCT	
	Pages used for PT	
	Pages used for SKPT	
	Pages used for DBD	

Statistics Panel	Field	Panel ID
Buffer Pool	Current active buffers	DGOMSWBP
	Buffers allocated for hiperpool	
	Buffers allocated for virtual buffer pool	
	ALTER BUFFERPOOL expansions and contractions - For Hiperpool	
	Hiperpool buffers backed	
	Maximum concurrent workfiles	
Open/Close Management	Open data sets - Current	DGOMSOC2
	Open data sets - With CLOSE(NO)	DGOMSWOC
	Open data sets - Not in use	
	Data sets on deferred close queue - Current	
Query Parallelism Data	Maximum Degree of Parallelism	DGOMSWQP
RID List Processing	RID blocks allocated - Current	DGOMSWRP
Distributed Data	Inactive DBATs - Currently	DGOMSWDD
	Active DBATs - Currently	

High Water Mark Fields

The following table lists all the high water mark fields and their corresponding statistics panels:

Statistics Panel	Field	Panel ID
DB2 Statistics Detail	Open data sets - High Water Mark	DGOMSPSM
Buffer pool	Concurrent streams - HWM	DGOMSWBP
Open/Close Management	Open data sets - HWM	DGOMSWOC
	Data sets on deferred close queue - Maximum	
RID List Processing	RID blocks allocated - Maximum	DGOMSWRP
Distributed Data	Inactive DBATs - HWM	DGOMSWDD
	Active DBATs - HWM	
	Total DBATs - HWM	

Statistics Panel Overview

The DB2 Statistics Detail panel shows a summary of key statistics values. From this panel, you can access windows providing statistics data in greater detail.

Moving between statistics panels does not cause the values shown to be updated. Data displayed on the current panel is refreshed whenever you press **Enter** *without* selecting a window to be displayed or executing a command.

DB2 Statistics Detail Panel

Use the DB2 Statistics Detail panel to view key DB2 performance data and percentages, and important DB2 thresholds. The DB2 Statistics Detail panel should be used as a regular check on the performance of DB2.

To display the DB2 Statistics Detail panel, select option 2 (*Display Statistics*) from the DB2 PM Online Monitor Main Menu.

Note: The DB2 Statistics Detail panel displayed at your site may have been tailored by your installation and consequently may not necessarily match the panel example shown in this book.


```

DGOMSPSM 12:58          DB2 Statistics Detail          PMO1DLOC DSN1 V6
                        GROUP001 MEMBER01
                        INTERVAL 12:43.051
For details, type any character next to heading, then press Enter.
More:  - +
- EDM Pool
  EDM Pool full . . . . . : 0
  EDM Pool pages in use (%) . . . . . : 1.6
  CT requests/CT not in EDM pool . . . . . : 7.4
  PT requests/PT not in EDM pool . . . . . : 1.8
  DBD requests/DBD not in EDM pool . . . . . : 27.4
- Buffer Manager
  Synchronous Reads . . . . . : 10.3
  Deferred write threshold reached . . . . . : 0
  DM critical threshold reached . . . . . : 0
- Locking Activity
  Suspensions - all . . . . . : 6089
  Deadlocks . . . . . : 0
  Timeouts . . . . . : 0
  Lock escalations - all . . . . . : 0
- Open/Close Management
  Open data sets - High Water Mark . . . . . : 58
- Bind Processing
- Plan/Package Allocation, Authorization Management
- Log Manager
  Reads satisfied - Output Buffer . . . . . : 39
  Reads satisfied - Active Log . . . . . : 397
  Reads satisfied - Archive Log . . . . . : 0
  Write-no-wait . . . . . : 1677
  Unavailable output log buffers . . . . . : 0
- Subsystem Service
  Queued at create thread . . . . . : 0
  System event checkpoints . . . . . : 2
- SQL Activity
- PREPARE Detail
  Prepare . . . . . : 10
- Query Parallelism Data
- RID List Processing
- Distributed Data
- CPU Times and Other Data
- Data Sharing Locking Activity
- Group Buffer Pool Activity
- Global Group Buffer Pool Statistics
- Stored Procedures

Command ==>
F1=Help      F2=Split    F3=Exit     F5=Auto     F6=History  F7=Up
F8=Down     F9=Swap    F10=Delta   F11=Interval F12=Cancel  F16=Look
F17=Collect

```

Figure 82. DB2 Statistics Detail Panel

From this panel, you can display windows showing statistics on various aspects of the system. To do this, type any character in the selection field next to the corresponding heading and press **Enter**. Multiple windows can be selected simultaneously.

If you have enabled display exception processing, all fields in exception are shown in reverse video, and the color indicates the level of the exception. *Warning* level exceptions are highlighted in yellow, while *problem* level exceptions are highlighted in red. Selection fields on this panel are shown in reverse video when their next level windows contain fields in exception status.

The following list describes some of the important fields shown on this panel, and how to interpret the values contained in these fields.

DB2 Statistics

EDM Pool pages in use (%)

The percentage of pages in the EDM pool that have been used or are currently in use (snapshot value). This means, it shows the number of nonstealable pages.

During peak periods, the value in this field should be between 80 and 100 percent. Because stealable pages are not represented here, a value close to 100 percent does not necessarily indicate an EDM pool constraint. As the value approaches 100, examine the efficiency ratios to verify that acceptable levels are met. If the EDM pool is too small, it causes increased I/O activity in database DSNDB01, table spaces DBD01 and SCT02.

Note: The EDM pool use varies across the day. It is not only the pages that are in use, but also the pages that are not in use, waiting to avoid I/O, that are important for performance.

Synchronous Reads

Number of synchronous read I/O operations performed by sequential and random requests.

Deadlocks

Number of times lock suspensions ultimately resulted in a deadlock. This happens when two or more application processes each hold locks on resources that the others need, without which they cannot proceed. Deadlocks result principally from an application design problem. Ensure that all applications accessing the same tables access them in the same order. Deadlocks can also occur through index page splits if there is high insert activity. In this case, it is suggested to set SUBPAGES to 1 for the index.

Timeouts

Number of times lock suspensions ultimately resulted in a timeout. This happens when a requester for a lock on a resource has waited longer than the installation-specified RESOURCE TIMEOUT limit on the DB2 install panel DSNTIPI.

Reads satisfied - Archive Log

Number of times DB2 needed to read log records, and had to go to the archive log for the records. The value for this should ideally be zero.

System event checkpoints

The value in this field indicates the frequency of DB2 checkpoints. For example, if the statistics interval is 30 minutes and the value of this field is 15, DB2 is taking checkpoints every 2 minutes.

PREPARE Detail

Select this field to display the PREPARE Detail panel.

Prepare

The number of prepares. It reflects the number of real PREPARE commands received by DB2. If the PREPARE is satisfied by getting a copy from the cache rather than by the traditional prepare process, the count is incremented. If the prepares are done under control of KEEP DYNAMIC(YES), the count is not incremented.

DB2 Statistics Windows

Following are descriptions of the windows that can be accessed from the DB2 Statistics Detail panel. To access a window, type any character in the space beside the desired heading. Multiple windows can be accessed simultaneously. The windows are overlaid on the DB2 Statistics Detail panel. To leave the current window and proceed with the next window, press **F3** (Exit). To cancel all windows and return to the DB2 Statistics Detail panel, press **F12** (Cancel).

EDM Pool Window

Use the EDM Pool window to examine statistics on the efficiency of the EDM buffer pool, and to determine the size of the EDM pool for optimum system performance.

To display this window, select *EDM Pool* from the DB2 Statistics Detail panel.

```

DGOMSWEP          EDM Pool

                                INTERVAL  3:32.419
                                More:    - +
Requests for CT sections . . . . . :      89
CT section not found in EDM pool . . . . . :     12
CT requests/CT not in EDM pool . . . . . :    7.4

Requests for PT sections . . . . . :      16
PT section not found in EDM pool . . . . . :     9
PT requests/PT not in EDM pool . . . . . :    1.8

Requests for DBD sections . . . . . :     137
DBD section not found in EDM pool . . . . . :     5
DBD requests/DBD not in EDM pool . . . . . :   27.4

EDM Pool full . . . . . :          0

EDM Pool pages in use (%) . . . . . :     1.6

Pages in EDM pool . . . . . :      1425
Free pages in free chain . . . . . :   1402
Pages used for CT . . . . . :        1
Pages used for SKCT . . . . . :       9
Pages used for PT . . . . . :         0
Pages used for SKPT . . . . . :       4
Pages used for DBD . . . . . :        9

Command ==>
F1=Help      F2=Split    F3=Exit     F5=Auto
F6=History   F7=Up       F8=Down     F9=Swap
F10=Delta    F11=Interval F12=Cancel  F16=Look
F17=Collect

```

Figure 83. EDM Pool Window

The EDM pool size should be large enough to store the cursor tables (CTs), package tables (PTs), and database descriptors (DBDs) for the most frequently used applications.

The following list describes some of the important fields shown on this window, and how to interpret the values contained in these fields.

DB2 Statistics

EDM Pool pages in use (%)

The percentage of the EDM pool pages that are in use. If this percentage is consistently less than 50%, the EDM pool size is probably too large. The size can be reduced without affecting the efficiency ratios (*CT requests/CT not in EDM pool*, *PT requests/PT not in EDM pool*, and *DBD requests/DBD not in EDM pool*) significantly. However, driving the EDM pool toward 100% usage can cause performance problems.

Note that EDM pool use will vary across the day. It is not only the pages that are in use, but also the pages that are not in use, waiting to avoid I/O, that are important for performance.

CT requests/CT not in EDM pool

Ratio of number of requests for CT sections and number of times CT sections were not already in the EDM pool.

PT requests/PT not in EDM pool

Ratio of number of requests for PT sections and number of times PT sections were not already in the EDM pool.

DBD requests/DBD not in EDM pool

Ratio of number of requests for DBDs and number of times DBDs were not already in the EDM pool.

Buffer Manager Window

Use the Buffer Manager window to view a list of active buffer pools and to examine synchronous reads and important threshold information.

To display this window, select *Buffer Manager* from the DB2 Statistics Detail panel.

```
DGOMSWBM          Buffer Manager          ROW 1 TO 4 OF 4
                                     INTERVAL 1:59.084
For additional details, type any character next to Buffer Pool ID,
then press Enter.

  Buffer Pool Synchronous  Hit      Deferred Write      DM Critical
  ID          Read  Ratio  Threshold Reached  Threshold Reached
- BP0          6  29.3          3              3
- BP1          6  41.4          3              3
- BP2          6  11.9          3              3
- BP3          6   7.0          3              3
--- End of Buffer Pool List ---

Command ==>
F1=Help      F2=Split    F3=Exit      F5=Auto      F6=History
F7=Up        F8=Down    F9=Swap     F10=Delta    F11=Interval
F12=Cancel   F16=Look   F17=Collect
```

Figure 84. Buffer Manager Window

The buffer manager is one of the major components involved in DB2 system performance. The buffer manager's most significant role in performance is to reduce I/O activity, and to perform required I/O in an efficient manner.

Buffer pools should be large enough to store frequently used data in virtual storage, reducing the amount of I/O necessary. However, to minimize paging I/O, you should choose buffer pool sizes which can be backed by real or expanded storage.

Select any active buffer pool listed on the Buffer Manager window to display the Buffer Pool window, where you can view further details on an individual buffer pool. Multiple windows can be accessed simultaneously by selecting multiple fields. The windows are overlaid on the Buffer Manager window. To leave the current window and proceed with the next window, press **F3** (Exit). To cancel all windows and return to the DB2 Statistics Detail panel, press **F12** (Cancel).

Buffer Pool Windows

Use the Buffer Pool window to view important statistics on an active buffer pool.

To display the Buffer Pool window, select any active buffer pool listed on the Buffer Manager window.

The following windows show all the information available on the Buffer Pool window. Use the scrolling keys **F7** (Up) and **F8** (Down) to view the portions of the window not displayed.

DB2 Statistics

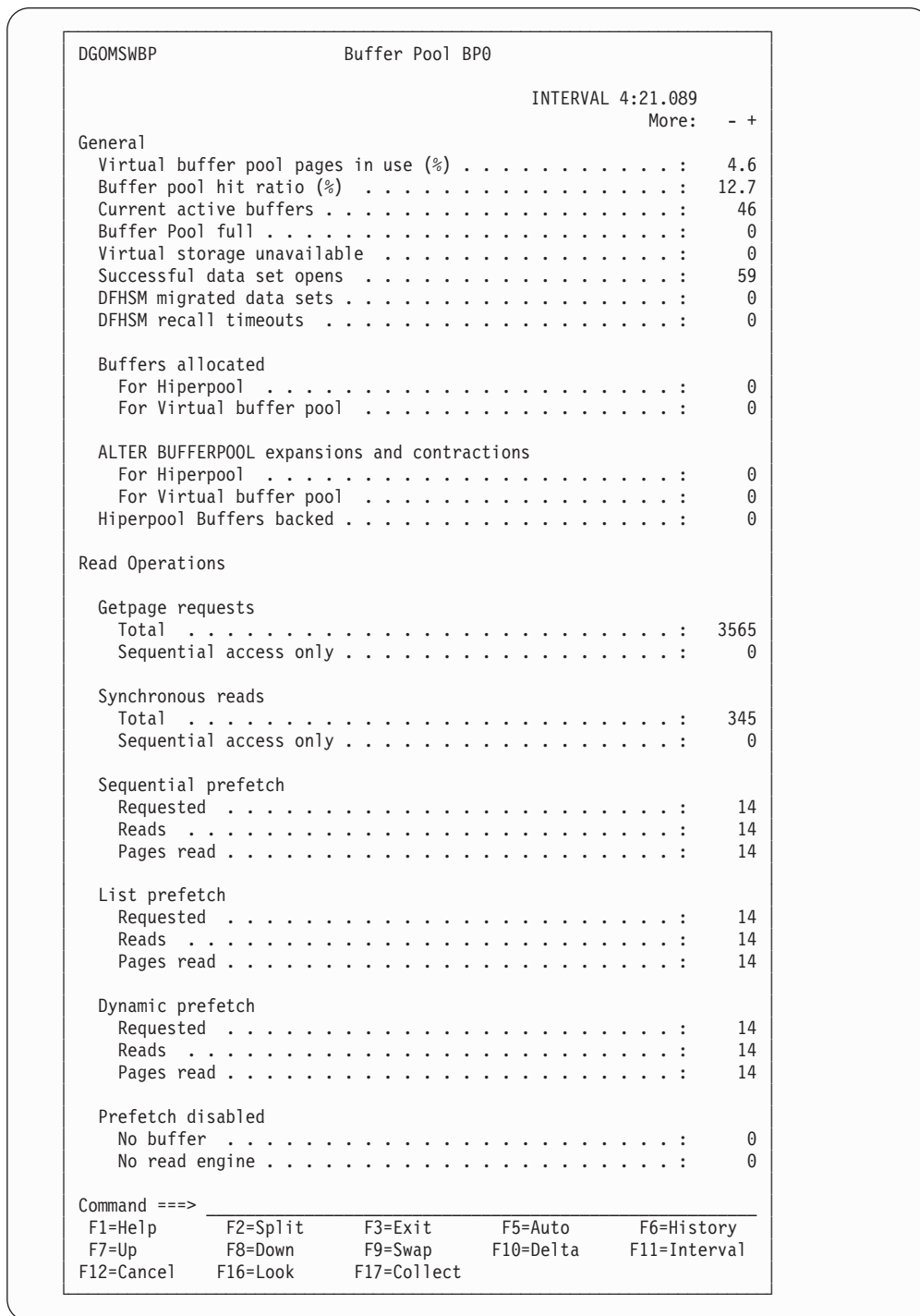


Figure 85. Buffer Pool Window (Screen 1)

DGOMSWBP		Buffer Pool BPn		
		INTERVAL 1:01.550		
		More:	- +	
Hiperpool reads				
Synchronous	.....	:	0
Asynchronous				
Without Asynchronous Data Mover Facility	.....	:	0
With Asynchronous Data Mover Facility	.....	:	0
Unsuccessful				
Without Asynchronous Data Mover Facility	.....	:	0
With Asynchronous Data Mover Facility	.....	:	0
Page-ins required for read I/O	.....	:	0
Write Operations				
Buffer updates	.....	:	957
Pages written	.....	:	168
Synchronous writes	.....	:	0
Asynchronous writes	.....	:	41
Write engine not available	.....	:	0
Thresholds reached				
Deferred write	.....	:	0
Vertical deferred write	.....	:	0
Data Manager critical	.....	:	0
Hiperpool pages written				
Synchronously	.....	:	0
Asynchronously				
Without Asynchronous Data Mover Facility	.....	:	0
With Asynchronous Data Mover Facility	.....	:	0
Unsuccessfully				
Without Asynchronous Data Mover Facility	.....	:	0
With Asynchronous Data Mover Facility	.....	:	0
Page-ins required for write I/O	.....	:	0
Query Parallelism				
Prefetch I/O streams				
Concurrent streams - high water mark	.....	:	0
Streams reduced - buffer shortage	.....	:	0
Parallel query requests	.....	:	0
Reduced parallel query requests	.....	:	0
Prefetch quantity reduced to 1/2	.....	:	0
Prefetch quantity reduced to 1/4	.....	:	0
Command ==>				
F1=Help	F2=Split	F3=Exit	F5=Auto	F6=History
F7=Up	F8=Down	F9=Swap	F10=Delta	F11=Interval
F12=Cancel	F16=Look	F17=Collect		

Figure 86. Buffer Pool Window (Screen 2)

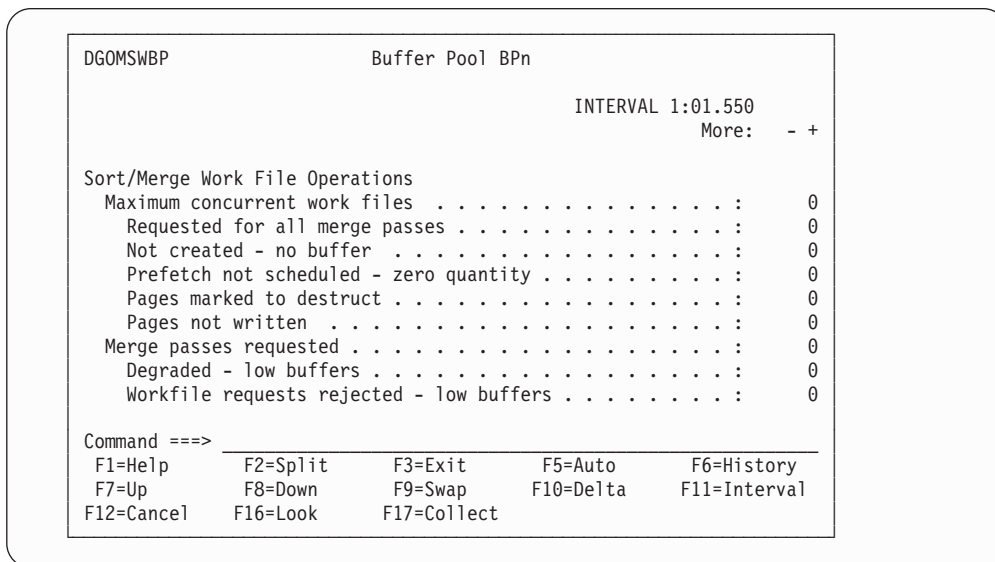


Figure 87. Buffer Pool Window (Screen 3)

The following list describes some of the important fields shown on this window, and how to interpret the values contained in these fields.

Buffer pool hit ratio (%)

The total number of GETPAGE operations, minus the number of pages read from DASD (both synchronously and using prefetch), divided by the total number of GETPAGE operations, multiplied by 100.

Current active buffers

Total number of current active (nonstealable) buffers at the moment the statistics were collected. A buffer critical condition is only shown if it occurs at that moment. The buffer pool may be too small if the number of active buffers is greater than the deferred write threshold (DWQT) of the buffer pool.

Getpage requests Total

The number of GETPAGEs issued by sequential and random requests.

Synchronous reads Total

Number of synchronous read I/O operations performed by sequential and random requests.

Sequential prefetch Reads

Number of times sequential prefetch reads were performed.

Sequential prefetch Pages read

Number of pages read due to sequential prefetch.

Ratio of *Sequential prefetch Pages read* to *Sequential prefetch Reads* will be between 0 and 32. Normally 32 is the maximum prefetch quantity for table space scans, whether data or index.

List prefetch Reads

Number of times list prefetch reads were performed.

List prefetch Pages read

Number of pages read due to list prefetch.

Ratio of *List prefetch Pages read* to *List prefetch Reads* will be between 0 and 32.

Dynamic prefetch Reads

Number of times dynamic prefetch reads were performed.

Dynamic prefetch Pages read

Number of pages read due to dynamic prefetch performed because of sequential detection.

Ratio of *Dynamic prefetch Pages read* to *Dynamic prefetch Reads* are between 0 and 32.

Prefetch disabled No buffer

Number of times sequential prefetch was disabled because buffers were not available. In other words this is the number of times the sequential prefetch threshold was reached. This fixed threshold is experienced if 90% of the pages in the buffer pool are unavailable. This has a significant effect on large and frequent scans that use sequential prefetch.

Hiperpool reads Unsuccessful Without Asynchronous Data Mover Facility

An unsuccessful read occurs when a requested page was found in the hiperpool, but its content was discarded by MVS. This count does not include pages moved by the Asynchronous Data Mover facility.

Hiperpool reads Unsuccessful With Asynchronous Data Mover Facility

An unsuccessful read occurs when a requested page is found in the hiperpool but its contents have been discarded by MVS. This count includes pages moved by the Asynchronous Data Mover facility.

Buffer updates

Number of times pages were updated in the buffer pool.

Pages written

Number of pages written. This field contains the number of pages in the buffer pool written to DASD.

Synchronous writes

Total number of immediate writes for a page.

An immediate write can occur when:

- Data set is closed
- DB2 Checkpoint is taken
- Immediate Write Threshold (97.5% pages in the buffer pool are unavailable) which is a fixed threshold
- A write engine is not available.

Asynchronous writes

Number of asynchronous write I/O operations performed by media manager to a direct access storage device.

Thresholds reached Deferred write

Number of times the deferred write threshold was reached. This threshold is a percentage of the virtual buffer pool that might be occupied by unavailable pages, including both updated pages and pages in use.

Thresholds reached Vertical deferred write

Number of times the vertical deferred write threshold was reached. This threshold is expressed as a percentage of the virtual buffer pool that might be occupied by updated pages from a single data set.

When this threshold is reached, writes are scheduled for that data set.

Thresholds reached Data manager critical

Number of times the data manager critical threshold was reached. This

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fixed threshold is experienced if 95% of the pages in the buffer pool are unavailable. This has a significant effect on CPU usage.

Hiperpool pages written Unsuccessfully Without Asynchronous Data Mover Facility

Number of pages for which a synchronous or asynchronous write request failed because of a shortage of expanded storage. In other words, no backing expanded storage page could be allocated. This count does not include pages moved by the Asynchronous Data Mover facility.

Hiperpool pages written Unsuccessfully With Asynchronous Data Mover Facility

Number of pages for which a write request using the Asynchronous Data Mover facility failed due to the backing expanded storage being stolen.

Not created - no buffer

The number of times a workfile could not be created due to insufficient buffer resources during sort processing.

Prefetch not scheduled - zero quantity

The number of workfile prefetches rejected due to a zero prefetch quantity.

Degraded - low buffers

The number of times that a merge pass could not be efficiently performed due to a shortage of space in the buffer pool.

Workfile requests rejected - low buffers

The number of workfiles (runs) that were rejected during all merge passes because of shortage of space in the buffer pool.

Buffer Pool Management in DB2

In DB2, the user specifies through DSNZPARM the virtual buffer pool (and hiperpool) sizes for the buffer pools BP0 through BP49 and BP32K through BP32K9. These values are shown in DB2 PM system parameters panels. The buffer pool sizes can be changed dynamically by executing an ALTER BUFFERPOOL command specifying buffer pool attributes. DB2 PM system parameters panels show the desired size of each buffer pool and the statistics panels provide information about the actual number of buffers allocated.

The statistics panels show if any thresholds were experienced. However, the system parameters panels need to be displayed if the user wants to know the threshold values. This is because the threshold values for horizontal deferred write threshold, vertical deferred write threshold, virtual buffer pool sequential steal threshold, hiperpool sequential steal threshold, and virtual buffer pool parallel sequential steal threshold can be set or altered by executing the ALTER BUFFERPOOL command. The threshold values for sequential prefetch threshold (90%), data manager threshold (95%), and immediate write threshold (97.5%) are fixed.

Locking Activity Window

Use the Locking Activity window to view statistics on lock suspensions, timeouts, deadlocks, and lock escalations.

To display this window, select *Locking Activity* from the DB2 Statistics Detail panel.

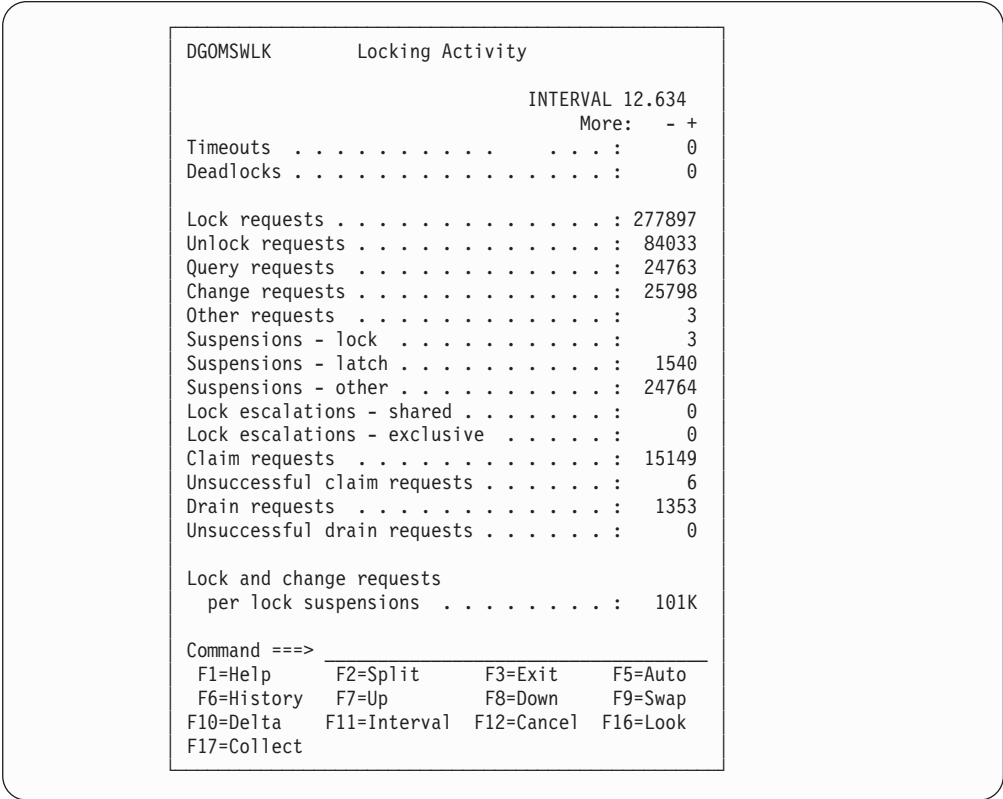


Figure 88. Locking Activity Window (Statistics)

Application deadlocks and timeouts should be avoided if possible. Unusually high values for these fields indicate the existence of a problem application. Exception events and console messages indicate deadlock participants. Use history to view details of the event surrounding the deadlock. You can use the Locked Resources window in thread activity to investigate thread resources locked or held.

Lock escalation counts greater than zero usually indicate an application process that updates more pages than expected. If this is not the case, examine fields *Max page locks per table space* and *Max locks per user* on the DB2 System Parameters Detail panel to determine whether to increase DSNZPARM fields NUMLKTS and NUMLKUS (LOCKS PER TABLE(SPACE) and LOCKS PER USER respectively on the INSTALL DB2 - IRLM PANEL 2 panel DSNTIPJ).

The following list describes some of the important fields shown on this window, and how to interpret the values contained in these fields.

Lock requests

Number of times a lock on a resource was requested.

Suspensions - lock

Number of resource conflicts. A suspension is a wait for a lock and each of these waits may contribute adversely to DB2 performance. The suspension may ultimately result in normal resumption, or, in the case of lock contention, in a timeout or deadlock. The number of lock suspensions is a function of the lock requests. Lock suspensions (or conflicts) may occur on either lock request or change request.

Lock escalations - shared

Count of lock escalations to shared mode. Number of times the LOCKS

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PER TABLE(SPACE) parameter on the DB2 install panel DSNTIPJ was exceeded and the table space lock was promoted from a page lock (IS) to a table space lock (S). Escalation can cause unpredictable response times. The lock escalation to shared mode should only happen on an exception basis. For example, a REPEATABLE READ application references most pages in a table.

Lock escalations - exclusive

Count of lock escalations to exclusive mode. Number of times the LOCKS PER TABLE(SPACE) parameter on the DB2 install panel DSNTIPJ was exceeded and the table space lock was promoted from a page lock (IX) to a table space lock (X). Escalation can cause unpredictable response times. The lock escalation to exclusive mode should only happen on an exception basis. For example, an application updates most pages in a table.

Lock escalations, shared or exclusive, should not be expected in a transaction environment.

Locking Considerations

The following aspects should be considered if concurrency is an issue.

- Consistent data access sequence in applications
- The mix of concurrent processing types (batch and transaction)
- IRLM startup procedure options and DB2 installation options
- DDL LOCKSIZE
- DDL LOCKMAX
- BIND parameters.

Refer to *IBM DB2 Universal Database Server for OS/390 Version 6 Administration Guide* for detailed information.

Open/Close Management Window

The Open/Close Management window displays statistics on data set activity and drain requests. Use the Open/Close Management window to determine the number of open data sets, the number of drain requests, the number of page sets available to drain, and the number of successful and failed drains.

To display this window, select *Open/Close Management* from the DB2 Statistics Detail panel.

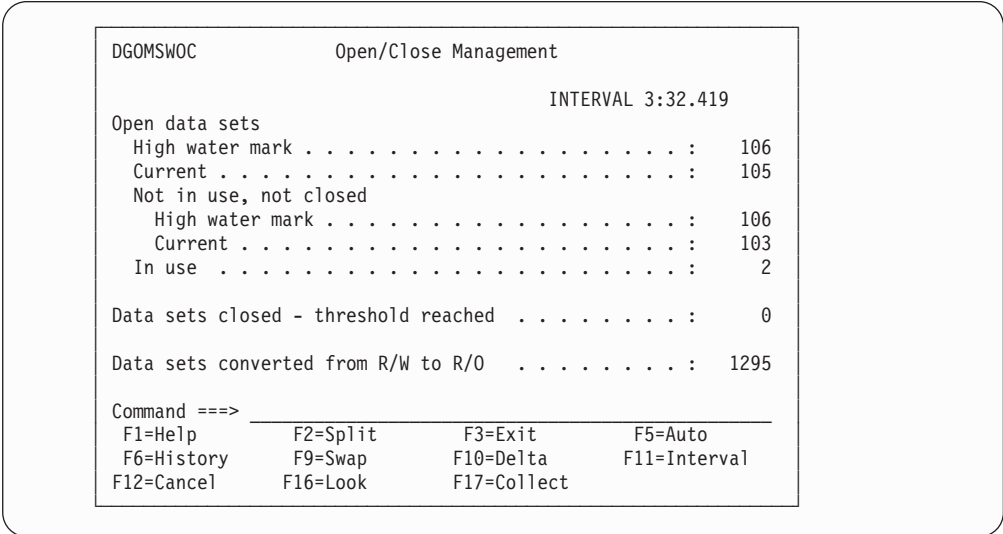


Figure 89. Open/Close Management Window

The following list describes some of the important fields shown on this window, and how to interpret the values contained in these fields.

Open data sets High water mark

The maximum number of data sets open concurrently (high water mark).

Monitor this field to see whether you are reaching the maximum number of open data sets permissible for your system. The maximum number of open data sets depends on the MVS version, modifications to your system, and various other factors. Refer to *OS/390 MVS Initialization and Tuning Guide* for the maximum number of open data sets permissible for your system.

Bind Processing Window

Use the Bind Processing window to view statistics on plans successfully bound, attempts to REBIND a plan, automatic binds, and attempts to FREE a plan.

To display this window, select *Bind Processing* from the DB2 Statistics Detail panel.

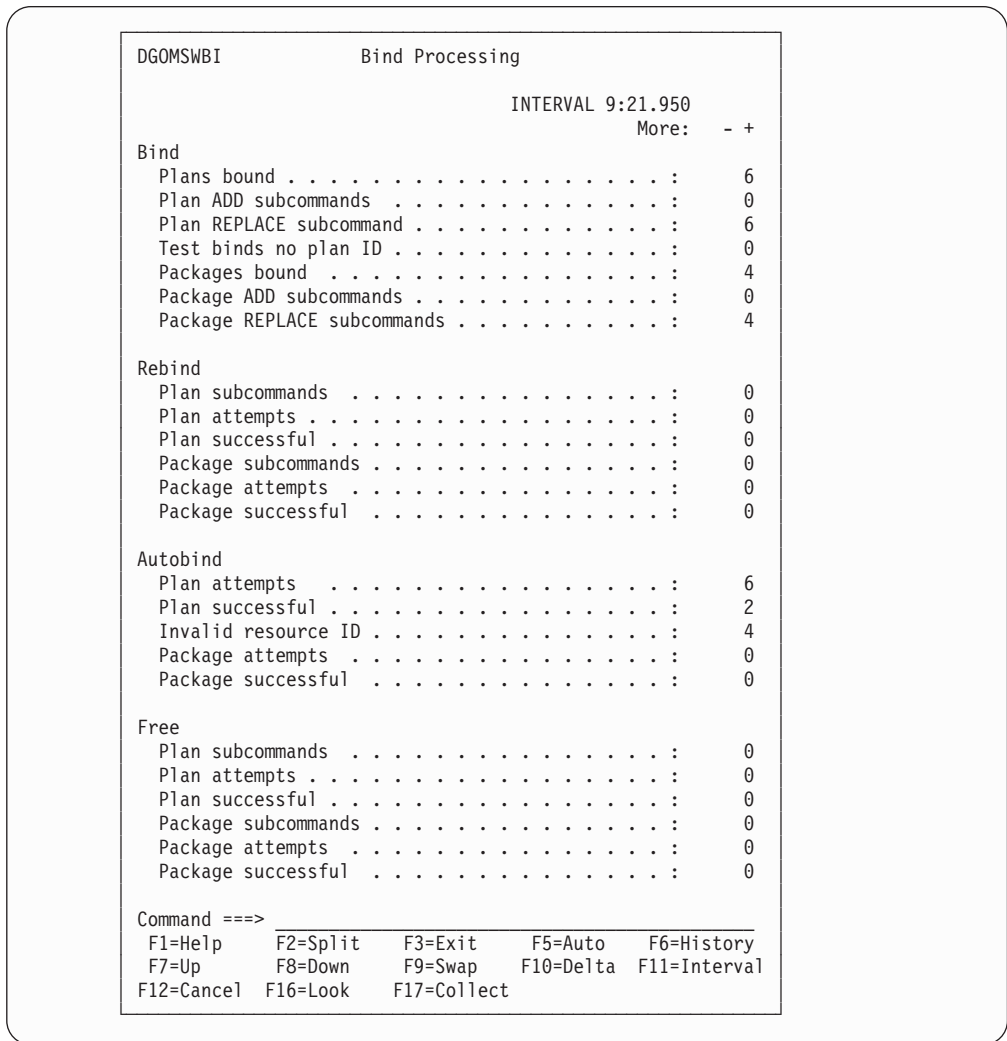


Figure 90. Bind Processing Window

The Bind Processing window consists of the following sections:

Bind This section shows statistics on bind events. These events occur when an explicit DB2 BIND subcommand is issued to bind a plan or package.

Rebind This section shows statistics on rebind events. These events occur when an explicit DB2 REBIND subcommand is issued to rebind an existing plan or package.

Autobind This section shows statistics on autobind events. These events occur if the plan becomes invalid since the last time the plan was bound. In this case, DB2 rebinds the plan before the plan is executed.

Free This section shows statistics on free events. These events occur when an explicit DB2 FREE subcommand is issued to remove a DB2 plan or package from the DB2 catalog and directory.

Plan and Package Allocation Window

Use the Plan and Package Allocation window to check plan/package allocation attempts and successes, and authorization management attempts and successes.

To display this window, select *Plan/Package Allocation, Authorization Management* from the DB2 Statistics Detail panel.

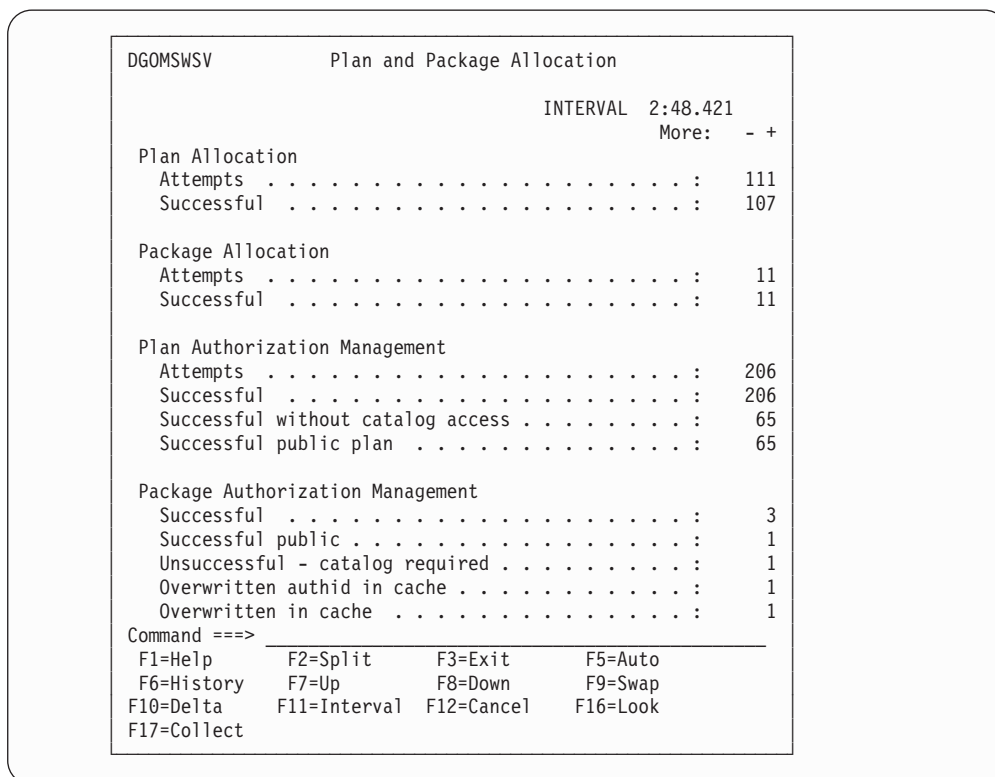


Figure 91. Plan and Package Allocation Window

Successful without catalog access

The number of successful authorization checks not using the DB2 catalog, that is, using plan cache checks and public checks.

For transaction level security, ENABLE and DISABLE on BIND PACKAGE should be used to ensure adequate security. Granting execute authority on the plan to public may be quite adequate. Refer to *IBM DB2 Universal Database Server for OS/390 Version 6 Administration Guide* for detailed information.

Log Manager Window

Use the Log Manager window to check read and write activity both to and from the log.

To display this window, select *Log Manager* from the DB2 Statistics Detail panel.

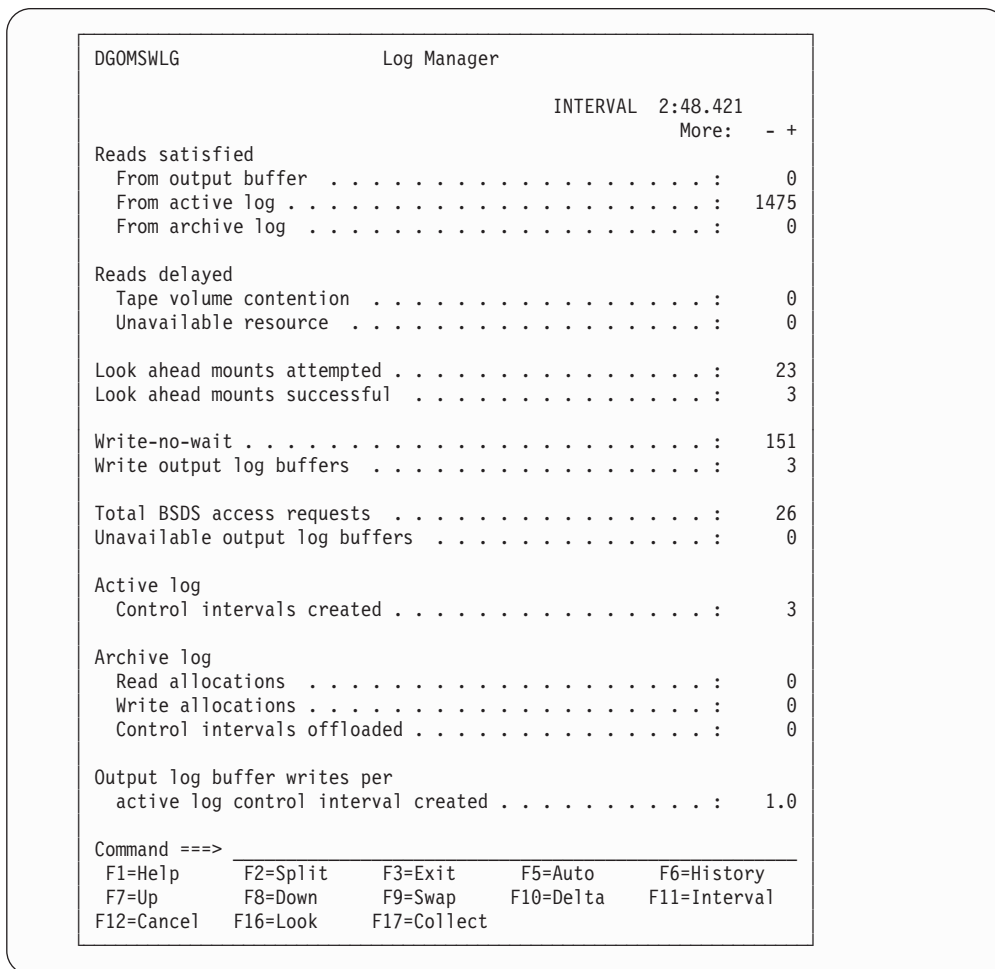


Figure 92. Log Manager Window

If a high percentage of reads comes from the archive log, it might be necessary to increase the size of the active log. For example, a large update job with few commits could fill the active log forcing an archive. If the job fails, recovery is required to retrieve records from the archive log. Archive activity can be expensive in terms of response time, especially if the archive log is placed on slow devices such as tape or cartridge.

The following list describes some of the important fields shown on this window, and how to interpret the values contained in these fields.

Tape volume contention

Number of read accesses delayed due to tape volume contention (that is, a tape volume was already in use by another thread).

Unavailable resource

Number of read accesses delayed due to an unavailable resource. This can be due to an insufficient number of tape units allocated, or because the archive log read service task is not available.

Write output log buffers

The number of write requests issued irrespective of single or dual logging. This field is updated once per buffer write. The update value is either one or

two I/Os, depending on which logging option is chosen (single or dual). This should have a value consistent with the known workload update rate.

Unavailable output log buffers

This field shows how many times a write request to the active log had to wait because no buffer was available. The value should ideally be zero as these waits should not occur. If these waits do occur, the output buffer might be too small, or the size of the write threshold might be too close to the size of the output buffer.

Active log Control intervals created

Number of active log output control intervals created. Log records are placed sequentially in output log buffers, which are formatted as VSAM control intervals. The control intervals are written to a set of predefined DASD active log data sets, which are used sequentially and recycled.

A useful ratio is: *Write output log buffers* divided by *Active log Control intervals created*.

Logging Considerations

Minimize device contention on the log data sets by placing data sets correctly, that is, if using dual logging, do not place both logs on the same volume.

Avoid waits that occur because no log buffer is available.

Define enough active log data sets to prevent DB2 from waiting while a log is archived.

Make the active logs large enough that backouts do not have to use the archive log.

Consider the 3990 DASD FAST WRITE controller for the log. Performance measurements have shown that sequential access mode with DASD FAST WRITE provided substantially better performance than native DASD when the amount of log data written per commit was 24 KB or less. DASD FAST WRITE performance was comparable to that of native DASD when 48 KB of log data was written to DASD for each commit. When more than 48 KB was written, native DASD performed better than DASD FAST WRITE. Therefore there may be a need to determine in which environments log performance is critical in order to assess the value of DASD FAST WRITE.

Subsystem Service Window

Use the Subsystem Service window to view DB2 subsystem activity, such as connections to DB2, threads, commits, and units of recovery. You can examine these statistics to determine the work load of various subsystem functions, and to help you adjust DB2 system parameters for optimum system performance.

To display this window, select *Subsystem Service* from the DB2 Statistics Detail panel.

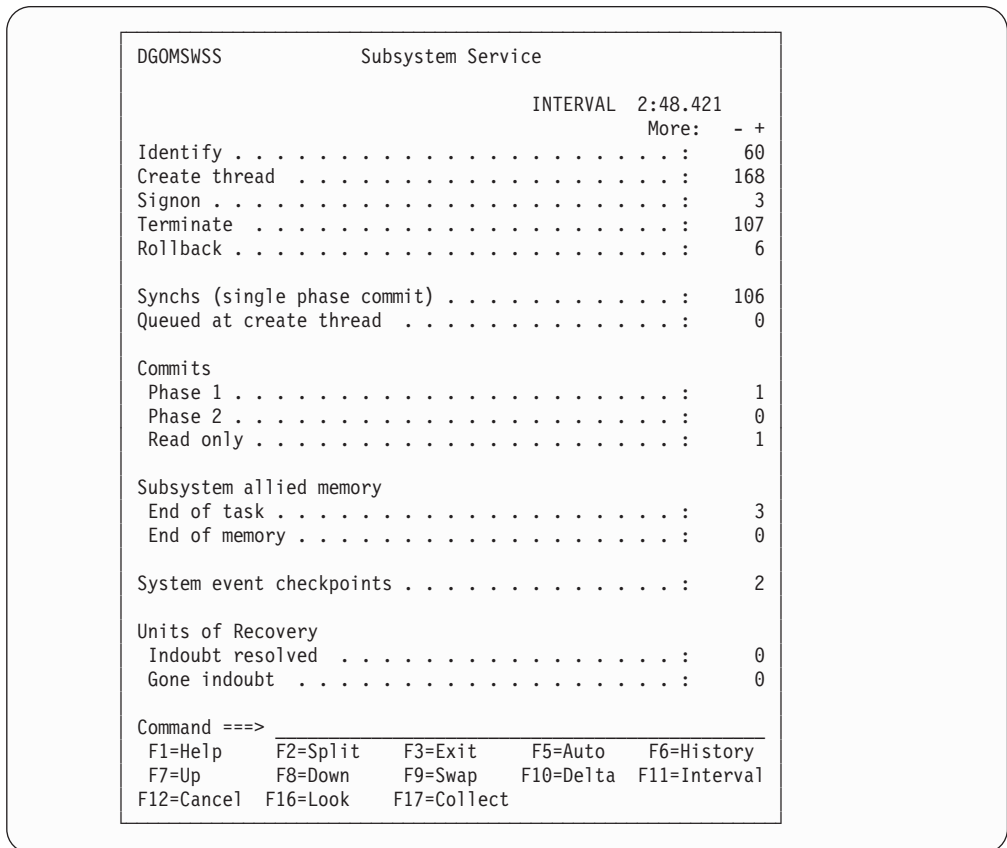


Figure 93. Subsystem Service Window

The following list describes some of the important fields shown on this window, and how to interpret the values contained in these fields.

Identify

The number of successful connections to DB2 from an allied address space (for example TSO, BATCH, CICS, IMS, CAF, RRSAP, or UTILITY).

Create thread

The number of threads created. Thread creation can be a significant part of the cost in a short transaction. Thread reuse (discussed later) can help improve performance.

Signon

The number of signons that have occurred in IMS or CICS. If the number of signons is greater than the number of create thread occurrences, some threads have been reused. In the case of the TSO attachment facility and the call attachment facility (CAF), there is no sign-on, because the user is identified when the TSO address space is connected.

Thread Reuse

The term *thread reuse* only applies to IMS and CICS attachments. In the case of the TSO attachment facility and the call attachment facility (CAF), threads cannot be reused, because the threads are allocated to the user address space.

Thread reuse should be considered in the following cases:

- If transaction volume is high:

High volume transactions should achieve a high percentage of thread reuse. If threads are reused on low volume transactions, the number of threads needed increases because these threads are not automatically terminated by IMS when not being used. This may result in too many idle threads for the level of the DB2 workload. Under CICS, protected threads are terminated after the purge cycle (user-specified, with a minimum of 30 seconds and up to 59 minutes and 59 seconds, and an average of 45 seconds in DB2 V3) if no transaction eligible to reuse the thread has been received.

- If thread creation cost is significant:

As a rule of thumb, more than 5% of the total CPU cost of transaction processing is considered significant.

The ACQUIRE and RELEASE parameters of BIND should be specified to minimize the thread creation cost, while providing the needed concurrency:

- If most of the application plan's SQL statements are executed, then ACQUIRE(ALLOCATE) is cheaper than ACQUIRE(USE).
- If only a small number of the SQL statements are executed, ACQUIRE(USE) becomes cheaper and improves concurrency, because the required resources are only acquired (locked) when the plan actually references (uses) them. An example would be a generalized plan used by many different transactions. It would contain multiple logic paths referencing different tables.

Note that when packages are involved, ACQUIRE(USE) is always implicitly used.

- Concurrency in thread reuse is based on page locking provided by the IS and IX intent locks, whose duration is governed by ACQUIRE and RELEASE of BIND.

RELEASE(DEALLOCATE) is strongly recommended for thread-reuse transactions to reduce transaction CPU time.

When thread reuse is implemented, monitor the EDM pool. It should be sufficient in size to accommodate expanding plans where the next transaction requires additional plan sections over those already part of the EDM pool.

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Terminate

The number of threads that have been terminated. The value of this field is usually greater than the number of create thread occurrences, because it also includes the termination of connections to DB2 (IDENTIFY) and other internal counts.

Synchs (single phase commit)

The number of commits from TSO, CAF, and UTILITY environments.

Queued at create thread

The number of create thread requests queued. This count does not include DBATs.

Monitoring this field is useful in determining the right setting for the MAX USERS option on the DSNTIPE installation panel. This parameter is used to control the number of threads (excluding DBATs) in the DB2 system.

Rule of thumb: About 1% thread queuing is acceptable.

Commits Phase 1

The number of successful requests for COMMIT PHASE 1 of two-phase commit (BEGIN COMMIT). IMS, CICS, and RRS applications use the PREPARE and COMMIT sequence to commit work. This value does not include successful single-phase commits.

Commits Phase 2

The number of successful requests for COMMIT PHASE 2. IMS, CICS, and RRS applications use the PREPARE and COMMIT sequence to commit work. This value does not include successful single-phase commits. A nonzero value for this field indicates that updates have occurred.

Commits Read only

The number of times read operations were completed in a two-phase commit environment.

System event checkpoints

A count of the number of checkpoints DB2 has taken. The checkpoint interval is defined by the number of log records you specify for checkpoint frequency (LOGLOAD in DSN6SYSP). A checkpoint is taken when the specified number of log records have been written. A checkpoint is also taken each time DB2 switches to a new active log data set. If the statistics interval is 30 minutes and the value of this field is 15, then DB2 is taking checkpoints every 2 minutes.

SQL Activity Window

Use the SQL Activity window to view subsystem-wide SQL activity for determining the SQL workload on the system. This information displays the number of times each SQL statement has been executed. To display this window, select *SQL Activity* from the DB2 Statistics Detail panel.

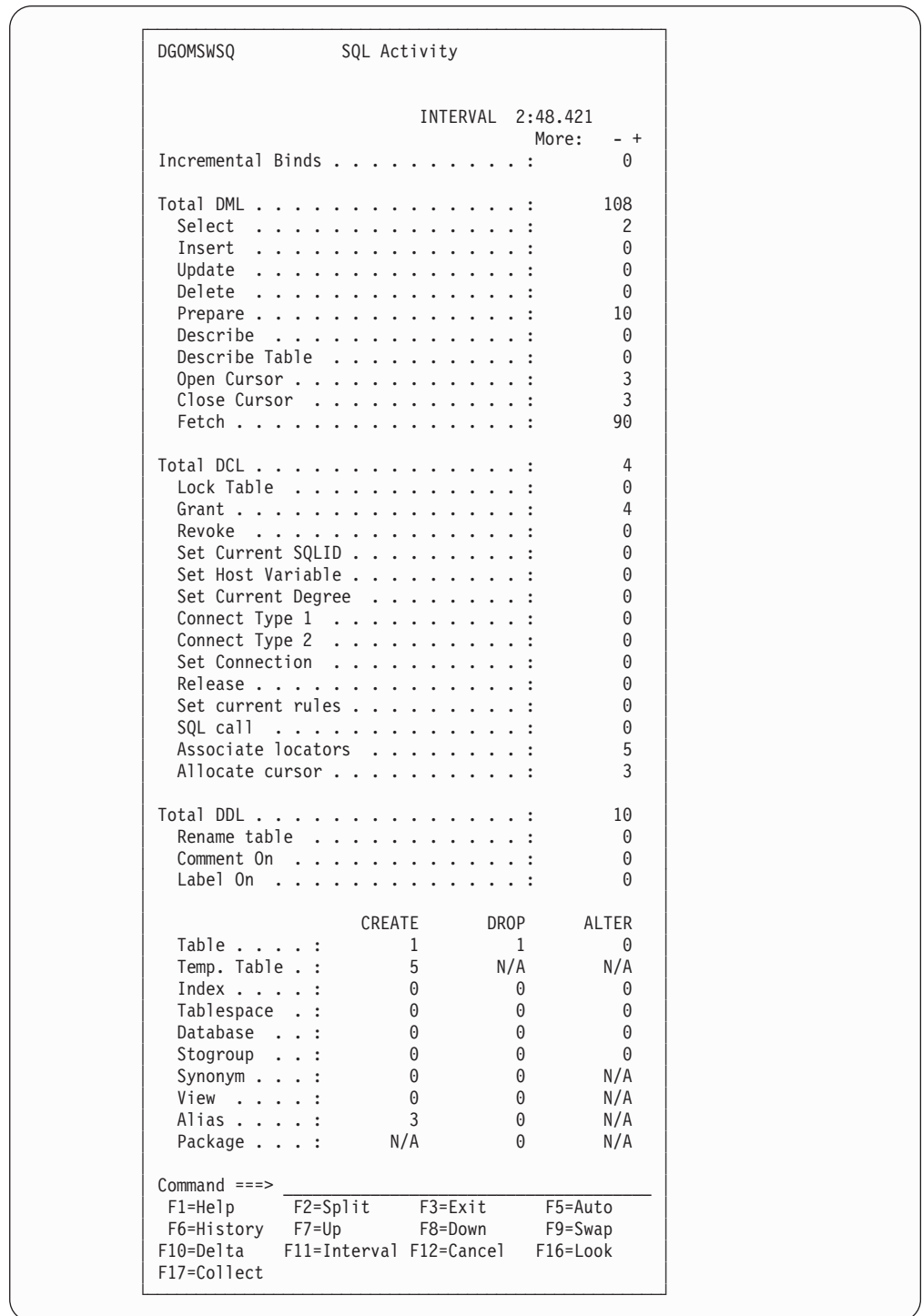


Figure 94. SQL Activity Window (Statistics)

The SQL Activity window consists of the following sections:

Total DML (Data Manipulation Language)

This section shows the number of executions performed by various SQL statements concerning the manipulation of data.

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Total DCL (Data Control Language)

This section shows the number of executions performed by various SQL statements concerning the controlling of various activities.

Total DDL (Data Definition language)

This section shows a table containing the number of executions performed by various DDL SQL statements for each of the applicable object types. These SQL statements are used to *create*, *drop*, and *alter* objects.

Incremental Binds

This field is the number of INCREMENTAL BINDs.

If a plan is bound with VALIDATE(RUN), DB2 performs validity checks (such as authorizations and existence of referenced DB2 objects) at bind time and rechecks any failures at run time. This can result in catalog contention and degraded application performance, depending on the number of statements flagged and the number of times they are executed. Therefore VALIDATE(RUN) should be avoided as much as possible. Ensure that all objects are created and all privileges are granted before binding, and select the VALIDATE(BIND) option.

In addition to plans bound with VALIDATE(RUN), this counter is incremented for plans using DB2 private protocol.

PREPARE Detail Window

Use the PREPARE Detail window to view information about the treatment of PREPARE commands as well as information on kept dynamic statements and dynamic cached statements.

To display this window, select *PREPARE Detail* from the DB2 Statistics Detail panel.

DGOMSWPD		PREPARE Detail	
Prepares satisfied	:		123
Prepares received	:		4
Prepares implicit	:		12
Prepares avoided	:	12223	
Kept dynamic statement discarded	:		12
Dynamic cache statement purged	:		4
Command ==>			
F1=Help	F2=Split	F3=Exit	F5=Auto
F6=History	F9=Swap	F10=Delta	F11=Interval
F12=Cancel			

Figure 95. PREPARE Detail Window (Statistics)

The following list describes the fields shown on this window, and how to interpret the values contained in these fields.

Prepares satisfied

The number of times a PREPARE command was satisfied by copying a statement from the prepared statement cache.

Prepares received

The number of times a PREPARE command was received, but a matching statement was not found in the prepared statement cache. Cache search is only done for DML SQL.

Prepares implicit

The number of times an implicit prepare was performed because KEEP_DYNAMIC(YES) was used and an open, execute, or describe for a dynamic SQL statement has occurred after a commit.

Prepares avoided

The number of times a prepare was avoided because the KEEP_DYNAMIC(YES) bind option was used and an open, execute, or describe for a dynamic SQL statement has occurred after a commit.

Kept dynamic statement discarded

The number of times a kept dynamic statement was discarded because the MAXKEEPD system limit has been reached.

Dynamic cache statement purged

The number of times a dynamic cached statement was purged from the cache because a dependent object was dropped or altered.

Query Parallelism Data Window

Use the Query Parallelism Data window to view information on the total number of parallel groups executed and to find out whether the type or degree of parallelism was changed at run time.

To display this window, select *Query Parallelism Data* from the DB2 Statistics Detail panel.

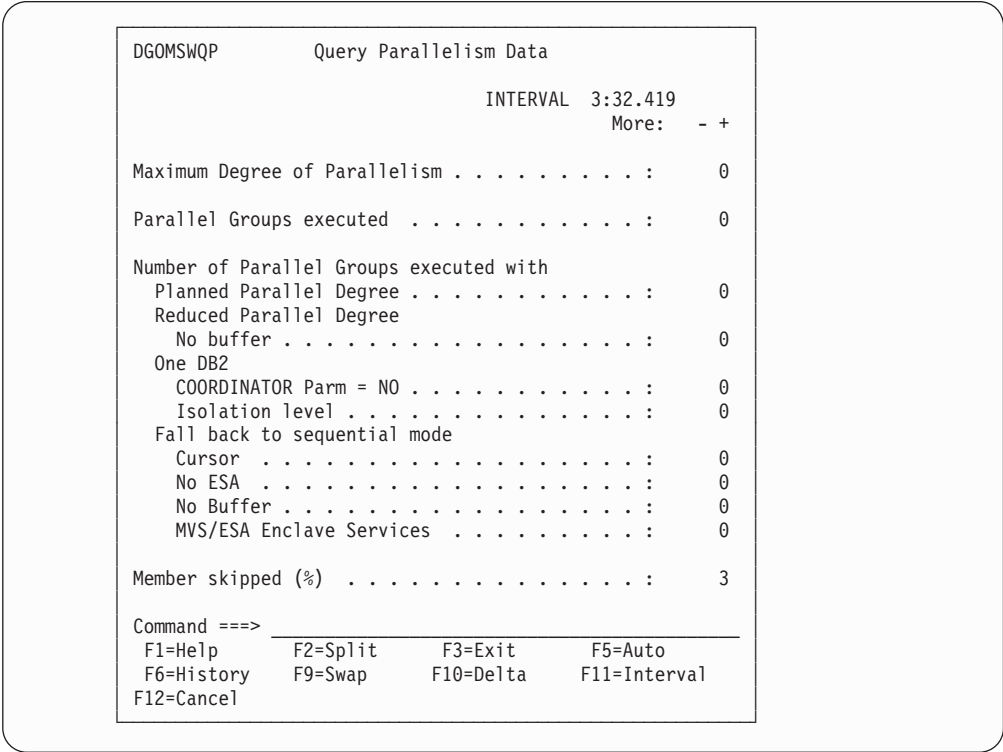


Figure 96. Query Parallelism Data Window (Statistics)

The main objective of query parallelism is to improve query response times.

Query parallelism is suited to both *data-intensive* as well as *complex* queries. A query is *data-intensive* if it has a high ratio of I/O compared to CPU and *complex* if it requires a high use of CPU to resolve complex predicates and functions.

By examining the information displayed on this window, you can view the number of parallel groups that have fallen back to sequential mode and determine the cause.

The following list describes some of the important fields shown on this window, and how to interpret the values contained in these fields.

One DB2 - COORDINATOR Parm = NO

The total number of parallel groups scheduled for Sysplex query parallelism, but executed on a single DB2 due to the COORDINATOR subsystem parameter set to NO. When the statement was bound, the COORDINATOR subsystem parameter was set to YES. The same can happen when a package or plan is bound on a DB2 subsystem with COORDINATOR = YES, but is run on a DB2 subsystem with COORDINATOR = NO.

One DB2 - Isolation level

The total number of parallel groups scheduled for Sysplex query parallelism, but executed on a single DB2 due to repeatable-read or read-stability isolation.

Member skipped (%)

The percentage of parallel groups that were not distributed as planned.

The purpose of this count is to indicate situations with insufficient buffers on a member so that the parallelism coordinator has to bypass a DB2 when distributing tasks.

RID List Processing Window

Use the RID List Processing window to view the number of blocks concurrently allocated for RID entries (maximum and current), and the number of times RID list processing has been terminated.

To display this window, select *RID List Processing* from the DB2 Statistics Detail panel.

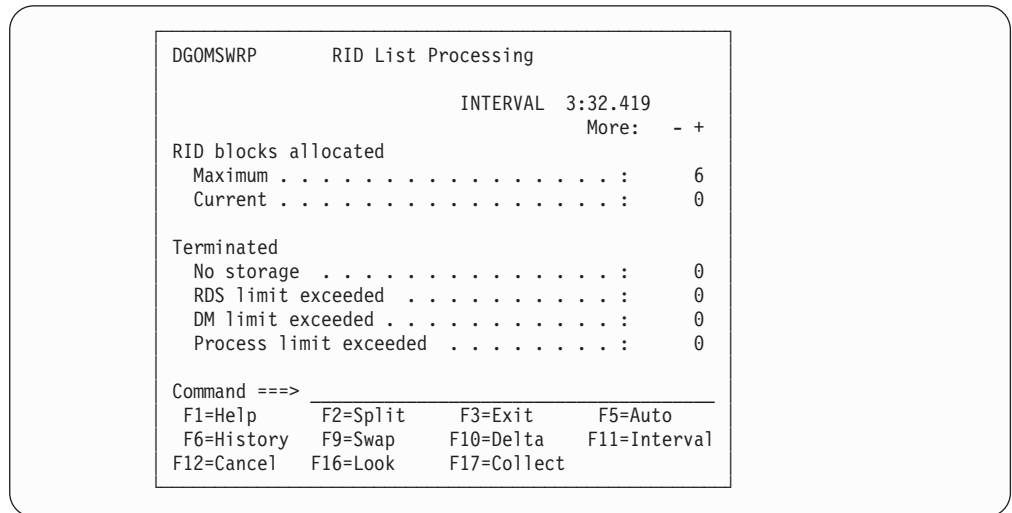


Figure 97. RID List Processing Window (Statistics)

RID list processing can terminate because the number of RID entries exceeds the RDS limit, the number of RID entries exceeds the data manager limit, or because the maximum RID list storage is exceeded.

The following list describes some of the important fields shown on this window, and how to interpret the values contained in these fields.

No storage

Number of times RID list processing was terminated due to insufficient storage.

This failure occurs when the 2 GB limit is reached. You cannot increase virtual storage beyond 2 GB.

RDS limit exceeded

The number of times RID list processing was terminated because either the number of RID entries was greater than the maximum limit of 25% of the table size, or because the number of RID entries that can fit into the guaranteed number of RID blocks was exceeded. The latter can only happen when *RID blocks allocated Maximum* approaches the RID list storage size. There is one guaranteed RID block.

DM limit exceeded

Number of times RID list processing was terminated because the number of RID entries exceeded the Data Manager limit of 16 million.

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Process limit exceeded

Number of times RID list processing was terminated due to the maximum RID list storage used.

The size is determined by the installation parameter RID POOL SIZE (DB2 install panel DSNTIPC). It can be 0, or between 16 KB and 1 GB.

The general formula for calculating the RID pool size is:

Number of concurrent RID processing activities x
average number of RIDs x 2 x 5 bytes per RID

Distributed Data Window

Use the Distributed Data window to view subsystem-wide Distributed Data Facility (DDF) activity, and to examine a list of remote locations involved in this activity. If many remote locations are involved in distributed activity, you can use the scrolling keys **F7** (Up) and **F8** (Down) to browse the list.

To display this window, select *Distributed Data* from the DB2 Statistics Detail panel.

```

DGOMSWDD                Distributed Data                ROW 2 TO 2 OF 2
                                INTERVAL 3:03.838
For additional details, type any character next to the location,
then press Enter.

DBATs queued - maximum active . . . . . : 0
Conversations deallocated - maximum concurrent . . : 0
Active / Inactive DBATs currently . . . . . : 0 / 0
Active / Inactive DBATs high water mark . . . . . : 14 / 0
Total DBATs high water mark . . . . . : 14
Cold / warm start connections . . . . . : 0 / 0
Resynchronization attempted / succeeded . . . . . : 0 / 0

Location                Transactions    Conversations
- DSNAPC5                Sent          12             12
                        Recv          0             0
- DSNAPC1                Sent          2             2
                        Recv          0             0
--- End of Location List ---

Command ==>
F1=Help      F2=Split    F3=Exit     F5=Auto     F6=History
F7=Up        F8=Down     F9=Swap     F10=Delta   F11=Interval
F12=Cancel  F16=Look    F17=Collect
  
```

Figure 98. Distributed Data Window (Statistics)

From this window, you can select any remote location listed to display the Remote Location window, where the remote location can be examined in greater detail.

DBATs queued - maximum active

Monitoring this field is useful in developing the right setting for the DSNTIPE parameter MAX REMOTE ACTIVE. This parameter is used to control the number of DBATs that can be concurrently active in the DB2 system.

Rule of thumb:

About 1% DBAT queuing is acceptable.

MAX REMOTE ACTIVE

The MAX REMOTE ACTIVE option on the install panel DSNTIPE is used to specify the number of database access threads that can be active at the same time as opposed to MAX USERS on the same panel which specifies the maximum number of allied threads. The combined maximum allowed for MAX USERS and MAX REMOTE ACTIVE cannot exceed 2 000.

MAX REMOTE CONNECTED on the DB2 install panel DSNTIPE represents the number of database access threads that can concurrently exist. This number cannot exceed 25 000.

The total number of inactive database access threads is the difference between MAX REMOTE CONNECTED and MAX REMOTE ACTIVE.

An installation may choose, via DDF THREADS on the DB2 install panel DSNTIPR, to have database access threads considered inactive when the last operation of the thread was a commit or rollback, all packages used by the database access thread had the RELEASE (COMMIT) option, and the thread holds no database locks (including not having any cursors open with the HOLD option). When this is the case, the thread is removed from active thread lists and moved to inactive thread lists.

If the limit set by MAX REMOTE ACTIVE parameter is reached, remote SQL requests are queued until a DBAT can be created. The number of times queuing occurred is shown by the field *DBATs queued - maximum active*. If necessary, the value of MAX REMOTE ACTIVE should be increased.

Note: The Distributed Data window is not accessible if there is no distributed activity.

Remote Location Window

Use the Remote Location window to view statistics regarding the distribution of data by the remote location selected from the Distributed Data window. These statistics show the number of distributed data events performed at this remote location.

To display this window, select any remote location listed on the Distributed Data window.

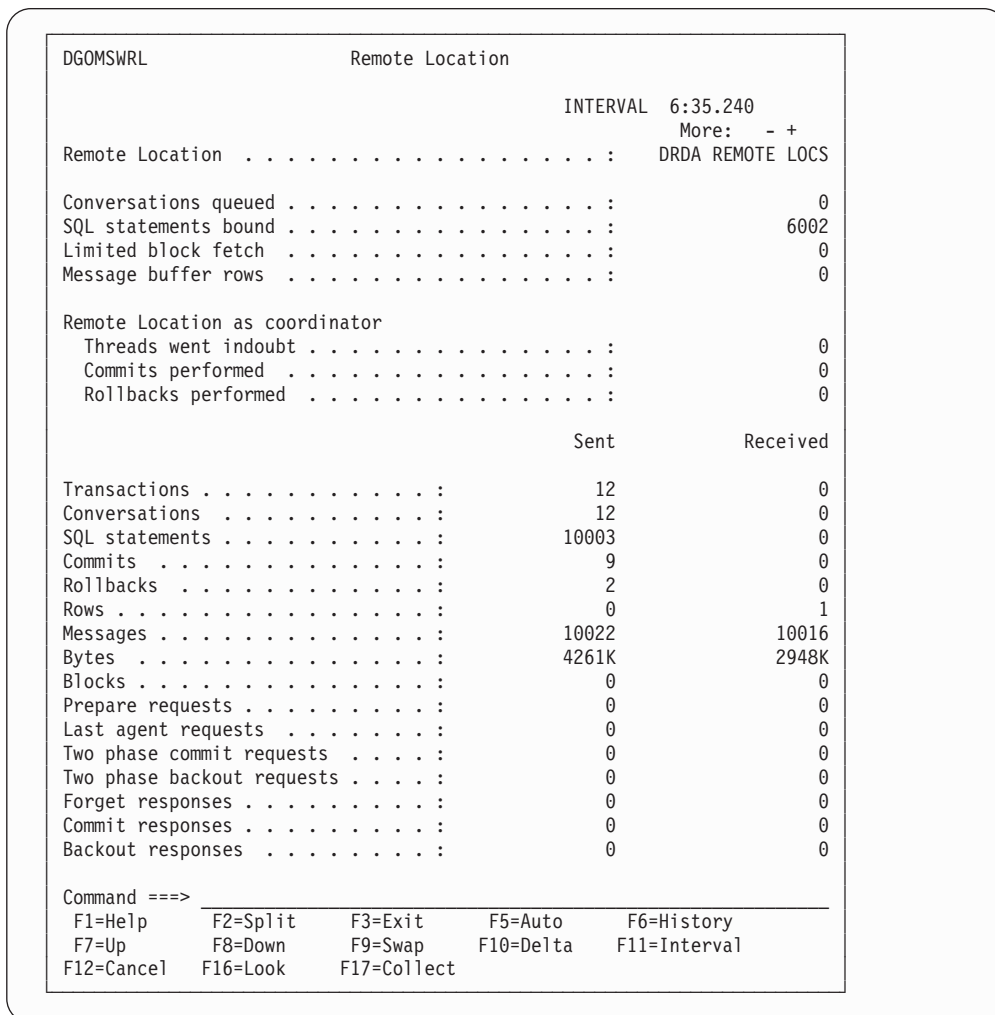


Figure 99. Remote Location Window

To leave the Remote Location window and return to the Distributed Data window, press **F3** (Exit). To leave the Remote Location window and return to the DB2 Statistics Detail panel, press **F12** (Cancel).

The following list describes some of the important fields shown on this window, and how to interpret the values contained in these fields.

Remote Location

Location name of the remote location with which DDF data is associated, or, for DRDA protocol, this field contains the string “DRDA REMOTE LOCS”. Statistics for all remote locations accessed by DRDA protocol are grouped under the location name “DRDA REMOTE LOCS”. For DB2 private protocol, statistics are gathered independently for each remote location.

Conversations queued

The number of conversation requests, queued by the Distributed Data Facility, waiting for allocation.

When this value is high, you may want to consider tuning VTAM.

Limited block fetch

The number of times a switch was made from continuous to limited block fetch mode. This value applies only to DB2 private protocol.

When this value is high, you may want to consider tuning VTAM.

CPU Times and Other Data Window

Use the CPU Times and Other Data window to view statistics on the work that various address spaces have accumulated.

To display this window, select *CPU Times and Other Data* from the DB2 Statistics Detail panel.

```

DGOMSWOT                CPU Times and Other Data

                                INTERVAL 6:35.240
For additional details, type any character next to heading, then
press Enter.

                                More:  - +

CPU Times
      TCB      SRB      Total
      Time     Time     Time
System Services . . . . . : 0.54272  0.18774  0.73047
Database Services . . . . . : 0.65193  0.37567  1.02761
IRLM . . . . . : 0.02337  0.01779  0.04116
DDF address space . . . . . : 0.11245  0.03937  0.15183

DB2 Application Programming Interface
Abends . . . . . : 0
Unrecognized . . . . . : 0
Command requests . . . . . : 1
READA requests . . . . . : 0
READS requests . . . . . : 7
WRITE requests . . . . . : 0

Miscellaneous
Log RBA . . . . . : X'000000000EB8C7E6'
Reason invoked . . . . . : IFI READS
Columns bypassed . . . . . : 89321

- DB2 Commands
- Instrumentation Record Counts
- IFC Destination Data
- Data Capture

Command ==>
F1=Help      F2=Split    F3=Exit     F5=Auto     F6=History
F7=Up        F8=Down     F9=Swap     F10=Delta   F11=Interval
F12=Cancel   F16=Look    F17=Collect

```

Figure 100. Statistics CPU Times and Other Data Window

The *CPU Times* fields display statistics on the accumulated CPU processing time spent in various address spaces, and on various tasks. Use these statistics to examine system usage, and to determine if there are any problem areas consuming more CPU time than expected. If the distributed data facility (DDF) is not installed, N/P is displayed in the DDF address space time fields.

The *DB2 Application Programming Interface* fields show the number of calls made to the instrumentation facility interface (IFI) by various functions, and the number of IFI abnormal terminations.

DB2 Statistics

From the CPU Times and Other Data window, you can access windows displaying information on DB2 commands, instrumentation record counts, IFC destination data, and data capture.

DB2 Commands Window

Use the DB2 Commands window to view the total number of executions of various DB2 commands, whether or not they completed successfully.

To display this window, select *DB2 Commands* from the CPU Times and Other Data window.

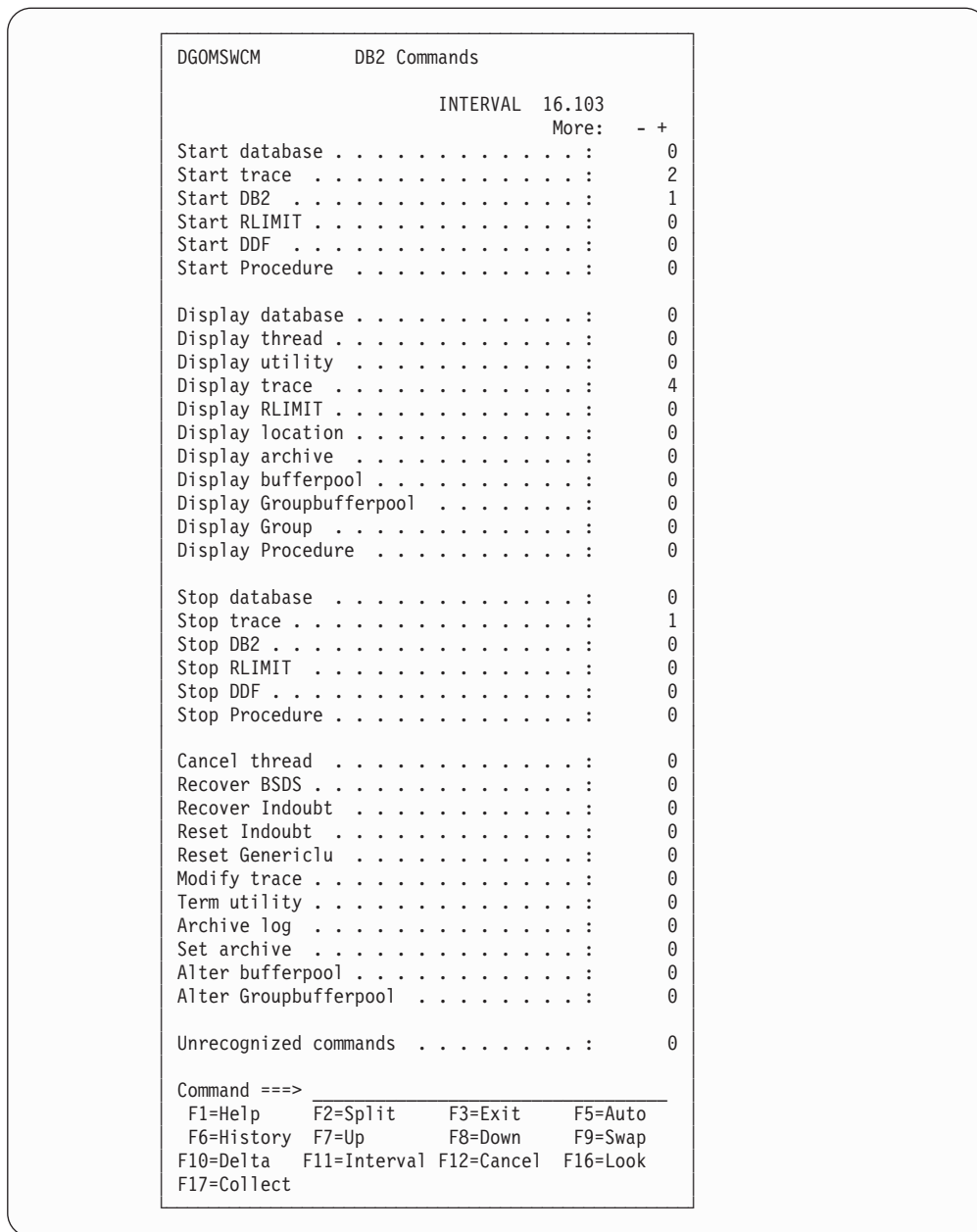


Figure 101. DB2 Commands Window

DB2 Instrumentation Window

Use the DB2 Instrumentation window to view the number of records successfully written by the DB2 instrumentation facility to SMF, GTF, and OPx destinations, and the number of records where a write was attempted but did not succeed.

To display this window, select *Instrumentation Record Counts* from the CPU Time and Other Data window.

DGOMSWIN		DB2 Instrumentation	
		INTERVAL 16:14.034	
Type of record		Written	Not Written
System related	:	5	4
Database related	:	5	4
Accounting	:	15	0
Start trace	:	1	0
Stop trace	:	0	0
DSNZPARM	:	8	1
Audit	:	0	0
Command ==>			
F1=Help	F2=Split	F3=Exit	F5=Auto
F9=Swap	F10=Delta	F11=Interval	F12=Cancel
F17=Collect			F16=Look

Figure 102. DB2 Instrumentation Window

Unsuccessful writes can be caused by buffer full conditions or other failures.

DB2 IFC Destinations Window

Use the DB2 IFC Destinations window to view the number of instrumentation records written to IFC destinations, and the number of various failures.

To display this window, select *IFC Destination Data* from the CPU Times and Other Data window.

Destination		Written	Not Written	Buffer Overrun	Not Accepted	Write Failure
						More: - +
SMF . . . :		27	0	0	0	0
GTF . . . :		0	0	N/A	0	0
OP1 . . . :		1	0	N/A	0	N/A
OP2 . . . :		0	0	N/A	0	N/A
OP3 . . . :		0	0	N/A	0	N/A
OP4 . . . :		0	0	N/A	0	N/A
OP5 . . . :		0	0	N/A	0	N/A
OP6 . . . :		0	0	N/A	0	N/A
OP7 . . . :		0	0	N/A	0	N/A
OP8 . . . :		0	0	N/A	0	N/A
RES . . . :		0	N/A	N/A	N/A	N/A

Command ==>				
F1=Help	F2=Split	F3=Exit	F5=Auto	F6=History
F7=Up	F8=Down	F9=Swap	F10=Delta	F11=Interval
F12=Cancel	F16=Look	F17=Collect		

Figure 103. DB2 IFC Destinations Window

The IFC destinations on this window are:
SMF System management facility
GTF Generalized trace facility
OP1 to OP8 Output buffer destinations
RES Resident trace table.

Use this window to examine instrumentation record write activity, and identify possible problems. A nonzero value in the *Not Written* column can indicate a problem. In this case, check for nonzero values in the *Buffer Overrun*, *Not Accepted*, and *Write Failure* columns to determine the possible cause.

Data Capture Window

Use the Data Capture window to view statistics on data capture activity.

To display this window, select *Data Capture* from the CPU Times and Other Data window.

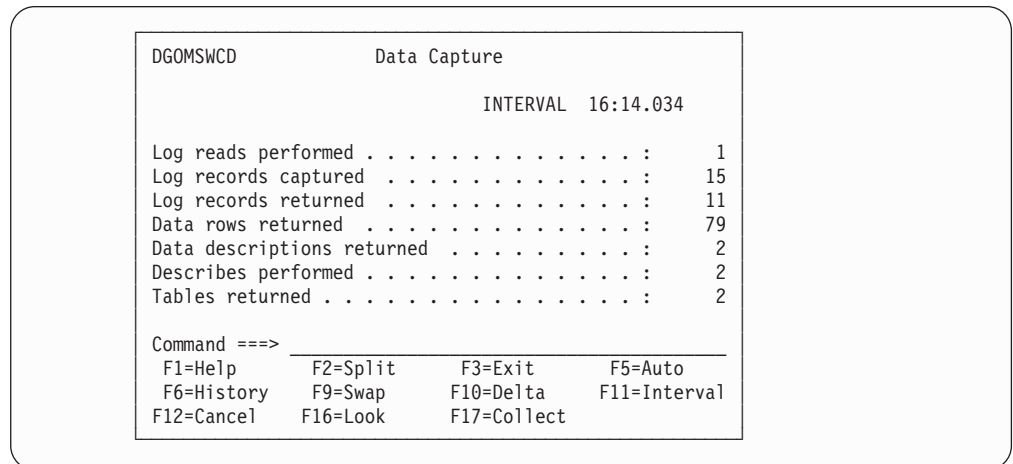


Figure 104. Data Capture Window

The following list describes the fields shown on this window:

Log reads performed

The total number of data capture log reads for processing IFI READS requests for IFCID 185.

Log records captured

The number of log records retrieved for which data capture processing was invoked.

Log records returned

The total number of data capture log records returned.

Data rows returned

The total number of data capture data rows returned.

Data descriptions returned

The total number of data capture data descriptions returned.

Describes performed

The total number of data capture describes performed.

A data capture describe is the process of getting descriptive information about a DB2 table from the catalog.

Tables returned

The total number of data capture tables returned to the caller of an IFI READS call for IFCID 185.

Data Sharing Locking Activity Window

Use the Data Sharing Locking Activity window to view statistical information on data sharing locking activity for the DB2 subsystem.

To display this window, select *Data Sharing Locking Activity* from the DB2 Statistics Detail panel. This selection is only available if the monitored DB2 subsystem is part of a data sharing group.

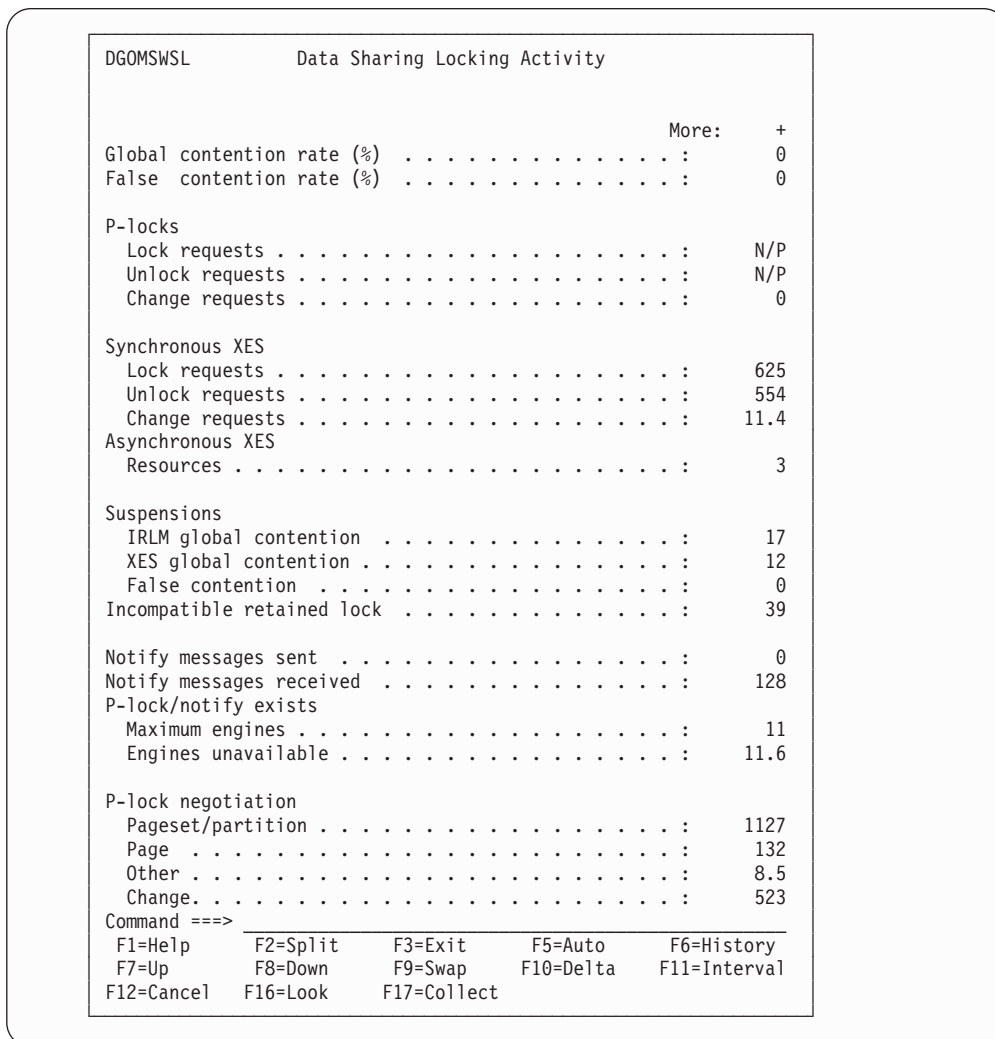


Figure 105. Data Sharing Locking Activity Window

A logical lock (L-lock) is a lock used by transactions to control intra-DB2 and inter-DB2 data concurrency between transactions. A physical lock (P-lock) is a lock used only by data sharing and is acquired by DB2 to provide consistency on data cached in different DB2 subsystems. P-locks are owned by the subsystem, not by the transaction. XES is the Cross System Extended Services component of MVS. For more information on locking in a data sharing environment, see the *IBM DB2 Universal Database Server for OS/390 Version 6 Data Sharing: Planning and Administration* manual.

The following list describes the fields shown on this window:

Global contention rate (%)

The total number of suspends because of contention, divided by the total number of requests that went to XES (excluding asynchronous requests), multiplied by 100.

False contention rate (%)

The number of false contentions, divided by the total number of contentions, multiplied by 100. A false contention is where two different locks on different resources hash to the same lock entry.

P-locks - Lock requests

The number of lock requests for P-locks.

P-locks - Unlock requests

The number of unlock requests for P-locks.

P-locks - Change requests

The number of change requests for P-locks.

Synchronous XES - Lock requests

The number of lock requests propagated to MVS XES synchronously.

Synchronous XES - Unlock requests

The number of resources synchronously propagated to MVS XES by unlock requests.

Synchronous XES - Change requests

The number of change requests propagated to MVS XES synchronously.

Asynchronous XES - Resources

The number of resources propagated to MVS XES asynchronously by IRLM.

Suspensions - IRLM global contention

The number of suspensions due to IRLM global contention. IRLM lock states were in conflict.

Suspensions - XES global contention

The number of suspensions due to MVS XES global contention. MVS XES lock states were in conflict, but IRLM was not.

Suspensions - False contention

The number of suspensions due to false contention. This happens when different resource names hash to the same entry in the Coupling Facility Lock Table. This causes MVS XES to detect contention on the hash class. However, when MVS XES determines that there is no real conflict on the resource, the contention is called false.

Incompatible retained lock

The number of global lock or change requests rejected or suspended due to an incompatible retained lock.

Notify messages sent

The number of notify messages sent.

Notify messages received

The number of notify messages received.

P-lock/notify exits - Maximum engines

The maximum number of engines available for P-lock exit or notify exit requests.

P-lock/notify exits - Engines unavailable

The number of times an engine is not available for P-lock exit or notify exit requests.

P-lock negotiation - Pageset/partition

The number of times this DB2 was driven to negotiate a pageset or partition P-lock due to changing inter-DB2 interest levels on the pageset or partition.

P-lock negotiation - Page

The number of times this DB2 was driven to negotiate a page P-lock due to inter-DB2 P-lock contention.

DB2 Statistics

P-lock negotiation - Other

The number of times this DB2 was driven to negotiate another P-lock type (other than pageset/partition or page).

P-lock negotiation - Change

The number of times a P-lock change request was issued during P-lock negotiation.

Group Buffer Pools Activity Window

Use the Group Buffer Pools Activity window to view all group buffer pools used by the DB2 subsystem. If there are many group buffer pools listed, you can use the scrolling keys **F7** (Up) and **F8** (Down) to browse the list.

```
DGOMSWGB          Group Buffer Pools Activity          ROW 1 TO 1 OF 1

For additional details, type any character next to Group Buffer Pool
ID, then press Enter.

  Group Buffer      ----- Synchronous Read (XI) -----
  Pool ID          Data Returned      No data returned
-  GBP0            0                      0
-  TOTAL           0                      0
--- End of Group buffer pool list ---

Command ==>
F1=Help      F2=Split      F3=Exit      F5=Auto      F6=History
F7=Up        F8=Down       F9=Swap      F10=Delta    F11=Interval
F12=Cancel   F16=Look      F17=Collect
```

Figure 106. Group Buffer Pools Activity Window

You can select any group buffer pool ID listed on this window to display the Group Buffer Pool Detail window, where you can view read and write activity both to and from that particular group buffer pool, or select *Total* to view read and write activity on all of the listed group buffer pools combined.

Group Buffer Pool Detail Window

Use the Group Buffer Pool Detail window to view statistics on the group buffer pool selected from the Group Buffer Pools Activity window. These statistics show read and write activity both to and from that buffer pool. If *Total* was selected from the Group Buffer Pools Activity window, the Group Buffer Pool Detail window shows combined statistics on all the group buffer pools used by the thread.

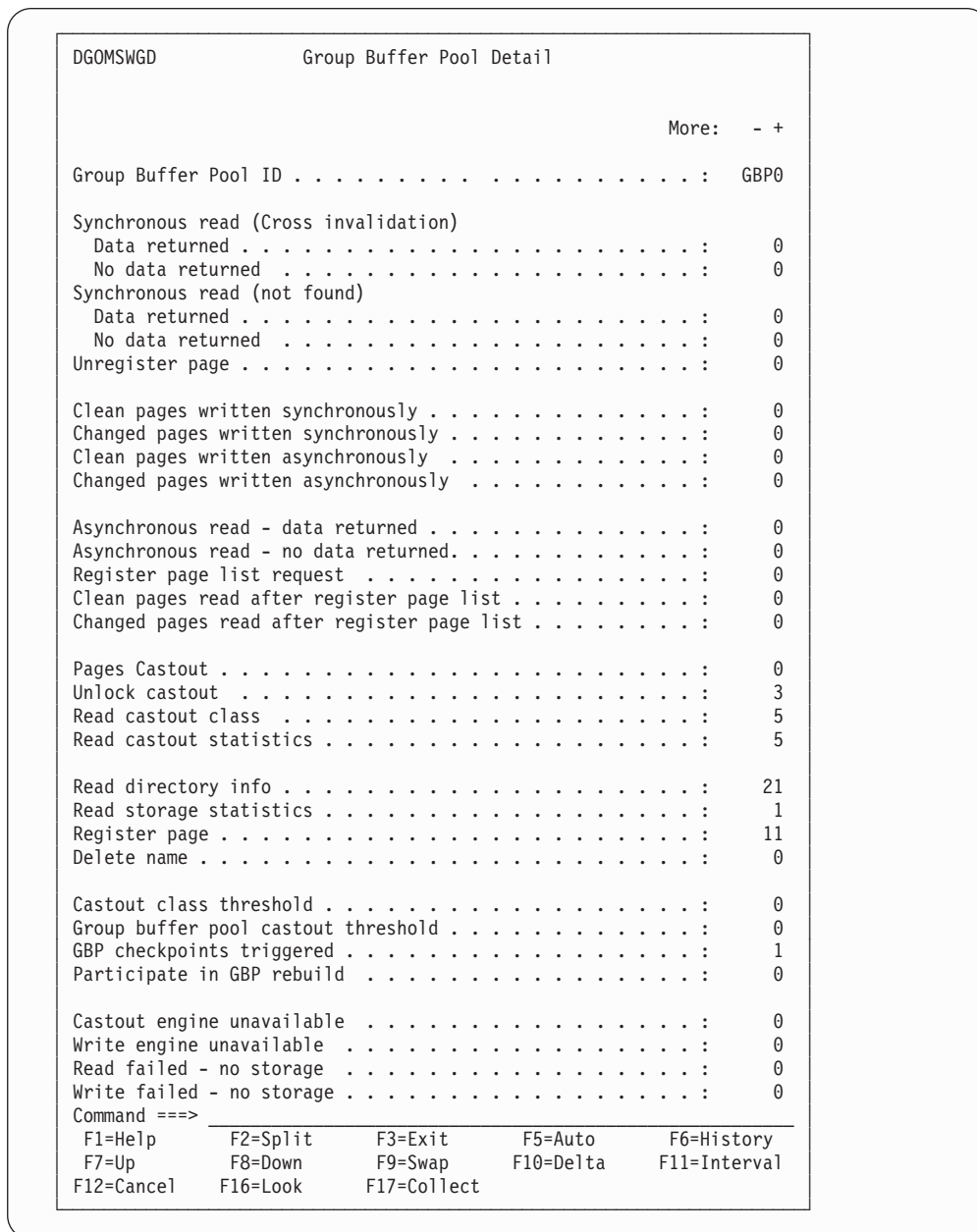


Figure 107. Group Buffer Pool Detail Window

The following list describes the fields shown on this window:

Synchronous read (Cross invalidation) - Data returned

The number of synchronous coupling facility read requests caused by the page in the member's buffer pool that is marked *invalid*. Data is returned from the group buffer pool.

Synchronous read (Cross invalidation) - No data returned

The number of synchronous coupling facility read requests caused by the page in the member's buffer pool that is marked *invalid*. Data is not returned from the group buffer pool but from DASD.

Synchronous read (not found) - Data returned

The number of synchronous coupling facility read requests necessary because the requested page was not found in the buffer pool. Data was returned from the coupling facility.

Synchronous read (not found) - No data returned

The number of synchronous coupling facility read requests necessary because the requested page was not found in the buffer pool. Data is not returned from the group buffer pool but from DASD.

Unregister page

The number of times DB2 unregistered interest to the group buffer pool for a single page. This is generally done by DB2 when it steals pages from the local buffer pool that belong to group buffer pool dependent page sets or partitions.

Clean pages - Written asynchronously

The number of clean pages asynchronously written from the member's virtual pool to the group buffer pool. If a buffer pool threshold is reached, pages can be forced out before the application commits. This can also happen when P-lock negotiation forces the pages on the vertical deferred write queue to be written to the group buffer pool.

Asynchronous read - Data returned

The number of coupling facility reads for prefetch, in which data was returned from the coupling facility.

Asynchronous read - No data returned

The number of coupling facility reads for prefetch, in which data was not returned from the coupling facility, and a coupling facility directory entry was created, if it did not already exist.

Pages Castout

The number of pages cast out from the group buffer pool to DASD.

Unlock castout

The number of times DB2 issued an unlock request to the coupling facility for castout I/Os that have completed. When pages are in the process of being cast out to DASD, they are locked for castout in the coupling facility. The castout lock is not an IRLM lock. Its purpose is to enforce that only one system can cast out a given page at a time.

Read castout class

The number of requests made to the group buffer pool to determine which pages belonging to a given page set or partition are cached in the group buffer pool as changed pages and therefore need not be cast out.

The read castout class request is issued by the page set or partition castout owner and also by the group buffer pool structure owner when the GBPOOLT threshold has been reached.

Read castout statistics

The number of requests issued by the group buffer pool structure owner when the GBPOOLT threshold has been reached. These requests are to determine which castout classes have changed pages. Read castout statistics requests are usually issued only once or twice for each occurrence of the GBPOOLT threshold.

Read directory info

The number of requests (issued by the group buffer pool structure owner) for group buffer pool checkpoints to read the directory entries of all changed

pages in the group buffer pool, so that the oldest recovery LRSN (Log Record Sequence Number, displayed in message DSNB7981) can be recorded and used for recovery purposes in case the group buffer pool fails. Read directory information requests may have to be issued several times for each group buffer pool checkpoint in order to read the directory entries for all changed pages.

Read storage statistics

The number of times DB2 requested statistics information from the group buffer pool. Usually this number should be relatively low. Requests for statistics information are issued once per group buffer pool checkpoint by the group buffer pool structure owner. They are also issued for DISPLAY GROUPBUFFERPOOL GDETAIL requests and to record IFCID 254.

Register page

The number of times DB2 registered interest to the group buffer pool for a single page. These are register-only requests, which means that DB2 does not request that data is returned for the page. DB2 knows that there is no data cached in the group buffer pool for this page. The only purpose of the register page request is to create a directory entry for the page for cross-invalidation when downgrading the P-lock on a page set or partition from S mode to IS mode, or from SIX mode to IX mode.

Delete name

The number of times DB2 issued a request to the group buffer pool to delete directory and data entries associated with a given page set or partition. DB2 issues this request when it converts a page set or partition from group buffer pool dependent to not group buffer pool dependent, and also for GBPCACHE ALL objects when the first DB2 member opens the object.

Read failed - no storage

The number of coupling facility read requests that could not complete due to a lack of coupling facility storage resources. If the value of this counter is constantly high, consider increasing the group buffer pool size.

Write failed - no storage

The number of coupling facility write requests that could not complete due to a lack of coupling facility storage resources. If the value of this counter is constantly high, consider increasing the group buffer pool size.

Global Group Buffer Pool Statistics Window

Use the Global Group Buffer Pool Statistics window to view various information on the number of coupling facility read requests for the group buffer pools. While the Group Buffer Pools Activity and the Group Buffer Pool Detail windows (see Figure 106 on page 166 and Figure 107 on page 167) display statistics on the group buffer pool usage of the currently monitored subsystem, the Global Group Buffer Pool Statistics window and the associated Global GBP Statistics Detail window provide information on the group buffer pool usage across the whole data sharing group. If there are many group buffer pools listed, you can use the scrolling keys **F7** (Up) and **F8** (Down) to browse the list.

To display this window, select *Global Group Buffer Pool Statistics* from the DB2 Statistics Detail panel. This selection is only available if the monitored DB2 subsystem is part of a data sharing group.

```
DGOMSWBC      Global Group Buffer Pool Statistics

For additional details, type any character next to Group Buffer Pool
ID, then press Enter.

  Group Buffer                               Read miss
  Pool ID      Read hit                      directory hit
-   GBP0              0                          0
-   GBP7             200                          0
-   GBP32K7         311                          0
-   Total           511                          0
--- End of Group Buffer Pool List ---

Command ==> _____
F1=Help      F2=Split      F3=Exit      F5=Auto      F6=History
F7=Up        F8=Down        F9=Swap      F10=Delta    F11=Interval
F12=Cancel   F16=Look       F17=Collect
```

Figure 108. Global Group Buffer Pool Statistics Window

You can select any group buffer pool listed on this window to display the Global GBP Statistics Detail window, where you can view more information on the buffer pool in greater detail.

Global GBP Statistics Detail Window

Use the Global GBP Statistics Detail window to view statistics on coupling facility activity for the group buffer pool selected from the Global Group Buffer Pool Statistics window.

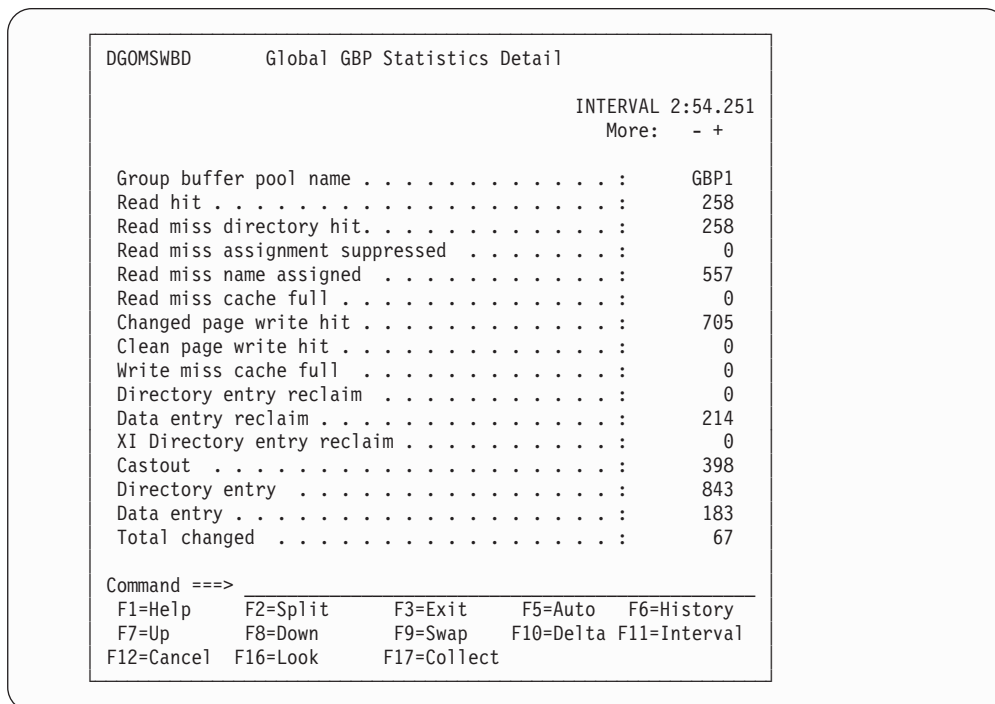


Figure 109. Global GBP Statistics Detail Window

The following list describes some of the fields shown on this window:

Read miss assignment suppressed

The number of coupling facility read requests for a page, in which data was not returned, where the page name was not assigned in the coupling facility directory, and where directory name assignment is suppressed.

DB2 requests suppression of the directory entry assignment in cases where it does not have to register the page to coupling facility for cross invalidation (XI). This is the case when DB2 is the only one in the group with read/write interest in the pageset or partition.

Read miss name assigned

The number of coupling facility read requests for a page, in which data was not returned, where the page name was not assigned in the coupling facility directory, but a directory entry was successfully assigned to the new name.

Read miss cache full

The number of coupling facility read requests for a page, in which the page name was not assigned to a coupling facility directory entry and where name assignment could not complete due to a lack of coupling facility storage resources.

Stored Procedures Window

Use the Stored Procedures window to view activity on calls made to stored procedures.

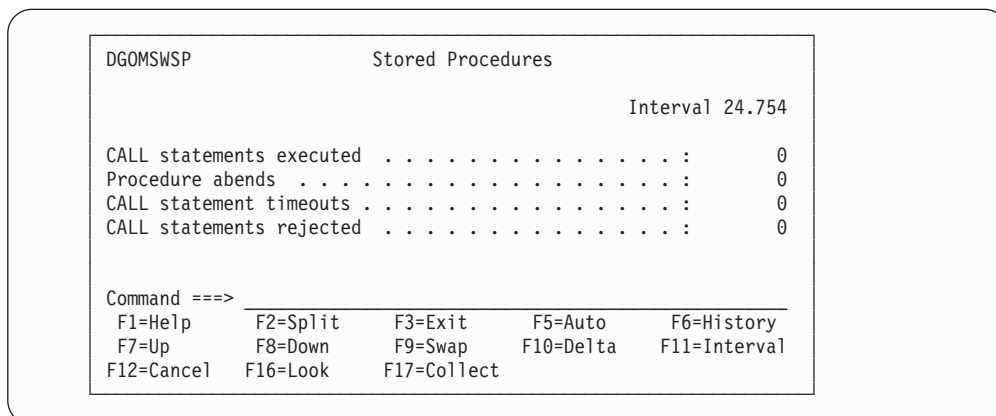


Figure 110. Stored Procedures Window

The following list describes the fields shown on this window:

CALL statements executed

The number of SQL CALL statements executed.

Procedure abends

The number of times a called stored procedure terminated abnormally.

CALL statement timeouts

The number of times an SQL CALL statement timed out while waiting to be scheduled.

CALL statements rejected

The number of times an SQL CALL statement was rejected due to the procedure being in the STOP ACTION (REJECT) state.

Statistics Commands

The following commands apply to statistics panels. You can type the commands on any statistics panel command line, or invoke them using the function keys. A list of active function keys is displayed at the bottom of each panel.

You can abbreviate commands down to three characters in length. For example, the AUTO command can be abbreviated to AUT.

AUTO Command

Use the AUTO command to refresh values displayed on panels without having to press **Enter**. When you activate auto-display mode, the displayed values are updated periodically, as specified by the AUTO command. You cannot perform any other tasks with your Online Monitor session while auto display-mode is running.

The command syntax is:



Figure 111. Syntax of the AUTO Command

Parameter Descriptions

The AUTO command accepts the following parameters:

integer	Optional. Specifies the auto-display interval. The valid ranges are: <ul style="list-style-type: none"> • 1 to 7 200 seconds • 1 to 120 minutes.
SECONDS	Optional. Specifies the auto-display unit in seconds. If no unit is specified, the default is seconds. If this parameter is specified, <i>integer</i> should also be specified.
MINUTES	Optional. Specifies the auto-display unit in minutes. If this parameter is specified, <i>integer</i> should also be specified.

If no parameters are specified, the values on the Auto Display window are used.

Starting Auto Display Mode

To start auto display mode, type AUTO (or one of its abbreviations) followed by any parameters on the command line and press **Enter**.

Note: The AUTO command can be abbreviated to AUT, the SECONDS to S, and the MINUTES to M.

To stop auto display, press the attention key.

Note: While the Online Monitor is executing a DB2 call (IFI or SQL), pressing the attention key might not stop the auto-display mode. An 'A' is displayed every time the key is pressed until attention processing is available again. For example, this is the case when the Online Monitor is issuing SQL statements to resolve names of locked resources.

AUTO Command Examples

- AUTO 5 refreshes the panel with updated values every 5 seconds
- AUTO 1 MIN refreshes the panel with updated values every minute
- AUTO 10 refreshes the panel with updated values every 10 seconds
- AUTO uses the values specified on the Auto Display window.

DELTA Command

Use the DELTA command to view subsystem-wide DB2 statistics activity between the times that you press **Enter**.

The command syntax is:



```
▶—DELTA—◀
```

Figure 112. Syntax of the DELTA Command

Selecting Delta Processing

To select delta processing mode, type DELTA (or one of its abbreviations) on the command line and press **Enter**.

Each time you press **Enter**, the displayed values are updated to reflect the system activity which occurred since the previous display update. If auto-display mode is active, the values are updated on each auto-display interval.

When DELTA is active, the DELTA time is displayed on the message line.

To return to regular mode, issue the RESET command.

Note: The DELTA command can be used in any truncated form beginning with a minimum of DEL.

INTERVAL Command

Use the INTERVAL command to view an accumulation of statistics data from a specified point in time.

The command syntax is:



```
▶—INTERVAL—◀
```

Figure 113. Syntax of the INTERVAL Command

Selecting Interval Processing

To select interval processing mode, type INTERVAL (or one of its abbreviations) on the command line and press **Enter**.

When you invoke interval mode, the time of the current display is used as a base point for further displays. Each time you press **Enter** to update the display in interval mode, the statistics data is accumulated from that base point. If the auto display function is active, the values are updated automatically from the base point with each auto-display cycle.

When INTERVAL is active, the interval elapsed time is displayed on the message line.

To return to regular mode, issue the RESET command.

Note: The INTERVAL command can be used in any truncated form beginning with a minimum of INT.

RESET Command

Use RESET to deactivate delta or interval processing mode and revert back to regular display mode.

The command syntax is:



Figure 114. Syntax of the RESET Command

Resetting the Processing Mode

To deactivate delta or interval processing mode and revert back to regular display mode, type RESET (or one of its abbreviations) on the command line and press **Enter**.

Note: The RESET command can be used in any truncated form beginning with a minimum of RES.

HISTORY Command

Use the HISTORY command to view past data that was previously collected by the data collector. The data is gathered at installation-defined intervals. The date and time on the panels supporting history indicate when the data being displayed was collected.

You can only view past data if the data collector is active for the subsystem you are monitoring and if it was started with the parameter HISTORY=YES. Refer to “Chapter 14. Data Collector Purpose and Function” on page 233 for information about the data collector.

The command syntax is:

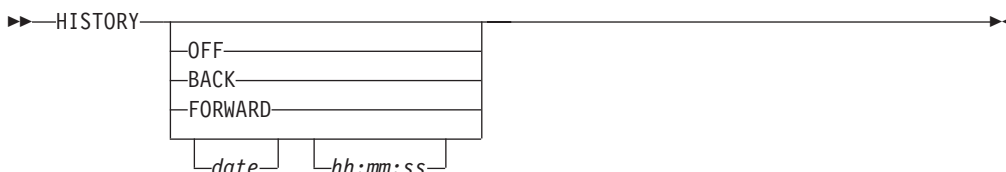


Figure 115. Syntax of the HISTORY Command

Note that the defined ISPF national format is used for the date and time format.

Parameter Descriptions

The HISTORY command accepts the following parameters:

- OFF** Returns the display to the current time.
- BACK** Displays data for the previous interval. If no more data is available, data from the earliest available interval is displayed.

DB2 Statistics

FORWARD	Displays information for the next available interval. If there are no further stored records, data from the current time is displayed and processing continues as if history were 'OFF'.
date	The date of the required information. If no date is specified, today's date is assumed.
hh:mm:ss	The time of the required information. If no time is specified, the time defaults to that of the earliest available history record for the specified date. The seconds do not need to be specified.

If there is no data available for the specified date and time, the next available record is displayed.

If you do not specify any parameters, the History window is displayed (refer to Figure 22). The current system date and time are the defaults for the History window.

Viewing Past Data

To view past data, type HISTORY (or one of its abbreviations) followed by any parameters on the command line and press **Enter**.

Note: The HISTORY command can be used in any truncated form beginning with a minimum of HIS.

History and Statistics Processing Modes

History can be active simultaneously with either interval or delta processing mode.

Delta processing helps isolate DB2 statistics activity taking place between user-specified points in time. When History is invoked, the delta is the time between the currently displayed statistical data and the data requested by the HISTORY command. The two sets of statistics records are checked to determine which is the oldest in order to avoid the calculation of negative DELTA values.

Interval processing helps isolate DB2 statistics activity beginning at a certain point in time. When History is invoked, the interval is the time between the first statistics data encountered after the INTERVAL command and the statistics data requested by the HISTORY command. The two sets of statistics records are checked to determine which is the oldest in order to avoid the calculation of negative INTERVAL values.

Chapter 9. Monitoring the Access Path—Explain

Tuning DB2

This chapter identifies and describes the specific DB2 data which is reported for the purpose of tuning DB2. For general tuning advice on DB2, refer to the DB2 Administration Guide 'Performance, Monitoring, and Tuning' chapters for the specific release of DB2.

Online Monitor explain provides a real-time analysis of the access path methods chosen by DB2 for a given SQL statement. You can also modify the SQL statement text and reexplain it. This provides you with the ability to tune a DB2 subsystem while you are online.

This chapter describes how to select the SQL statement you want to explain from within the Online Monitor or from within an ISPF/PDF editor, the authorization required to use explain, performance considerations, tuning advice, and the DB2 Explain Output panel.

Online Monitor explain is based on DB2's SQL explain function. However, it translates the more important PLAN_TABLE codes into full English sentences, so you need not know the values and columns of the PLAN_TABLE. In addition, it provides direct access to related catalog information, that is, the catalog statistics of the tables and indexes used in the SQL statement.

Authorizations Required to Use Explain

Product-Sensitive Programming Interface

To explain an SQL statement, you should have DB2 EXECUTE privilege on the DB2 PM explain plan defined at installation. The default name of this plan is DGOPMEX.

The following DB2 PLAN_TABLE privileges might also be required:

- Explain an entry in a plan table.
You require DB2 SELECT privilege on the PLAN_TABLE.
- Explain an SQL statement from a previously bound plan or package.
You require DB2 SELECT privilege on the plan or package owner's PLAN_TABLE. If you do not have the above privilege, a dynamic explain of the statement is performed if you have UPDATE privilege on your own PLAN_TABLE.
- Explain an SQL statement entered on the panel.
You require DB2 UPDATE privilege on your own PLAN_TABLE.
- Explain an SQL statement from a thread activity window.
You require DB2 SELECT privilege on the plan or package owner's PLAN_TABLE. If you do not have the above privilege, a dynamic explain of the statement is performed if you have UPDATE privilege on your own PLAN_TABLE.
- CREATE or ALTER a plan table.

Explain

You require a minimum of CREATETAB authority on the database that the PLAN_TABLE is created in, or ALTER authority to modify the PLAN_TABLE.

└─ **End of Product-Sensitive Programming Interface** _____

Performance Considerations

└─ **Product-Sensitive Programming Interface** _____

The performance of a DB2 PM Batch explain execution directly depends on the functions and the processing options specified. The number of accesses to the DB2 system catalog is the most important factor. The following catalog tables are nonindexed:

- SYSIBM.SYSSTMT
- SYSIBM.SYSDBRM.

One approach is to create user-defined indexes on the catalog tables:

- Two indexes for SYSIBM.SYSSTMT: one on the columns PLCREATOR, PLNAME, NAME, and STMTNO and one on the columns PLNAME, SEQNO, STMTNO, and SECTNO
- One index for SYSIBM.SYSDBRM: on the columns PLCREATOR, PLNAME, and NAME.

Note, however, that in addition to the usual costs of indexes (for more information, refer to the *IBM DB2 Universal Database Server for OS/390 Version 6 Administration Guide*) you might experience a performance overhead in an environment with frequent DDL and static bind activity.

Another way to achieve better performance is to create copies of these catalog tables and add indexes to these copies. A sample member, DGOYCOPY, which creates such copies, is provided in SDGOSAMP. However, DB2 does not automatically update the copied tables. To obtain up-to-date DB2 PM explain information, copy the data from the DB2 catalog tables to your tables on a daily basis. For this procedure, another sample member, DGOYRSQL, is provided in SDGOSAMP. This member can be modified as required by your installation.

The execution time to explain a plan or package depends on the number of rows in the accessed PLAN_TABLE. If the table has many rows, you can improve performance by creating an index on PROGNAME, QUERYNO. Alternatively, delete unnecessary rows from your PLAN_TABLE.

For further information on performance considerations, see also the *DB2 PM Program Directory*.

└─ **End of Product-Sensitive Programming Interface** _____

What to Look for in the EXPLAIN Information

Product-Sensitive Programming Interface

When an SQL statement is being explained, it is very important that the explaining takes place on the production DB2 subsystem, or at least on a DB2 subsystem where the catalog statistics have been updated to reflect the real production system, for example, in terms of table size, available indexes, and other key values. Online Monitor explain lets you specify the “current server” on which explain is to be executed. This option makes it possible that you are connected to a DB2 test subsystem while you execute the explain on the remote production system.

Following are some examples of explain information that can be useful in determining why an application does not achieve the expected performance:

- **Access path chosen**

Table space scans and nonmatching index scans should be avoided unless you intend to access all rows in a given table or the table is very small. If the table has one or more indexes, try to reconstruct the SQL statement in such a way that DB2 chooses a better access path. If there is no index, consider creating one.

- **Index Only Access**

When selecting a few column values only, you should consider the possibility of including these few columns in the column list of one of the indexes. In this way, all requested data can be found in the index. The access path message informs you if you succeed in doing so. Likewise, if you are selecting a maximum value, you might consider building a descending index on that column (or ascending index, if the minimum value is requested). In this way, you can even avoid scanning of leaf pages in the index structure.

- **Clustering versus clustered**

Make sure that if a clustering index has been chosen by DB2, the actual index is clustered. On the Index Information window, if the clustered value is NO, or if the cluster ratio is less than 95%, the table space might need a reorganization in order to bring the data rows into clustering sequence.

- **Number of matching columns**

On the Plan Table Data panel, if DB2 has selected a matching index scan, you should verify on the Index Information window that the number of columns used in the index is what you expect.

- **Active pages versus pages with rows**

Verify that the number of pages with rows is about the same as active pages, especially if you are performing table space scans. In other words, the value shown in the *Percentage of pages used* field on the Table Information window should be as close as possible to 100 percent.

- **Number of tables per tablespace**

On the Table Space Information window, you should monitor the *Tables* field. This field shows the number of tables located in the tablespace. If the access path is “Tablespace scan” and the tablespace is not segmented, it is recommended that there be only one table in the tablespace. In a nonsegmented tablespace, all tables are scanned, not only the selected table.

- **Host variable definitions versus column definitions**

An inconsistent definition of host variables shown on the Host Variable Definition window, compared to the corresponding column definitions shown on the Key Column Selection window, can indicate an inefficient access path selection,

Upgrade PLAN_TABLE

If a plan table exists but does not match your current version of DB2, the Upgrade Plan Table window is displayed. Use this window to confirm that the table definition be upgraded to match your current version of DB2.

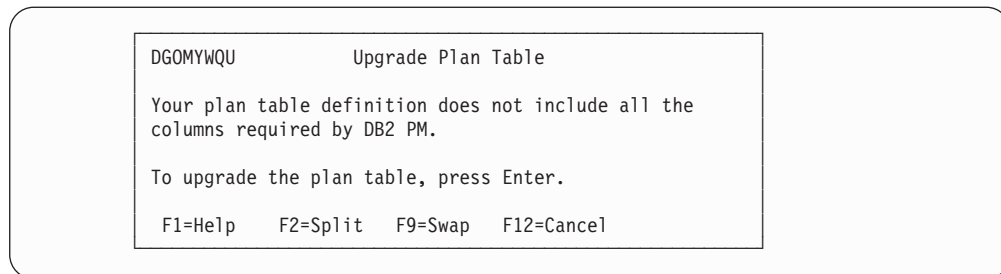


Figure 117. Upgrade Plan Table Window

Explain an SQL Statement

You can explain an SQL statement by:

- Entering the EXPLAIN command or pressing **F18** (Explain) on any thread diagnosis panel or either the SQL Statement and Package window or SQL Statement and DBRM window.
The current SQL statement is then explained.
- Selecting option 10 (*Explain*) from the DB2 PM Online Monitor Main Menu.
The Explain Menu is displayed, where you can select one of four options for explaining an SQL statement.
- Marking a range of lines to be explained from within an ISPF/PDF editor and issuing the EXPLAIN command from the editor command line.
Refer to “Source Explain” on page 194 for more information.

The SQL statement is then explained and the result displayed on the DB2 Explain Output panel.

Figure 118 shows the flow of the explain process.

Explain

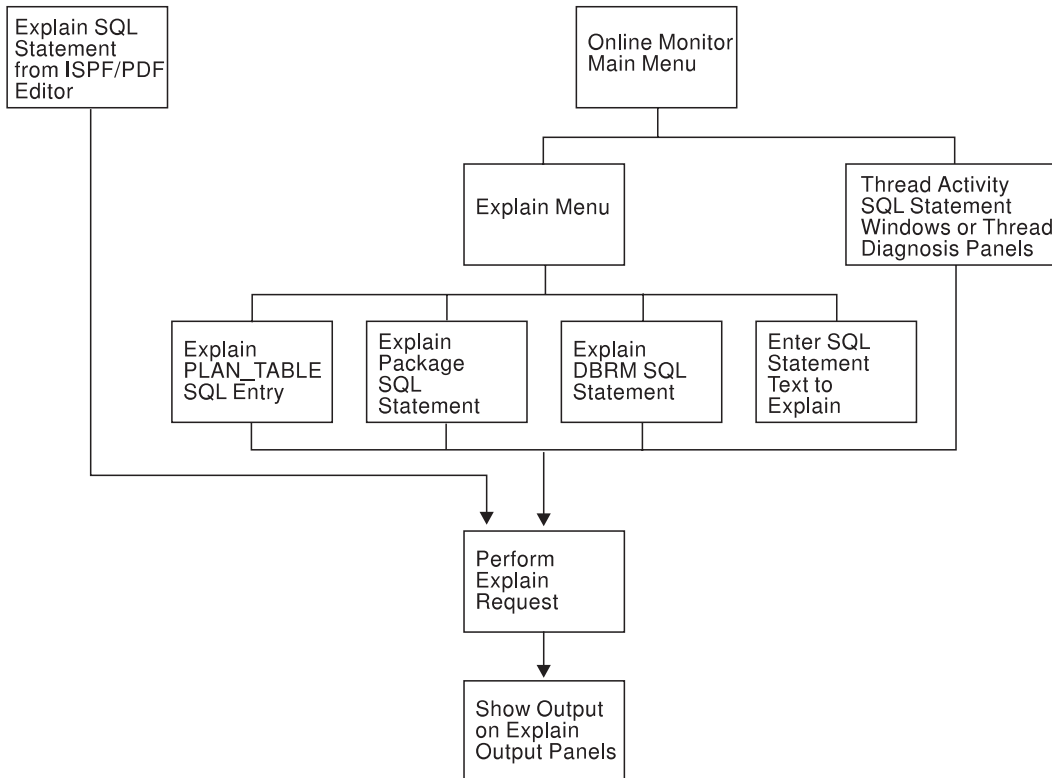


Figure 118. Flow of Explain Process

Explaining an SQL Statement from Thread Activity

You can explain an SQL statement from any thread diagnosis panel or the following thread activity windows:

- SQL Statement and Package
- SQL Statement and DBRM.

Note: If the Thread Detail panel has been customized to show the SQL statement text, the EXPLAIN command can also be used from the Thread Detail panel.

To access explain from these windows, type EXPLAIN on the command line and press **Enter**, or press **F18** (Explain). The SQL statement shown on the thread activity panel is then explained. For more information about the EXPLAIN command, refer to “Online Monitor EXPLAIN Command” on page 194.

If explain executed successfully, the DB2 Explain Output panel is displayed. For more information about the DB2 Explain Output panel, refer to “Explain Output” on page 192.

Selecting Explain from the Online Monitor Main Menu

You can access explain by selecting option 10 (*Explain*) from the DB2 PM Online Monitor Main Menu. Refer to Figure 1 on page 4 for an example of the Online Monitor main menu.

The Explain Menu is displayed, where you can select one of four methods for specifying the SQL statement you want explained.

Explaining an SQL Statement from an ISPF/PDF Editor

You can explain an SQL statement that is imbedded in a source program or SPUFI input from an ISPF/PDF editor. To do this, specify a range of source lines to explain using the **E** line prefix command, then type **EXPLAIN** on the command line and press **Enter**. Any valid SQL statements within the specified range can then be selected from a list for explain processing. For more information about source explain, refer to “Source Explain” on page 194.

If explain executed successfully, the DB2 Explain Output panel is displayed. For more information about the DB2 Explain Output panel, refer to “Explain Output” on page 192.

Explain Menu

Use the Explain Menu to specify the DB2 subsystem where the explain request is to be performed (optional), a different SQL authorization ID for qualifying the unqualified tables in the statements being explained, and to select an option for explaining an SQL statement. To display the Explain Menu, select option 10 (*Explain*) from the DB2 PM Online Monitor Main Menu.

```

DGOMYPMN                                Explain Menu
Local Location . . . . . : PM01DLOC          DSN1  V6
Current Server . . . . . : PM01DLOC          DSN1  V6

Change current server if required, then select one of the following.

- 1. Explain an existing entry in the plan table
  2. Explain a package's SQL statement
  3. Explain a DBRM's SQL statement
  4. Enter an SQL statement to be explained

Current Server . . . . . PM01DLOC
Current SQLID . . . . . _____

Command ==> _____
F1=Help      F2=Split  F3=Exit  F9=Swap  F12=Cretriev F13=Help
F14=Split    F15=Exit  F21=Swap F24=Cancel
    
```

Figure 119. Explain Menu

Use the *Current server* input field to specify the DB2 subsystem where you want the explain request to be performed. This field makes it possible that you are connected to a DB2 test subsystem while you execute the explain on the remote production system. This field defaults to the local location.

Use the *Current SQLID* field to specify a different SQL authorization ID for qualifying the unqualified tables in the SQL statements being explained. The *Current SQLID* field is also used to qualify the plan table to be accessed. If this field is not specified, it defaults to your user ID.

Explain

Whenever package or DBRM SQL statements are explained, the package or plan qualifier is used to qualify unqualified SQL statements. The package or plan owner is used to qualify the plan table.

From this window, you can select one of the following options:

1. **Explain an existing entry in the plan table**
Select this option to display the Plan Table Entry window, where you can interpret an existing entry in your plan table, or in another user's plan table if you have the required DB2 authority.
2. **Explain a package's SQL statement**
Select this option to display the Package SQL Statement window, where you can explain an SQL statement for a previously bound package.
3. **Explain a DBRM's SQL statement**
Select this option to display the DBRM SQL Statement window, where you can explain an SQL statement for a previously bound plan.
4. **Enter an SQL statement to be explained**
Select this option to display the SQL Text Entry window, where you can explain a dynamic SQL statement. After you have specified the query number, the SQL Text Edit panel is displayed, where you can enter and explain a dynamic SQL statement.

Use these options, and related windows, to select the SQL statement you want to explain. The SQL statement is then explained, and the result displayed on the DB2 Explain Output panel.

Explain Existing Entry in Plan Table

Use the Plan Table Entry window to explain an entry in your plan table, or if you have the required DB2 authority, an entry in another user's plan table. Regardless of the user specified, a DB2 plan table needs to exist for that user.

To display this window, select option 1 from the Explain Menu.

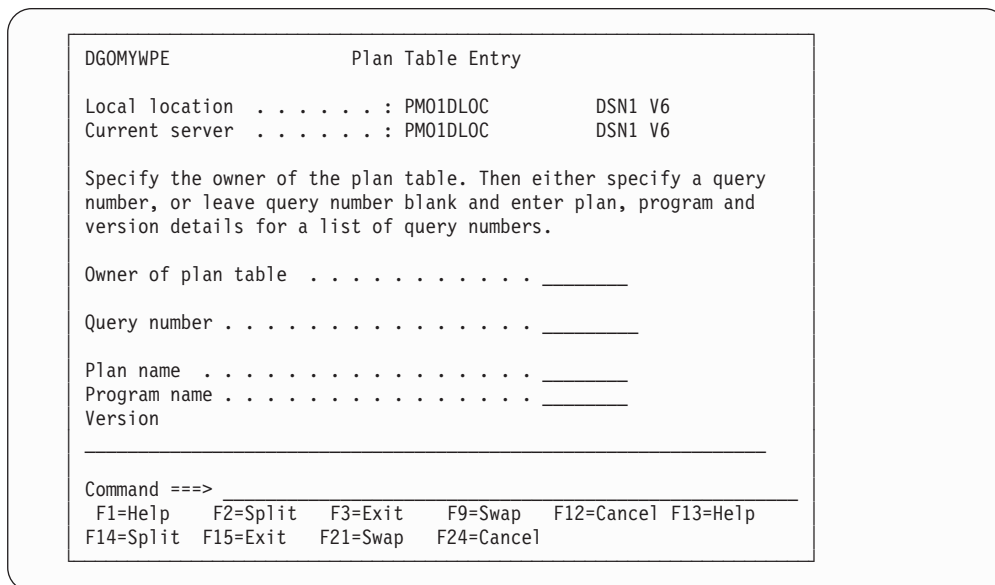


Figure 120. Plan Table Entry Window

Enter a user ID in the *Owner of plan table* field, or leave this field blank to specify your own plan table. Then specify the query number of the plan table entry you want to explain.

If the *Query number* field is left blank, then all entries matching the plan name, program name, and version you specified are listed. Leaving any of these criteria fields blank defaults to an asterisk (*), which matches all entries. The Plan Table Entry List panel is then displayed listing all the matching entries in the plan table.

After selecting an entry in a plan table, the entry is processed and the result is shown on the DB2 Explain Output panel.

Plan Table Entry List Panel

Use the Plan Table Entry List panel to select an entry from the list of entries belonging to the plan table. If there are many table entries listed, you can use the scrolling keys **F7** (Up) and **F8** (Down) to browse the list.

Explain

```
DGOMYWPL          Plan Table Entry List          ROW 1 TO 2 OF 2

Local location . . . . . : PM01DLOC          DSN1 V6
Current server . . . . . : PM01DLOC          DSN1 V6

Table . . . . . : USERT003.PLAN_TABLE

  Query  Plan      Program                      Timestamp
  Version
-   1    LOCEXP1   LOCEXP1COL.LOCEXP          01/16/99 16:13:10.00
  DSN8610.PACKAGE.VERSION1
-   3    LOCEXP3   LOCEXP3COL.LOCEXP3        01/17/99 14:47:12.30
  DSN8610.PACKAGE.VERSION1
***** BOTTOM OF DATA *****

Command ==>
F1=Help    F2=Split  F3=Exit   F7=Up     F8=Down   F9=Swap
F12=Cancel F16=Look  F17=Collect
```

Figure 121. Plan Table Entry List Panel

After making a selection, the entry is processed and the result is shown on the DB2 Explain Output panel.

Explain an SQL Statement of a Package

Use the Package SQL Statement window to explain an SQL statement of a previously bound package.

To display this window, select option 2 from the Explain Menu.

```
DGOMYWKS          Package SQL Statement

Collection identifier . . . . . _____
Package name . . . . . _____
Version
DSN8610.PACKAGE.VERSION1

Command ==>
F1=Help    F2=Split  F3=Exit   F9=Swap   F12=Cancel
F16=Look  F17=Collect
```

Figure 122. Package SQL Statement Window

To explain an SQL statement from this window, type the collection identifier, package name, and version into the appropriate fields and press **Enter**. Wildcards are accepted in these fields. The fields can also be left blank. If any of these fields are left blank, they default to an asterisk (*). The Package Version List panel is then displayed, where you can select a package from a list of all the matching packages.

Package Version List Panel

The Package Version List panel displays a list of packages matching the fields specified on the Package SQL Statement window. If there are many packages listed, you can use the scrolling keys **F7** (Up) and **F8** (Down) to browse the list.

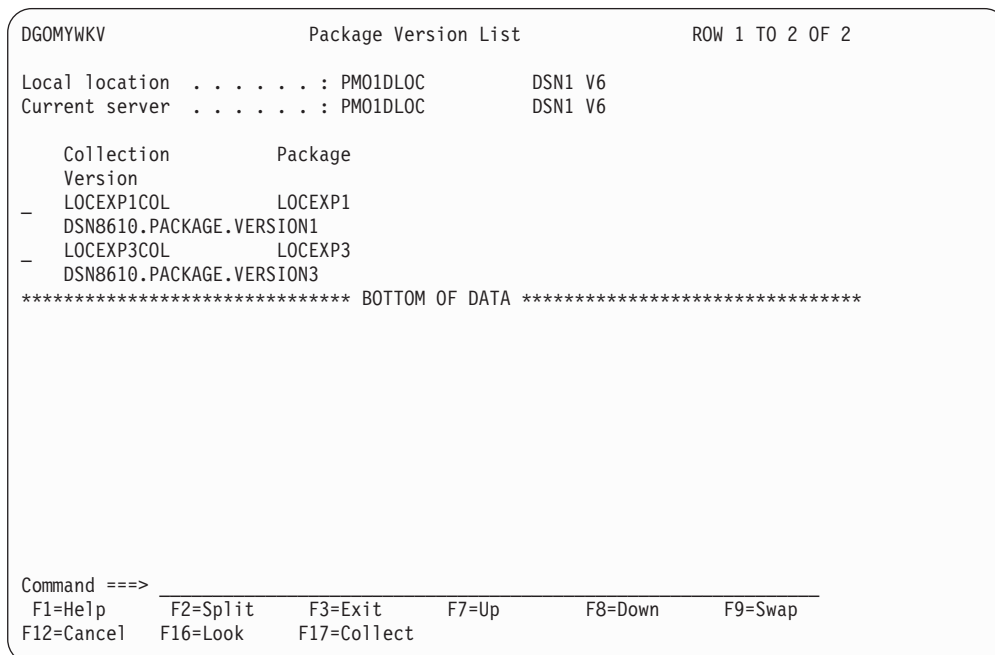


Figure 123. Package Version List Panel

From this window, you can select a package to display the SQL Statement List panel, where you can examine a list of SQL statements belonging to the package.

SQL Statement List Panel (Packages)

The SQL Statement List panel displays a list of SQL statements for the selected package, showing the statement number and the first 118 characters of the SQL statement text for each item listed. If there are many SQL statements listed, you can use the scrolling keys **F7** (Up) and **F8** (Down) to browse the list.

Explain

```
DGOMYWKQ          SQL Statement List          ROW 1 TO 1 OF 1

Local location . . . . . : PM01DL0C          DSN1 V6
Current server . . . . . : PM01DL0C          DSN1 V6

Collection . . . . . : LOCEXP1COL          Package . . . : LOCEXP1
Version
DSN8610.PACKAGE.VERSION1

          Statement  SQL Text
-----
          1  SELECT EMPNO, LASTNAME, WORKDEPT, BIRTHDATE FRO
M DSN8610.EMP WHERE (EMPNO BETWEEN '000170' AND '000190' AND WORKDEPT IN (
          23  SELECT LASTNAME WHERE EMPNO =:EMPLOYEE_NUMBER
*****
***** BOTTOM OF DATA *****

Command ==>
F1=Help      F2=Split    F3=Exit     F7=Up       F8=Down     F9=Swap
F12=Cancel   F16=Look    F17=Collect
```

Figure 124. SQL Statement List Panel

From this window, you can select the SQL statement to be explained. The SQL statement is then processed and the result is shown on the DB2 Explain Output panel.

Explain an SQL Statement of a DBRM

Use the DBRM SQL Statement window to explain an SQL statement of a previously bound plan.

To display this window, select option 3 from the Explain Menu.

```
DGOMYWDS          DBRM SQL Statement

DBRM name . . . . . : _____
Plan name . . . . . : _____

Command ==>
F1=Help      F2=Split    F3=Exit     F9=Swap
F12=Cancel   F16=Look    F17=Collect
```

Figure 125. DBRM SQL Statement Window

To explain an SQL statement from this window, type the DBRM name and plan name into the appropriate fields and press **Enter**. Wildcards are accepted in these fields. The fields can also be left blank. If any of these fields are left blank, they default to an asterisk (*). The DBRM and Plan List panel is then displayed, where you can select a DBRM from a list of all the matching DBRMs and plans.

DBRM and Plan List Panel

The DBRM and Plan List panel displays a list of DBRMs and plans matching the fields specified on the DBRM SQL Statement window. If there are many items listed, you can use the scrolling keys **F7** (Up) and **F8** (Down) to browse the list.

```

DGOMYWDL                                DBRM and Plan List                                ROW 1 TO 2 OF 2

Local location . . . . . : PM01DLOC                DSN1 V6
Current server . . . . . : PM01DLOC                DSN1 V6

      DBRM          Plan name
_   LOEXP1COL      LOEXP1
_   LOEXP3COL      LOEXP3
***** BOTTOM OF DATA *****

Command ==>
F1=Help      F2=Split    F3=Exit     F7=Up       F8=Down     F9=Swap
F12=Cancel   F16=Look     F17=Collect
  
```

Figure 126. DBRM and Plan List Panel

From this window, you can select any DBRM listed to display the SQL Statement List panel, where you can examine a list of SQL statements belonging to the DBRM.

SQL Statement List Panel (DBRMs)

The SQL Statement List panel displays a list of SQL statements for the selected DBRM. This window shows the statement number and the first 118 characters of the SQL statement text for each item listed. If there are many SQL statements listed, you can use the scrolling keys **F7** (Up) and **F8** (Down) to browse the list.

Explain

```
DGOMYWDQ                SQL Statement List                ROW 1 TO 1 OF 1

Local location . . . . . : PM01DLOC                DSN1 V6
Current server . . . . . : PM01DLOC                DSN1 V6

DBRM . : LOCEXP1    Plan Name . . . . . : LOCEXP1

          Statement  SQL Text
-----
          1  SELECT EMPNO, LASTNAME, WORKDEPT, BIRTHDATE FRO
M DSN8610.EMP WHERE (EMPNO BETWEEN '000170' AND '000190' AND WORKDEPT IN (
          23  SELECT LASTNAME WHERE EMPNO =:EMPLOYEE_NUMBER
***** BOTTOM OF DATA *****

Command ==>
F1=Help      F2=Split    F3=Exit     F7=Up       F8=Down     F9=Swap
F12=Cancel   F16=Look    F17=Collect
```

Figure 127. SQL Statement List Panel

From this window, you can select an SQL statement to be explained. The SQL statement is then processed and the result is shown on the DB2 Explain Output panel.

Explain Dynamic SQL Statement

Use the SQL Text Entry window and its associated SQL Text Edit panel to enter an SQL statement to be explained.

To display this window, select option 4 from the Explain Menu.

```
DGOMYWES                SQL Text Entry

Enter query number if desired, then press Enter to display the SQL
Text Edit panel.

Query number . . . . . 999735912

_ Set current degree to ANY

F1=Help      F2=Split    F9=Swap     F12=Cancel
```

Figure 128. SQL Text Entry Window

From this window, enter the query number you want to assign to the SQL statement. The query number identifies in the plan table the SQL statement that you are entering. If no query number is specified, it defaults to 999735912.

Explain

The *Set current degree to ANY* field specifies whether the SQL statement is eligible for query parallelism. If you enter a slash (/) in this field, the current degree of parallelism is set to ANY. Otherwise, the current degree of parallelism is set to 1.

After you press **Enter**, the Edit SQL Text panel is displayed, where you can enter the SQL statement text you want to explain.

SQL Text Edit Panel

Use this panel to view or modify the full text of an SQL statement for purposes of online tuning, or to create an SQL statement to be explained.

This panel is displayed by pressing **Enter** on the SQL Text Entry window, or by selecting the *SQL Text* field from the DB2 Explain Output panel.

```
EDIT ---- SYS90269.T082218.RA000.V$AI16.R0000028 ----- COLUMNS 001 072
***** ***** TOP OF DATA *****
000001 SELECT EMPNO, LASTNAME, WORKDEPT, BIRTHDATE FROM DSN8230.EMP WHERE
000002 (EMPNO BETWEEN '000170' AND '000190' AND WORKDEPT IN ('D01', 'E21')) OR
000003 (EMPNO = '00100' AND (WORKDEPT = (SELECT MIN (DEPTNO) FROM DSN8230.DEPT
000004 WHERE MGRNO = '000050'))
000005
000006
000007
000008
000009
000010
000011
000012
000013
000014
000015

COMMAND ==> _____ SCROLL ==> CSR
F1=HELP      F2=SPLIT    F3=END      F4=RETURN   F5=RFIND   F6=RCHANGE
F7=UP        F8=DOWN     F9=SWAP     F10=LEFT    F11=RIGHT  F12=RETRIEVE
***** ***** BOTTOM OF DATA *****
```

Figure 129. SQL Text Edit Panel

From this panel, you can enter a new (or modify an existing) SQL statement in order to assess the impact on access path selection. The statement can be adjusted and then explained again to dynamically assess the impact.

You can enter SQL text that exceeds the display depth by using the scrolling keys **F7** (Up) and **F8** (Down).

To process and explain the entered SQL text, press **F3** (Exit). The DB2 Explain Output panel is displayed with a message indicating that the statement was dynamically explained.

To ignore the changes and return to the previous panel, press **F12** (Cancel).

Explain Output

The DB2 Explain Output panel and catalog table windows can be used to investigate the access path methods of an explained SQL statement. Information regarding packages, DBRMs, table spaces, tables, indices, and column attributes can also be viewed.

DB2 Explain Output Panel

└─ **Diagnosis, Modification, or Tuning Information** ───────────────────

Use the DB2 Explain Output panel to examine the results of an explain request.

When an SQL statement has been chosen for explanation, the following processing depends on the origin of the statement:

Explain existing entry in the plan table

The specified PLAN_TABLE entry is shown as a result of the explain request.

Explain a package's SQL statement

The plan table of the package owner is searched to check whether the SQL statement has been explained during BIND. If the search is successful, this PLAN_TABLE entry is taken. If the search is not successful, a dynamic explain is performed, that is, SQL EXPLAIN is invoked for the statement. Then the result of this explain is displayed.

Explain a DBRM's SQL statement

The plan table of the DBRM owner is searched to check whether the SQL statement has been explained during BIND. If the search is successful, this PLAN_TABLE entry is taken. If the search is not successful, a dynamic explain is performed, that is, SQL EXPLAIN is invoked for the statement. Then the result of this explain is displayed.

SQL statement to be explained has been entered

A dynamic explain is performed, that is, SQL EXPLAIN is invoked for the statement, and the result is displayed.

SQL statement is modified in DB2 Explain Output panel

A dynamic explain is performed, that is, SQL EXPLAIN is invoked for the modified statement and the new result is displayed.

Only the DB2 Explain Output panel for packages (DGOMYPKM) is shown in this section.

```

DGOMYPKM                DB2 Explain Output                More - +

Local location . . . . . : PM01DLOC                DSN1 V6
Current server . . . . . : PM01DLOC                DSN1 V6

_ Package . . . . . : LOCEXP1COL.LOCEXP1
Version
DSN8610_PACKAGE_VERSION1
Explain executed at . . . . : 13:10:52 04/16/99

----- SQL Text -----
_ SELECT EMPNO, LASTNAME, WORKDEPT, BIRTHDATE FROM DSN8410.EMP WHERE
  (EMPNO BETWEEN '000170' AND '000190' AND WORKDEPT IN ('D01', 'E21')) OR
Status   : Compiled-REOPT specified. Rebound at exec.time using values
Isolation: Cursor stability

_ Host variable definitions

----- Access path summary for query block 1 step 1 -----
Multiple index access path has been chosen
Intersection of indexes XEMP1 and XEMP2
Union of multiple indexes XEMP1 and above combination
PREFETCH table space scan through a page list will be performed
Lock mode is Share Lock at page level
Page range scan will not be used

_ Table DSN8610 EMP
_ Index DSN8610 XEMP1
_ Index DSN8610 XEMP2

_ PLAN_TABLE details for step

----- Access path summary for query block 1 step 2 -----
Command ==>
F1=Help      F2=Split    F3=Exit     F7=Up       F8=Down     F9=Swap
F12=Cancel  F16=Look   F17=Collect

```

Figure 130. DB2 Explain Output Panel (Packages)

The DB2 Explain Output panel is divided into three main sections.

The first section of the panel shows the plan name, and information about the package or DBRM containing the SQL statement. You can select this section for further investigation of the package, DBRM, or plan name associated with the SQL statement.

The second section of the panel titled *SQL Text* shows the first 150 characters of the SQL statement text. You can view or modify the full SQL statement text by selecting the input field shown beside the SQL text. The SQL Text Edit panel is then displayed. For more information on the SQL Text Edit panel, refer to “SQL Text Edit Panel” on page 191. After the SQL text is modified, the SQL statement is reexplained, and the new result is shown on the DB2 Explain Output panel. From this section you can also access windows providing information on the host variable definitions.

The third section of the panel shows information on the access path methods chosen by DB2 for each of the individual query blocks and steps required to execute the SQL statement. Each step also shows a list of the tables and indexes accessed for that step. You can select any table or index listed in a step for further investigation. You can also display the raw PLAN_TABLE data for a step.

Explain

If the execution of the SQL statement contains many steps, you can use the scrolling keys **F7** (Up) and **F8** (Down) to browse through the steps.

└─ **End of Diagnosis, Modification, or Tuning Information** ───────────────────

Online Monitor EXPLAIN Command

Use the EXPLAIN command to explain the currently executing SQL statement on any thread diagnosis panel or on the following thread activity panels:

- SQL Statement and Package
- SQL Statement and DBRM.

Note: If the Thread Detail panel has been modified to show the SQL statement text, the EXPLAIN command can be used from the Thread Detail panel as well.

If the explain request was successful, the DB2 Explain Output panel is displayed.

The command syntax is:

▶─ EXPLAIN ───▶

Figure 131. Syntax of the EXPLAIN Command

Note: The EXPLAIN command can be used in any truncated form beginning with a minimum of EXP.

For a description of the DB2 Explain Output panel, refer to “Explain Output” on page 192.

Source Explain

You use DB2 PM source explain to explain SQL statements that are embedded in a source program or SPUFI input. Source explain is performed from within the ISPF/PDF editor. The supported languages are:

- Assembler
- C/370(TM)
- COBOL
- FORTRAN
- PL/I
- SPUFI.

Note: Before you activate source explain, make sure that the DB2 load library is allocated to your TSO ISPF session.

To explain an SQL statement while editing a source program (or SPUFI input), you specify the lines you want explained using the ISPF/PDF editor line prefix command **E**, then you type EXPLAIN on the command line and press **Enter**. Ensure that source explain has been installed at your site.

The **E** line prefix command can be used as follows:

E To explain a single line, you type E in the prefix area of the line to be scanned for SQL statements.

- EE** To explain a range of lines, you type EE in the prefix area of the first and last lines of the range to be scanned for SQL statements.
- E[n]** To explain a specific number of lines, type E[n] on the first line of the area to scan, where *n* is the number of lines to be scanned for SQL statements.

When you enter the EXPLAIN command, source explain scans the specified range for valid SQL statements. If a range is not specified, the entire source is scanned. Note that an SQL statement is processed even if the SQL statement text exceeds the specified range.

Figure 132 is an example of how to explain an SQL statement while editing COBOL source code. To explain a range of source from line 3040 to 3160, type EE in the line prefix area of lines 3040 and 3160 as shown in Figure 132. Type EXPLAIN on the command line and press **Enter** to explain the SQL statements within the specified range of lines.

```

EDIT ---- SYS1.DSN610.SDSNSAMP(DSN8BC3) - 01.00 ----- COLUMNS 001 072
003010      *** CURSOR LISTS ALL EMPLOYEE NAMES WITH A PATTERN (%) OR (_)
003020      *** FOR LAST NAME
003030
EE3040          EXEC SQL DECLARE TELE2 CURSOR FOR
003050              SELECT *
003060              FROM   VPHONE
003070              WHERE  LASTNAME LIKE :LNAME-WORK
003080              AND   FIRSTNAME LIKE :FNAME-WORK
003090          END-EXEC.
003100
003110      *** CURSOR LISTS ALL EMPLOYEES WITH A SPECIFIC
003120      *** LAST NAME
003130
003140          EXEC SQL DECLARE TELE3 CURSOR FOR
003150              SELECT *
EE3160              FROM   VPHONE
003170              WHERE  LASTNAME = :LNAME
003180              AND   FIRSTNAME LIKE :FNAME-WORK
003190          END-EXEC.
003200      /
003210      /*****
003220      * FIELDS SENT TO MESSAGE ROUTINE
003230      *****/
003240          01 MAJOR          PIC X(07) VALUE 'DSN8BC3'.
003250
003260          01 MSGCODE        PIC X(4).
COMMAND ==> explain
F1=HELP  F2=SPLIT  F3=END    F4=RETURN  F5=RFIND  F6=RCHANGE  SCROLL ==> CSR
F7=UP    F8=DOWN   F9=SWAP   F10=LEFT  F11=RIGHT F12=RETRIEVE

```

Figure 132. Source Explain Example

If the *Always display this window* field has been selected, the Source Explain Options window is displayed. Otherwise, the SQL Statement Selection window is displayed.

Source Explain Options Window

You can display this window from the ISPF/PDF editor in one of the following ways:

- By typing EXPLAIN OPTIONS on the command line and pressing **Enter**
- By typing EXPLAIN on the command line and pressing **Enter** after the *Always display this window* field is selected

Explain

- From the SQL Statement Selection panel by typing **OPTIONS** on the command line and pressing **Enter**.

You use the Source Explain Options window (Figure 133) to specify the source explain processing options, such as the language of the source code you are editing, the subsystem ID of the explaining DB2, the SQLID to be used, and the degree of parallelism.

```
DGOMYWSO          Source Explain Options

Update fields as required then press Enter

Local DB2 Subsystem . . . . . ____
Current Server Location . . . . . _____
Current SQLID . . . . . _____
Query number . . . . . _____
Set current degree to ANY
/ Always display this window
Define source language . . . . . _ 1. Assembler
                                         2. C/370
                                         3. COBOL
                                         4. FORTRAN
                                         5. PL/I
                                         6. SPUFI

F1=Help      F2=Split    F3=Exit     F9=Swap
F12=Cretriev F13=Help    F14=Split   F15=Exit
F21=Swap     F24=Cancel
```

Figure 133. Source Explain Options Window

The fields shown on the Source Explain Options window are:

Local DB2 Subsystem

The local DB2 subsystem to which you want to connect.

Current Server Location

The DB2 subsystem where you want the source SQL statements to be explained. This field makes it possible that you are connected to a DB2 test subsystem, while you execute the explain on the remote production system. If this field is left blank, it defaults to the local DB2 subsystem.

Current SQLID

A different SQL authorization ID for qualifying the unqualified tables in the SQL statements being explained. A different SQL authorization ID is also used to qualify the plan table to be accessed. If this field is not specified, it defaults to your user ID.

Query number

A number that identifies the explain statement. If left blank, the value 999735912 is assigned to this field.

Set current degree to ANY

To specify whether the SQL statement is eligible for query parallelism. If you enter a slash (/) in this field, the current degree of parallelism is set to ANY. Otherwise, the current degree of parallelism is set to 1.

Always display this window

To control the display of the Source Explain Options window. If you enter a slash (/) in this field, the Source Explain Options window is displayed on

each source explain request. If the field is blank, the Source Explain Options window is not displayed on each source explain request.

Define source language

The language of the source containing the SQL statements. This field cannot be left blank.

After specifying the required information, press **Enter** to proceed to the SQL Statement Selection panel.

SQL Statement Selection Panel

You use this window to view a summarized list of the valid SQL statements within the specified source area. If there are many SQL statements listed, you can use the scrolling keys **F7** (Up) and **F8** (Down) to browse the list.

```

DGOMYWSS                SQL Statement Selection                ROW 1 TO 2 OF 2

This panel summarizes the SQL statements found in the following source
module that can be explained.
                        SYS1.DSN610.SDSNSAMP(DSN8BC3)

Select an SQL statement then press Enter to process.

Source
Line No  SQL Statement Text
--      003040  DECLARE TELE2 CURSOR FOR SELECT * FROM VPHONE WHERE LASTNAM
--      003140  DECLARE TELE3 CURSOR FOR SELECT * FROM VPHONE
-- End of List --

Command ==>>
F1=Help      F2=Split    F3=Exit     F7=Backward F8=Forward  F9=Swap
F12=Creativ F13=Help   F14=Split   F15=Exit    F19=Backward F20=Forward
F21=Swap     F24=Cancel
    
```

Figure 134. SQL Statement Selection Panel

You can select any SQL statement listed on this window for explain processing. The selected SQL statement is then processed and the Online Monitor is accessed, where you can view the explain output on the DB2 Explain Output panel. Refer to “Explain Output” on page 192 for more information.

You can use the **OPTIONS** command to access the Source Explain Options window from the SQL Statement Selection panel, where you can change various source explain processing options. To do this, enter **OPTIONS** on the command line and press **Enter**. This command is only available on the SQL Statement Selection panel.

Source EXPLAIN Command

You use the **EXPLAIN** command to explain an SQL statement from within an ISPF/PDF editor, or to specify source explain options.

Explain

The command syntax is:

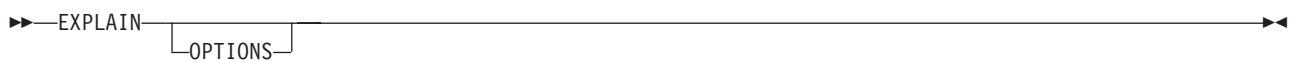


Figure 135. Syntax of the Source EXPLAIN Command

All lines within the specified source area are scanned for valid SQL statements which are then listed on the SQL Statement Selection panel. If no lines are marked, the entire source is scanned. You can then select any SQL statement from the SQL Statement Selection panel for explain processing.

If you specify OPTIONS or if the *Always display this window* field is selected, the Source Explain Options window is displayed before the SQL Statement Selection panel, where you can specify processing options such as the language of the source code you are editing, the subsystem ID of the explaining DB2, the SQLID to be used, and the degree of parallelism.

Chapter 10. Viewing System Parameters

All system parameter fields up to and including DB2 V5 are supported by thread activity display. To view new fields introduced with DB2 V6, use DB2 Visual Explain.

Use the system parameters panels to view current DSNZPARM and buffer pool values for the DB2 subsystem to which you are currently connected. The system parameters values specified at subsystem startup time and current buffer pool values are shown. The information displayed on these panels is similar to that presented by the Batch system parameters report set.

DB2 System Parameters Detail Panel

Use the DB2 System Parameters Detail panel to view a summary of important DSNZPARM values, maximum concurrent users, and IRLM thresholds. Use the scrolling keys **F7** (Up) and **F8** (Down) to view all the information on the DB2 System Parameters Detail panel.

To display the DB2 System Parameters Detail window, select option 3 (*Display System Parameters*) from the DB2 PM Online Monitor Main Menu.

Figure 136 shows the DB2 System Parameters Detail panel (DGOMZPSM).

System Parameters

```

DGOMZPSM                DB2 System Parameters Detail
For details, type any character next to heading, then press Enter.

PMO1DLOC                DSN1 V5    GROUP001 MEMBER01                More:  - +
- Virtual and Hiperpool Buffer Sizes
- Storage Sizes and Connections
- Operator and DDF Functions
- Tracing, Data Installation and Pseudo-Close
- Start SMF Accounting . . . . . : 1,2,3
- Start SMF Statistics . . . . . : 1,3
- Start Monitor trace . . . . . : NO
- Checkpoint frequency . . . . . : 1,000
- Locking (IRLM)
- Maximum locks per table space . . . . . : 1,000
- Maximum locks per user . . . . . : 10,000
- Resource timeout (seconds) . . . . . : 60
- Subsystem name . . . . . : NRLM
- Active Log
- Write threshold . . . . . : 20
- Input buffer size (KB) . . . . . : 28
- Output buffer size (KB) . . . . . : 400
- Archive Log
- Number of copies . . . . . : 1
- Quiesce period (seconds) . . . . . : 5
- Protection and Data Definition
- Stored Procedures
- Group Buffer Pools
- Data Sharing Parameters
- Data Sharing enabled . . . . . : YES
- Application Programming Defaults
- Other Parameters
- Maximum open data sets (DSMAX) . . . . . : 400
- Asynchronous drain start (%DSMAX) . . . . . : 1
- Asynchronous drain stop (%DSMAX) . . . . . : 3

Command ==>
F1=Help      F2=Split    F3=Exit     F6=History  F7=Up       F8=Down
F9=Swap      F12=Cancel  F16=Look    F17=Collect

```

Figure 136. DB2 System Parameters Detail Panel

Note: The DB2 System Parameters Detail panel you see may have been tailored by your installation and consequently may not necessarily match the panel examples shown in this book.

From the DB2 System Parameters Detail panel, you can access a set of windows providing system parameters information in greater detail. To access a window, type any character in the space provided beside the desired heading.

Several windows can be accessed simultaneously by selecting multiple fields on the DB2 System Parameters Detail panel. To leave the current window and proceed with the next window, press **F3** (Exit). To cancel all windows and return to the DB2 System Parameters Detail panel, press **F12** (Cancel).

System Parameters Commands

The following command applies to system parameters panels. You can type the command on any system parameters panel command line, or invoke it using the appropriate function key. A list of active function keys is displayed at the bottom of each panel.

You can abbreviate commands down to three characters in length. For example, the HISTORY command can be abbreviated to HIS.

HISTORY Command

Use the HISTORY command to view past data that was previously collected by the data collector. The data is gathered at installation-defined intervals. The date and time on the panels supporting history indicate when the data being displayed was collected.

You can only view past data if the data collector is active for the subsystem you are monitoring and if it was started with the parameter HISTORY=YES. Refer to “Chapter 14. Data Collector Purpose and Function” on page 233 for information about the data collector.

The command syntax is:

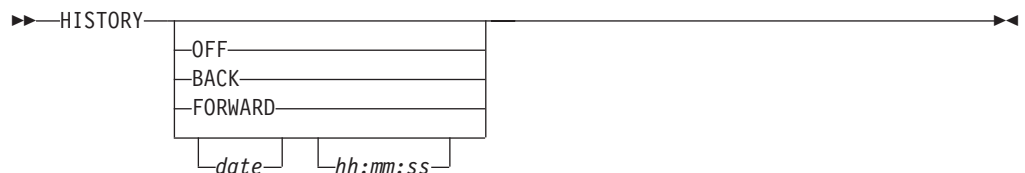


Figure 137. Syntax of the HISTORY Command

Note that the defined ISPF national format is used for the date and time format.

Parameter Descriptions

The HISTORY command accepts the following parameters:

- OFF** Returns the display to the current time.
- BACK** Displays data for the previous interval. If no more data is available, data from the earliest available interval is displayed.
- FORWARD** Displays information for the next available interval. If there are no further stored records, data from the current time is displayed and processing continues as if history were 'OFF'.
- date** The date of the required information. If no date is specified, today's date is assumed.
- hh:mm:ss** The time of the required information. If no time is specified, the time defaults to that of the earliest available history record for the specified date. The seconds do not need to be specified.

If there is no data available for the specified date and time, the next available record is displayed.

If you do not specify any parameters, the History window is displayed (refer to Figure 22). The current system date and time are the defaults for the History window.

System Parameters

Viewing Past Data

To view past data, type HISTORY (or one of its abbreviations) followed by any parameters on the command line and press **Enter**.

Note: The HISTORY command can be used in any truncated form beginning with a minimum of HIS.

Chapter 11. Problem Identification Examples

This chapter gives examples of how to discover and identify various system problems by using exception processing, viewing past data, analyzing the access paths chosen by DB2 to process an SQL statement, and viewing thread activity and statistics panels.

Example of Exception Processing

This example demonstrates how you can use exception processing to discover a possible class 2 CPU (processing) time problem, and identify the cause by viewing past data and analyzing the access paths chosen by DB2 to process an SQL statement. The data collector needs to be installed at your site to view past data.

First, you should set the exception threshold for class 2 CPU time to a value applicable to your environment. To do this, select option 9 (*IRF - Maintain parameter data sets*) from the DB2 PM Online Monitor Main Menu. This displays the Data Set Maintenance Menu.

```
DGOPMENU                Data Set Maintenance Menu

Select one of the following.

1  1. Maintain exception thresholds
   2. Maintain correlation translations
   3. Maintain time zone information
   4. Maintain MAINPACK definitions

Exception data set
'SAMPLE.EXCEPT.DATASET'

DPMPARMS data set
_____

Command ==> _____
F1=Help    F2=Split    F3=Exit    F6=History  F9=Swap    F12=Cancel
F17=Collect
```

Figure 138. Data Set Maintenance Menu

Ensure that you have specified an exception threshold data set name in the *Exception data set* field. Select option 1 (*Maintain exception thresholds*) to display the Exception Threshold Category Selection panel.

The Exception Threshold Category Selection panel is displayed.

Problem Identification

```
DG0PXDS1      Exception Threshold Category Selection

Select one or more categories, then press Enter.  Overtyping with space to
deselect any category.  Request EXIT when complete.

Category
/ Elapsed, CPU and Waiting Times per Plan Execution
- Elapsed, CPU and Waiting Times per Program Execution
- CPU Times per Address Space
- SQL Statements per Plan Execution
- SQL Statements per Program Execution
- SQL Statements per System
- Subsystem Events per Plan Execution
- Subsystem Events per System
- Locking Activity per Plan Execution
- Locking Activity per System
- RID List Processing per Plan Execution
- RID List Processing per System
- Query Parallelism per Plan Execution
- Query Parallelism per System
- Buffer Pools Activity per Plan Execution
- Buffer Pools Activity per System
- Distributed Activity per Location per Plan Execution

Command ==> _____
F1=Help   F2=Split  F3=Exit   F7=Up     F8=Down   F9=Swap   F12=Cancel
```

Figure 139. Exception Threshold Category Selection Panel

Select the category containing the desired exception field. For this example, select the *Elapsed, CPU and Waiting Times per Plan Execution* field.

The Exception Threshold Field Selection panel is displayed.

```
DG0PXDS2      Exception Threshold Field Selection

Select only one field, then press Enter.  Overtyping with space to
deselect any field.  Request EXIT when complete.

Field category . . : Elapsed, CPU, and Waiting Times per Plan Execution

Field  Description
- ADRECETT Elapsed time in application (Class 1)
- ADCPUT   CPU time in application (Class 1)
- ADDB2ETT Elapsed time in DB2 (Class 2)
/ ADDBCPUT CPU time in DB2 (Class 2)
- ADTWTDB  Total wait time in DB2 (Class 2)
- ADTWTAP  Total wait time in application (Class 1)
- ADTSUST  Total Class 3 suspensions time
- ADTSUSC  Total Class 3 suspensions
- QWACAWTL Lock/latch suspensions time (Class 3)
- ADLLSUSC Lock/latch suspensions (Class 3)
- QWACAWTI Synchronous I/O susp. time (Class 3)
- ADIOSUSC Synchronous I/O suspensions (Class 3)
- QWACAWTR Other read I/O susp. time (Class 3)

Command ==> _____
F1=Help   F2=Split  F3=Exit   F7=Up     F8=Down   F9=Swap   F12=Cancel
```

Figure 140. Exception Threshold Field Selection Panel

This panel displays all available fields within the specified category. Select the *ADDBCPUT* field and press **Enter**.

The Exception Threshold Field Details panel is displayed.

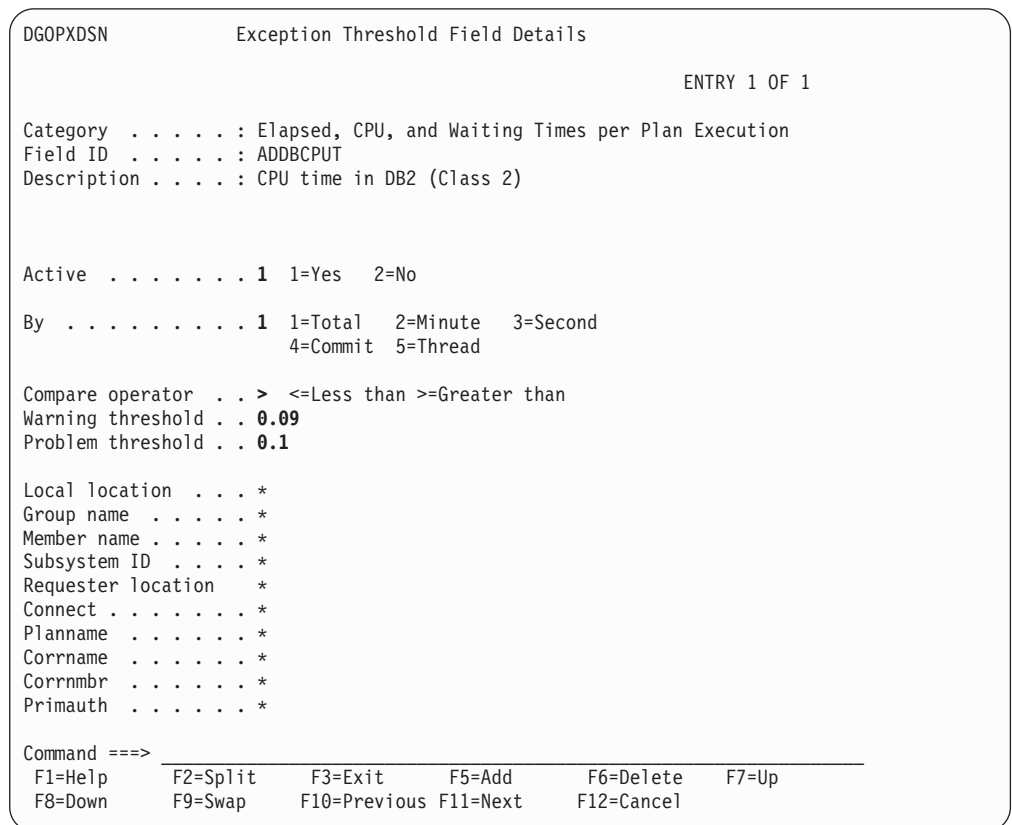


Figure 141. Exception Threshold Field Details Panel

Use the Exception Threshold Field Details panel to specify the threshold criteria for the exception field selected from the Exception Threshold Field Selection panel. For this example, enter a 1 in the *Active* field, set the *By* field to total (1), the *Compare operator* field to a greater-than symbol (>), and the *Problem threshold* field to a value of 0.1 seconds.

Note: You should choose a threshold value that is applicable to your environment. For information on defining exception threshold values, refer to “How to Define Exception Threshold Values” on page 50.

Now that the exception threshold has been defined, select option 5 (*Control Exception Processing*) from the Online Monitor main menu to display the Exception Processor panel.

Problem Identification

```
DGOMEPO2                Exception Processor                PMO1DL0C DSN1 V6

For any field enter any character to activate

Activate/Deactivate Exception Processing
- Display thread summary
- Display thread detail
- Display statistics detail
/ Periodic                _ User Exit
- Exception event notification

Options
Periodic units . . . . . 1      1=Seconds
                                   2=Minutes
Periodic interval . . . . . 10  1-7200 Seconds
                                   1-120 Minutes

> Disable auto-display for problem exceptions
> Sound alarm for exception warnings
_ Log file data set output needed
_ DPMOUT data set output needed

Exception threshold data set
Name . . . . . SAMPLE.EXCEPT.DATASET

Command ==> _____
F1=Help      F2=Split   F3=Exit    F7=Up      F8=Down    F9=Swap
F12=Cancel   F16=Look    F17=Collect
```

Figure 142. Exception Processor Panel

Use the Exception Processor panel to activate periodic exception processing. Enter the exception threshold data set name you specified on the Data Set Maintenance Menu and type a slash (/) in the *Periodic* field to activate periodic exception processing. In this example, the exception processor has been set to check for periodic exceptions every 10 seconds.

For more information on activating exception processing, refer to “How to Start Exception Processing” on page 56.

When a periodic exception occurs, the Online Monitor notifies you by displaying the Exception Notification window. This window is overlaid on the current panel.

```

DGOMTPSM 14:27                               Thread Detail                               PMO1DLOC DSN1 V6
                                                GROUP001 MEMBER01
For details, place any character next to heading, then press Enter.
More: - +

- Thread Identification
  Primauth . . . . . : TFA6
  Planname . . . . . : CICSEMP
  Connection ID . . . : APPCICP3
  Requesting Location: PMO1DLOC
- Current Package . . . . .
- Times
  Class 1 . . . . .
  Class 2 . . . . .
  Class 3 . . . . .
  Class 7 . . . . .
  Class 8 . . . . .
- Locking Activity
  Timeouts . . . . . : 0
  Deadlocks . . . . . : 0
  Suspensions . . . . . : 1
  Lock escalations . . . . . : 0
  Maximum page locks held . . . . . : 9
- Locked Resources
- RID List Processing
- Unsuccessful - any reason . . . . . : 0
- SQL Activity, Commits and Rollbacks
  DML . . . : 4 Commit . . . . . : 0
  DCL . . . : 0 Rollback . . . . . : 0
  DDL . . . : 0 Changes/Commit . . . . . : 0.0
- Buffer Manager Activity
  Getpage requests . . . . . : 60
  Buffer updates . . . . . : 0
  Prefetch reads . . . . . : 1
  Synchronous I/O . . . . . : 0
- SQL Statement and Package . . . . . : EMPSRCH
  Distributed Data
  Requester elapsed time . . . . . : N/P
- IFI (Class 5) and Data Capture
- Query Parallelism Data
- Data Sharing Locking Activity
  Suspensions . . . . . : N/A
- Group Buffer Pools Activity
- Stored Procedures

Command ==>
F1=Help      F2=Split    F3=Exit     F5=Auto     F6=History  F7=Up
F8=Down     F9=Swap     F12=Cancel  F16=Look   F17=Collect F22=Purge
  
```

Figure 143. Exception Notification Window (Overlaid on Thread Detail Panel)

The Exception Notification window indicates that a periodic exception has occurred. You can examine the exception in greater detail using the LOOK command. Type LOOK 1 on any command line and press **Enter** to display the Periodic Exceptions List window.

Problem Identification

```

DGOMLAXP                Periodic Exceptions List          Row 499 to 500 of 500
Periodic Interval started . . . . . : 04/03/99 11:43:26:10
Last Interval . . . . . : 04/03/99 14:27:41:22

   Time      Location      Group  Subsystem  Member  Corrname
   Field     Reqloc        Primauth Planname   Connect Corrnbr
   Descr
-----
- 14:27:41  PM01DLOC      GROUP001 DSN1      MEMBER01 TESTDC6
   'BLANK'   TFA6          CICSEMP  APPCICP3 'BLANK'
ADDBCPUT 0.108004 >          0.1      Problem  Total
CPU TIME IN DB2 (CLASS 2)

***** Bottom of data *****

Command ==>
F1=Help      F2=Split    F3=Exit     F7=Up       F8=Down     F9=Swap
F12=Cancel

```

Figure 144. Periodic Exceptions List Window

From this window you can examine a list containing the last 500 periodic exceptions that have occurred. The most recent exceptions are displayed at the bottom of the list.

In this example the thread causing the exception has ended. However, you can still select the exception to be examined from the list displayed on the Periodic Exceptions List window. If history and data collector are available, the Online Monitor retrieves past data and displays the Thread Detail panel where you can examine the thread causing the exception.

```

DGOMTPSM 14:36                               Thread Detail                               PMO1DLOC DSN1 V6
                                           GROUP001 MEMBER01 HISTORY 99/04/03 14:27:41
For details, place any character next to heading, then press Enter.

- Thread Identification
Primauth . . . . . : TFA6                      Correlation name . . . . . : TESTDC6
Planname . . . . . : CICSEMP                    Connection type . . . . . : CICS
Connection ID . . . : APPCICP3                  Type . . . . . : ALLIED
Requesting Location: PMO1DLOC                  Status . . . . . : DB2
- Current Package . . . . . : EMPSRCH
- Times
Class 1 . . . . . : 1:09:58.64058                Elapsed                CPU
Class 2 . . . . . : 11.563398                    2.381039
Class 3 . . . . . : 6.186118                      0.593096
Class 7 . . . . . : N/P                          N/A
Class 8 . . . . . : N/P                          N/A
- Locking Activity
Timeouts . . . . . : 0
Deadlocks . . . . . : 0
Suspensions . . . . . : 1
Lock escalations . . . . . : 0
Maximum page locks held . . . . . : 9
- Locked Resources
- RID List Processing
Unsuccessful - any reason . . . . . : 0
- SQL Activity, Commits and Rollbacks
DML . . . : 4 Commit . . . . . : 0
DCL . . . : 0 Rollback . . . . . : 0
DDL . . . : 0 Changes/Commit . . . . . : 0.0
- Buffer Manager Activity
Getpage requests . . . . . : 60
Buffer updates . . . . . : 0
Prefetch reads . . . . . : 1
Synchronous I/O . . . . . : 0
/ SQL Statement and Package . . . . . : EMPSRCH
Distributed Data
Requester elapsed time . . . . . : N/P
- IFI (Class 5) and Data Capture
- Query Parallelism Data
- Data Sharing Locking Activity
Suspensions . . . . . : N/A
- Group Buffer Pools Activity
- Stored Procedures

Command ==>
F1=Help      F2=Split    F3=Exit     F5=Auto     F6=History  F7=Up
F8=Down     F9=Swap    F12=Cancel  F16=Look    F17=Collect
F22=Purge

```

Figure 145. Thread Detail Panel

Note that the word HISTORY is displayed under the heading line of the Thread Detail panel to indicate that you are viewing past data. The date and time displayed next to HISTORY represent the time just after the exception occurred.

This is where past data can be used to examine the data on a thread that has ended. In this way, you can examine the thread before and after the exception occurred by moving backward and forward through time. Refer to “Chapter 5. Viewing Past Data” on page 43 for more information on viewing past data.

Because class 2 time is the time spent within DB2, the excessive class 2 time causing the exception could be caused by a possible SQL statement problem.

From the Thread Detail panel, select *SQL Statement and Package* to display the SQL Statement and Package window.

Problem Identification

```
DGOMTWCS          SQL Statement and Package      ROW 1 TO 1 OF 1
                                                HISTORY 99/04/03 14:27:41

Location . . . . . : PM01DLOC
Collection ID . . . . . : EMPLOYEE
Program Name . . . . . : EMPSRCH
Consistency Token . . . . . : X'149EEA901A79FE48'
Version
EMPSRCH_PACKAGE_VERSION1

Statement type . . . . . : CLOSE
Statement number . . . . . : 137

Thread status . . . . . : In application

SQL Statement
SELECT EMPNO, LASTNAME, WORKDEPT, BIRTHDATE FROM DSN8610.EMP WHERE
EMPNO = :H
***** BOTTOM OF DATA *****

Command ==>
F1=Help      F2=Split   F3=Exit    F5=Auto    F6=History  F7=Up
F8=Down      F9=Swap    F12=Cancel F16=Look   F17=Collect F18=Explain
F22=Purge
```

Figure 146. SQL Statement and Package Window

This window displays the SQL statement executing at the time the exception occurred. To obtain details on the access paths chosen by DB2 to process the SQL statement, press **F18** (Explain) to explain the SQL statement and display the DB2 Explain Output panel.

Diagnosis, Modification, or Tuning Information

```

DGOMYPKM          DB2 Explain Output          More - +

Local location . . . . . : PM01DLOC          DSN1 V6
Current server . . . . . : PM01DLOC          DSN1 V6

- Package . . . . . : EMPLOYEE.EMPSRCH
  Version . . . . . : EMPSRCH_PACKAGE_VERSION1

Explain executed at . . . . : 13:10:52 03/16/99

----- SQL Text -----
- SELECT EMPNO, LASTNAME, WORKDEPT, BIRTHDATE FROM DSN8610.EMP WHERE
  EMPNO = :EMPLOYEE_NUMBER
  Status : Compiled-REPORT specified. Rebound at exec.time using values
  Isolation: Cursor stability

- Host variable definitions

----- Access path summary for query block 1 step 1 -----
Table space scan - no index will be used
Standard sequential prefetch will be performed
Lock mode is share lock for the page
Page range scan will not be used

/ Table DSN8610 EMP

- PLAN_TABLE details for step

----- Access path summary for query block 1 step 2 -----
Command ==>
F1=Help      F2=Split    F3=Exit     F7=Up       F8=Down     F9=Swap
F12=Cancel  F16=Look    F17=Collect
  
```

Figure 147. DB2 Explain Output Panel (Packages)

End of Diagnosis, Modification, or Tuning Information

The access path summary on the DB2 Explain Output panel shows that a table space scan is being used to access the table. This could indicate the reason for the excessive class 2 time.

Select the table from the DB2 Explain Output panel to display the Table Information window, where you can see if any indexes have been defined for the table.

Problem Identification

```

DGOMYWTI                               Table Information
Local location . . . . . : PM01DLOC      DSN1 V6
Current server . . . . . : PM01DLOC      DSN1 V6
More: - +

Table name . . . . . : DSN8610.EMP
Type . . . . . : TABLE
/ Indexes . . . . . : YES
Database name . . . . . : DSN8031A
_ Table space name . . . . . : DSN8S31E
Table identifier . . . . . : 14
Columns . . . . . : 14
Rows . . . . . : 32
Status . . . . . : HAS PRIMARY INDEX
Maximum record length . . . . . : 107
Pages . . . . . : 1
Percentage of pages used . . . . . : 2
Last RUNSTATS . . . . . : 03/04/99 10:53:27
EDIT procedure name . . . . . : DSN8EAE1
VALIDATION procedure . . . . . : NONE
Auditing . . . . . : NONE
DATA CAPTURE option . . . . . : NONE
Row compression . . . . . : 0
Alias table or view . . . . . :
Check constraints . . . . . : 0
Encoding scheme . . . . . : EBCDIC

Command ==>
F1=Help   F2=Split  F3=Exit   F7=Up     F8=Down   F9=Swap
F12=Cancel F16=Look  F17=Collect

```

Figure 148. Table Information Window

From this window you can see that an index has been defined for the table. Select *Indexes* to display the Index Selection window where you can select the index to be examined. In this example, the index selected is DSN8610.XEMP1. This displays the Index Information window.

```

DGOMYWII                               Index Information
Local location . . . . . : PM01DLOC      DSN1 V6
Current server . . . . . : PM01DLOC      DSN1 V6
More: - +
- Index name . . . . . : DSN8610.XEMP1
  Index space name . . . . . : XEMP1
  Table name . . . . . : DSN8610.EMP
  Database name . . . . . : DSN8D31A
  Buffer pool . . . . . : BP0
/ Key columns . . . . . : 1
  Subpage size (bytes) . . . . . : 512
  Unique rule . . . . . : PRIMARY - UNIQUE
  Clustering index . . . . . : YES
  Currently clustered . . . . . : YES
  Cluster ratio . . . . . : 100
  Full key card . . . . . : 32
  First key card . . . . . : 32
  Levels . . . . . : 1
  Leaf pages . . . . . : 1
  Maximum piece size (KB) . . . . . : 256
  Close rule . . . . . : LEAVE OPEN
  Last RUNSTATS . . . . . : 03/04/99 10:53:27
  Allocated space . . . . . : 0
  Erase rule . . . . . : NO
  Index type . . . . . : 2
  Time of CREATE INDEX . . . . . : 1998-10-11-08.12.59.000000
  Time of last ALTER INDEX . . . . . : 1998-10-11-10.22.30.000000

Command ==>
F1=Help    F2=Split  F3=Exit   F7=Up     F8=Down   F9=Swap
F12=Cancel F16=Look   F17=Collect

```

Figure 149. Index Information Window

From the Index Information window, you can select *Key columns* to display the Key Column Information window.

Problem Identification

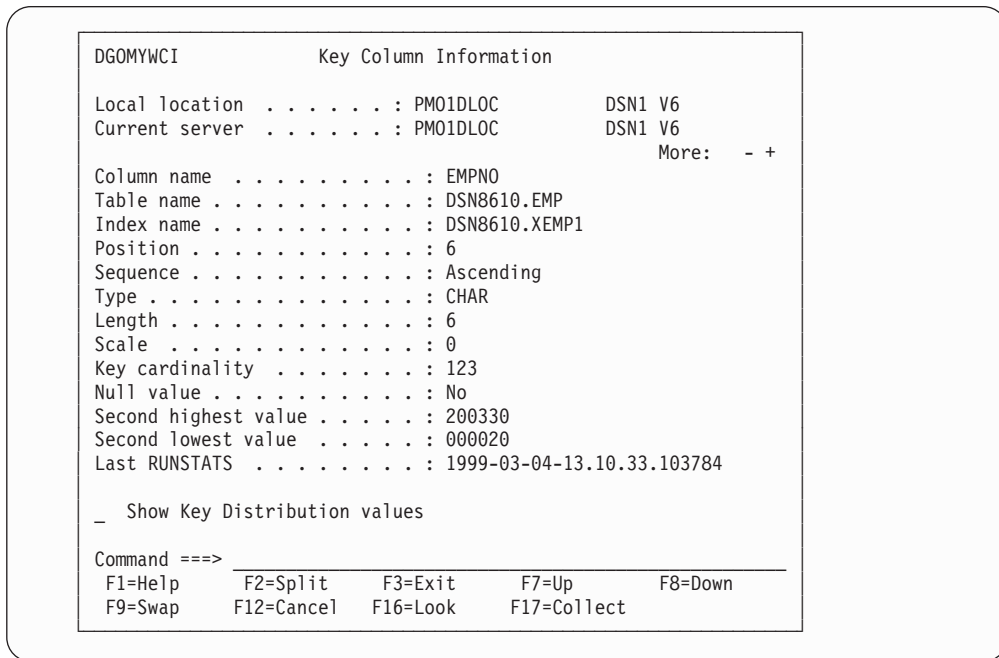


Figure 150. Key Column Information Window

Use this window to examine the characteristics of the key column on which the index has been defined.

One of the possible reasons for an index not being used is that the host variable defined in the program does not match the characteristics of the column as defined in the table. To determine whether this is the reason for the index not being used, you can return to the DB2 Explain Output panel where the Host Variable Definition window can be selected.

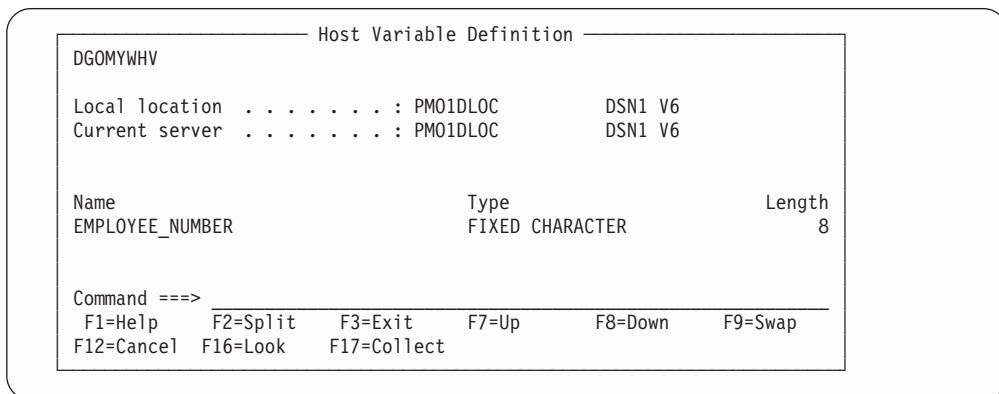


Figure 151. Host Variable Definition Window

In this particular example, the Host Variable Definition window shows that the definitions do not match, thereby disqualifying use of the index.

The host variable defined in the source program should be changed to match the table definition so that DB2 can use the index and thereby reduce the class 2 time.

Example of Thread Monitoring

The following example demonstrates how to identify a possible lock suspension problem using the Online Monitor thread activity function.

Display the Thread Summary panel by selecting option 1 (*Display Thread Activity*) from the DB2 PM Online Monitor Main Menu.

```

DGOMTPLUS 13:49          Thread Summary          ROW 1 TO 5 OF 5
PM01DLOC          DSN1 V6  GROUP001 MEMBER01

To display a thread, place any character next to it, then press Enter.

   Primauth  Planname  Program  Connection  Status  Elapsed
   _ SYSADM   DGOPMOM   SYSADM   DB2CALL    APPL    37:30.3691  1.2797744
   _ USERT001 DGOPMOM   USERT001 DB2CALL    APPL    19:06.9127  0.6458763
   _ USERT001 DSNESPRR  USERT001 TSO        APPL    30:10.7428  0.9713783
   _ USERT002 DGOPMOM   USERT002 DB2CALL    DB2     46:25.5780  1.5100349
   _ USERT003 DSNESPCS  USERT003 TSO        DB2     31.4012740  0.9831031
-- End of Thread list --

Command ==> _____
F1=Help      F2=Split    F3=Exit     F5=Auto     F6=History  F7=Up
F8=Down      F9=Swap     F10=Qualify F11=Sort    F12=Cancel  F16=Look
F17=Collect  F19=Left   F20=Right   F22=Purge
  
```

Figure 152. Thread Summary Panel

Note: To view Class 3 times on the Thread Summary panel, you need to scroll the display to the right (**F20**).

Type **SORT** on the command line and press **Enter** to display the DB2 Thread Sort Specification window, where you can sort threads by class 3 lock/latch times in descending sequence so that threads with the most time spent waiting due to lock and latch suspensions are sorted to the top.

Problem Identification

```

DGOMTWSS          DB2 Thread Sort Specification

Specify field order by number in range 1 to 15. Enter 1 for Ascending or
2 for Descending sequence.

Column              Order              Sequence
More:  -  +
Prim Auth  . . . . .  _                -
Plan Name  . . . . .  _                -

Package/DBRM
Collection ID . . . . .  _                -
Program Name . . . . .  _                -

Correlation . . . . .  _                -
Connection ID . . . . .  _                -
Connection type . . . . .  _                -
Requesting location . . . . .  _                -
Thread status . . . . .  _                -
Request count . . . . .  _                -

Class 1 times
Elapsed . . . . .  _                -
CPU . . . . .  _                -

Class 2 times
Elapsed . . . . .  _                -
CPU . . . . .  _                -

Class 3 time . . . . .  1                2

Command ==>
F1=Help   F2=Split  F3=Exit   F7=Up     F8=Down   F9=Swap
F12=Cancel F16=Look   F17=Collect
  
```

Figure 153. DB2 Thread Sort Specification Window

You can also sort threads by class 3 lock/latch times in descending sequence by typing the command SORT C3E and pressing **Enter** on the command line.

For information on the SORT command refer to “SORT Command” on page 120.

Press **F3** (Exit) to exit the DB2 Thread Sort Specification window and return to the Thread Summary panel.

```

DGOMTPLS 13:54          Thread Summary  SORT          ROW 1 TO 5 OF 5
PM01DLOC          DSN1 V6  GROUP001 MEMBER01

To display a thread, place any character next to it, then press Enter.

   Primauth  Planname  Program  Connection  ----- Elapsed -----
 / USERT003  DSNESPCS  USERT003  TSO         LOCK      2:43.66156  1:11.85677
- USERT001  DGOPMOM   USERT001  DB2CALL     APPL      19:06.9123  0.6458763
- USERT001  DSNESPRR  USERT001  TSO         APPL      30:10.7424  0.9713783
- USERT002  DGOPMOM   USERT002  DB2CALL     DB2       46:25.5787  1.5100349
- SYSADM    DGOPMOM   SYSADM    DB2CALL     APPL      37:30.369   1.2797744
-- End of Thread list --

Command ==> _____
F1=Help      F2=Split    F3=Exit     F5=Auto     F6=History  F7=Up
F8=Down      F9=Swap     F10=Qualify F11=Sort    F12=Cancel  F16=Look
F17=Collect  F19=Left   F20=Right   F22=Purge

```

Figure 154. Thread Summary Panel

At this point, all threads have been sorted in descending sequence by class 3 lock/latch time, although this field is not displayed. You can press the **F20** (Right) key to view class 3 times. Note that the word **Sort** is displayed in the header of the Thread Summary panel.

If, for example, you want to view detailed information about the class 3 lock and latch times of a particular thread, type any character next to that thread and press **Enter**. The Thread Detail panel is displayed.

Note: The Thread Detail panel you see may have been tailored by your installation and consequently may not necessarily match the panel examples shown in this book.

Problem Identification

```

DGOMTPSM 13:58                Thread Detail                PMO1DL0C DSN1 V6
                                GROUP001 MEMBER01
For details, place any character next to heading, then press Enter.
                                More:  - +
- Thread Identification
- Primauth . . . . . : USERT003          Correlation name . . . . : USERT003
- Planname . . . . . : DSNESPCS          Connection type . . . . . : TSO
- Connection ID . . . : TSO              Type . . . . . : ALLIED
- Requesting Location: DSNAPC6          Status . . . . . : LOCK
- Current Package . . . . . : DSNESM68
/ Times                          Elapsed                CPU
- Class 1 . . . . . : 2:44.363291        0.088226
- Class 2 . . . . . : 1:11.856771        0.041806
- Class 3 . . . . . : 1:04.192452        N/A
- Class 7 . . . . . : N/P                N/P
- Class 8 . . . . . : N/P                N/A
- Locking Activity
- Timeouts . . . . . : 0
- Deadlocks . . . . . : 0
- Suspensions . . . . . : 2
- Lock escalations . . . . . : 0
- Maximum page locks held . . . . . : 6
- Locked Resources
- RID List Processing
- Unsuccessful - any reason . . . . . : 0

Command ==>
F1=Help      F2=Split    F3=Exit     F5=Auto     F6=History  F7=Up
F8=Down      F9=Swap     F12=Cancel  F16=Look   F17=Collect
F22=Purge
  
```

Figure 155. Thread Detail Panel

The Thread Detail panel shows that the thread is in LOCK status. Select the *Times* field to display the Thread Times window, where you can examine the suspension time shown in the *Locks and latches* field.

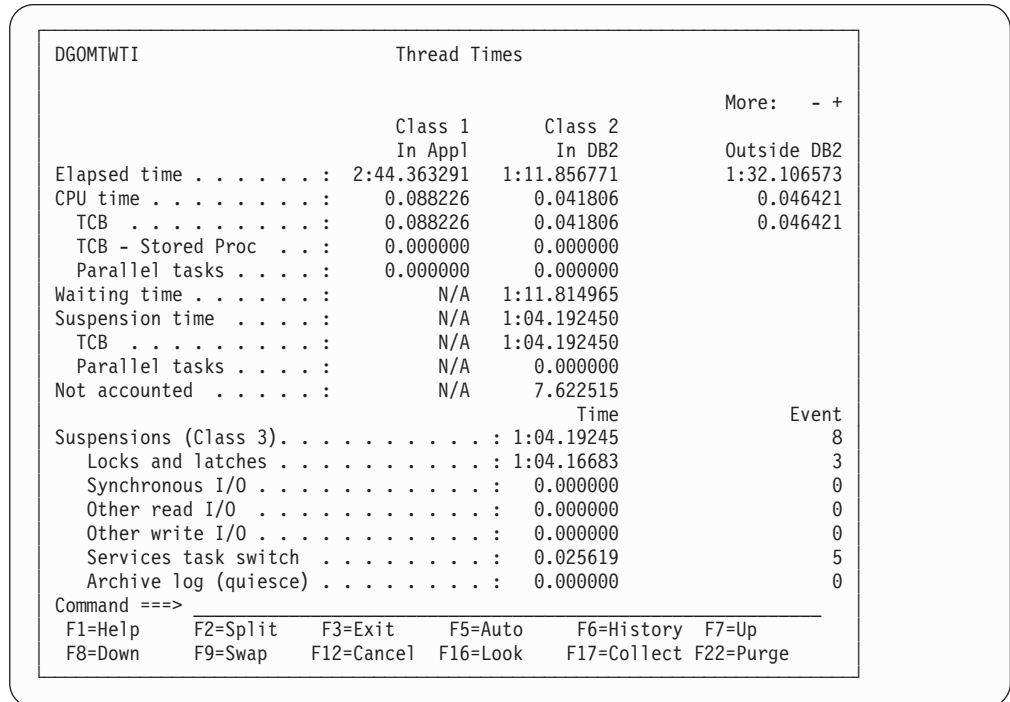


Figure 156. Thread Times Window

As you can see, most of the total class 3 suspension time is due to locks and latches.

To view the locked resources associated with this thread, press **F3** (Exit) to return to the Thread Detail panel and select the *Locked Resources* field.

The Locked Resources window is displayed.

Problem Identification

```

DGOMTWLD                Locked Resources                ROW 1 TO 5 OF 5

For a list of all the threads that have a lock on a resource, place any
character next to the resource, then press Enter.

   Database      Type      Status      Duration      Attribute
   Object        Count     Suspended   Function
 /  MACBP2DB     PAGESET   N/A         COMMIT        L-LOCK
   MACBP2TB     2         YES        LOCK          L-LOCK
-  MACBP2DB     PAGESET   IS         COMMIT        L-LOCK
   MACBP2TS     1         NO         N/A           L-LOCK
-  MACBP2DB     DATABASE S         COMMIT        L-LOCK
   N/A          1         NO         N/A           L-LOCK
-  DSNDDB06     SKPT      S         COMMIT        L-LOCK
   SYSUSER      1         NO         N/A           L-LOCK
-  N/A          SKCT      S         PLAN          L-LOCK
   DSNESPCS     1         NO         N/A           L-LOCK
***** BOTTOM OF DATA *****

Command ==>
F1=Help      F2=Split    F3=Exit     F5=Auto     F6=History  F7=Up
F8=Down      F9=Swap     F12=Cancel  F16=Look    F17=Collect F22=Purge
  
```

Figure 157. Locked Resources Window

All locks held by the selected thread USERT003 are displayed.

You can see that a suspension has occurred for object MACBP2TB. To view all users contending for the same object, type any character next to that object and press **Enter**. The Threads Holding Resource window is displayed.

```

DGOMTWRL                Threads Holding Resource        ROW 1 TO 2 OF 2

To display a new thread, place any character next to it, then press Enter.
The Thread Detail will be displayed.

Database . . . . . : MACBP2DB  Object . . . : MACBP2TB
Resource type . . . . . : PAGESET  Resource . . . : N/A

   Primauth      Corname      Status      Subsystem
   Planname      Connection   Suspended   Duration
-  USERT001      USERT001     S           N/P
   DSNESPRR      TSO          NO          COMMIT
-  USERT003      USERT003     N/A         N/P
   DSNESPCS      TSO          YES         COMMIT
***** BOTTOM OF DATA *****

Command ==>
F1=Help      F2=Split    F3=Exit     F5=Auto     F6=History  F7=Up
F8=Down      F9=Swap     F12=Cancel  F16=Look    F17=Collect F22=Purge
  
```

Figure 158. Threads Holding Resource Window (Planname)

All threads involved in the locking of this resource are displayed. From this window, it can be seen that USERT001 is causing USERT003 to be suspended. This problem can be resolved if USERT001 uses the SPUFI cursor stability plan (DSNESPCS), as does USERT003, instead of the SPUFI repeatable read plan

(DSNESP RR). You should decide whether it is necessary for USERT001 to use DSNESP RR, or if DSNESP CS can be used instead.

Using the Online Monitor in Deadlock Resolution

A deadlock is an error condition where processing cannot continue due to an unresolved contention for a particular resource. A deadlock is signaled when the deadlock detection cycle time has been reached. You should ensure that the resource timeout limit is at least twice that of the deadlock detection cycle so that deadlocks are detected before a timeout occurs.

Deadlock Detection

Start the data collector to collect deadlock events.

Start exception event processing from the Exception Processor panel to be notified when an exception event occurs. Refer to “How to Start Exception Processing” on page 56.

Deadlock Resolution

On detection of a deadlock, use LOOK to display the participants in the deadlock.

Problem Identification

```

DGOMLE00                                Deadlock Data                                More:  - +
IFCID . . . . . : 172

Number of resources involved in deadlock : 2
Deadlock interval counter . . . . . : 2
Time deadlock detected . . . . . : 21:38:34.15

Locked resource
Type . . . . . : Datapage
Database . . . . . : 271      Object : 6
Page # . . . . . : X'3001F1'

Blocker
Member/DBMS identifier . . . . . : MEMBER01
Plan name . . . . . : DDLD3P18
Correlation identifier . . . . . : RUNPRG18
Connection identifier . . . . . : BATCH
LUW identifier . . . . . : USIBMSY.SY10BDB2.A74AB9FEF91C
State . . . . . : EXCLUSIVE
Duration . . . . . : COMMIT
Status . . . . . : WAIT

Waiter
Member/DBMS identifier . . . . . : MEMBER02
Plan name . . . . . : DDLD3P15
Correlation identifier . . . . . : RUNPRG15
Connection identifier . . . . . : BATCH
LUW identifier . . . . . : USIBMSY.SY30BDB2.A74AB9EE117F
Requested function . . . . . : LOCK
State . . . . . : UPDATE
Duration . . . . . : MANUAL
DB2 assigned worth value . . . . . : 18

Command ==>
F1=Help      F2=Split    F3=Exit     F7=Up       F8=Down
F9=Swap      F12=Cancel

```

Figure 159. Deadlock Data Panel

If the *Locked resource Type* field is Datapage, ensure that all applications (*Holder* and *Waiter*) access the resource in the same order.

If the deadlock concerns an index with high insert activity (that is, the *Locked resource Type* field is Index Page), you should set the SUBPAGES parameter for the index to 1 or consider converting the index to type 2. If the problem is not related to SUBPAGES, it could be that the commit frequency for an update application is too low. The ratio of updates per commit can be viewed on the Thread Detail panel.

Part 4. Customizing the Online Monitor

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Chapter 12. Tailoring Exception Thresholds—Exception Profiling

Exception profiling can be used to set the thresholds in an exception threshold data set. With exception profiling, you specify the percentage of records in a field that you want to trigger exceptions. Exception profiling then uses DB2 instrumentation data as input to calculate the thresholds that would generate the percentage of exceptions requested.

Exception Profiling Panel

Use the Exception Profiling panel to specify the required data sets and profiling criteria required to calculate the thresholds in an exception threshold data set. The data set is used for both display and periodic exception processing. A report showing the details of the distribution and expected number of exceptions for each field can also be produced.

To display the Exception Profiling panel, select option 6 (*Exception profiling*) from the IBM Database 2 Performance Monitor menu.

```
DGOFEP00                Exception Profiling

Complete the following control information, then press Enter.

Warning exceptions . . . . . 5      (% of input data)
Problem exceptions . . . . . 2.5    (% of input data)
Produce profile report . . . . . 1   (1=yes 2=no)

Input data set
'MY.DPMOUT.DATA'

Input threshold data set
'MY.THRESH.DATA.IN'

Output threshold data set
'MY.THRESH.DATA.OUT'

Output report data set
SYSOUT=A

Command ==>
F1=Help      F2=Split    F3=Exit     F6=History  F9=Swap     F12=Cancel
F17=Collect
```

Figure 160. Exception Profiling Panel

The exception profiling function uses as input a GTF, SMF, or DPMOUT data set, an exception threshold data set, and profiling criteria entered on the Exception Profiling panel.

Exception profiling produces an output threshold data set. This data set is a copy of the input threshold data set with updated threshold values. Any threshold entries with a value of "*" specified in the input data set are updated by the profiling process. The new thresholds are calculated from the input data sets and the profiling criteria you have specified.

An output report data set can also be produced by specifying 1 in the *Produce profile report* field on the Exception Profiling panel. This profile report contains details about each field, including a table of the expected number of exceptions for various threshold entries. Refer to Figure 161 on page 228 for an example of this report.

After you have entered the required information on the Exception Profiling panel, press **Enter** to generate a job stream and to display the Job Processing Selections panel, where you can browse, edit, or submit the job.

To provide you with a starting point, sample threshold member DGOETV41 has been provided in SDGODATA.

Note that this member is provided only as an example and can be modified as required by your installation. This member contains fields with predefined thresholds and site-specific fields with "*" for threshold values. The "*" thresholds are replaced with calculated threshold values during exception profiling.

You can also create and submit a job stream using option 6 (*Exception profiling*) on the IBM Database 2 Performance Monitor menu. A sample job stream is shown in the following box labeled Exception Profiling—Sample JCL.

Note: Foreground execution is possible, although background execution may be preferable if there are many records to be processed.

Exception Profiling—Sample JCL

```
//EPV300 EXEC PGM=DB2PMEP
//STEPLIB DD DSN=DGO.V6R1M0.SDGLOAD,DISP=SHRSHR
//INPUTDD DD DSN=MY.DPMOUT.DATA,DISP=SHR
//SYSPRINT DD SYSOUT=*
//SYSOUT DD SYSOUT=*
//INTHRSH DD DSN=MY.THRESH.DATA.IN,DISP=SHR
//OUTTHRSH DD DSN=MY.THRESH.DATA.OUT,DISP=OLD
//EPRPTDD DD DSN=SYSOUT=A,DISP=OLD
//SYSIN DD *
REPORT
WARNING(10)
PROBLEM(5)
EXEC
```

Profiling Method

Each record in the input data set is processed as it would be for normal Batch exception processing. However, instead of checking each field for exception, the value of the field is recorded. When all records have been processed, statistics can be calculated to determine the thresholds.

The thresholds are set to a value that would generate the percentage of warning and problem level exceptions you requested.

For example, suppose the field QISECT has been specified in the exception threshold data set for location DSNAPC5, with the compare set to ">", and the warning and problem thresholds set to "*". The profiling criteria are specified as 5% for warning and 2.5% for problem thresholds on the Exception Profiling panel. If the

data set is processed and 320 records are found for field QISECT with the location DSNAPC5, exception profiling sets the warning threshold to the 17th highest record. This would generate 16 warning exceptions on average, which is 5% of the records (as requested). Similarly, the problem threshold is set to the 9th largest record, averaging 8 problem exceptions, which is 2.5% of the records.

Exception Profiling Input Data

Input to exception profiling consists of the following:

- Exception threshold data set

An exception threshold data set is used to specify which thresholds you want calculated by exception profiling. Only the thresholds containing an asterisk (*) are calculated.

- Input data set

The input data set can be a GTF, SMF, or DPMOUT data set. Use the accounting and statistics records you have collected over a normal work period. This can be a day or any representative number of hours. Usually these records come from SMF, although other sources such as GTF and collect report data are possible. But it is simplest to use the data you have on hand for normal batch accounting and statistics processing.

Exception profiling uses past input data to calculate threshold values appropriate to your system. Therefore, the records in the input data set should be representative of the type of data you expect to be generated in the future.

- Profiling criteria

The profiling criteria are entered on the Exception Profiling panel. The criteria specify the percentage of records you want to trigger warning exceptions (for example 5.00%), and the percentage to trigger problem exceptions (for example 2.50%). The percentage you specify can be as small as 0.01%. Refer to “Profiling Method” on page 226 for information about how this input is used to determine threshold values.

Sample Exception Profiling Report

Use the exception profiling report to examine the results of exception profiling.

An example of an exception profiling report is shown in Figure 161.

ACTUAL AT: 02/17/98 11:21:58.26
 INPUT FROM: 10/28/97 06:02:12.11
 INPUT TO: 11/03/97 02:30:00.00

DB2 PERFORMANCE MONITOR (V6)
 EXCEPTION PROFILING REPORT

PAGE: 1

WARNING THRESHOLD % 5.00
 PROBLEM THRESHOLD % 2.50

FIELD ID	LOCATION	GROUP	CONNECT	PLANNAME	PER	BY	OPERATOR	OCCURRENCES	DESCRIPTION
FLD.QUAL	REQLOC	MEMBER	CORRNAME	PRMAUTH					
	SUBSYSTEMID		CORRNMBR						
QBACGET	*	*	*	*	PLAN	TOTAL	>	103	GETPAGES
N/A	*	*	*	*					

	PROBLEM	WARNING	0.50 %	1.25 %	2.50 %	5.00 %	7.50 %	10.00 %	
SPECIFIED THRESHOLD	22	21	39	37	37	22	21	21	
EXCEPTIONS GENERATED	5	8	1	2	2	5	8	8	

SLRSUSP	*	*	*	*	SYSTEM	TOTAL	>	150	TOTAL ALL SUSPENSIONS
N/A	*	*	*	*					

	PROBLEM	WARNING	0.50 %	1.25 %	2.50 %	5.00 %	7.50 %	10.00 %	
SPECIFIED THRESHOLD	423603	402603	444603	441603	435603	423603	411603	402603	
EXCEPTIONS GENERATED	8	15	1	2	4	8	12	15	

SSCDML	*	*	*	*	SYSTEM	TOTAL	>	150	TOTAL SQL DML STATEMENTS
N/A	*	*	*	*					

	PROBLEM	WARNING	0.50 %	1.25 %	2.50 %	5.00 %	7.50 %	10.00 %	
SPECIFIED THRESHOLD	1410145	1340145	1480145	1470145	1450145	1410145	1370145	1340145	
EXCEPTIONS GENERATED	8	15	1	2	4	8	12	15	

EXCEPTION PROFILING REPORT COMPLETE

Figure 161. Example Exception Profiling Report

The *INPUT FROM* and *INPUT TO* fields show the date and time of the first and last record in the input data set.

The profiling report also shows a table for each of the fields. These tables show the calculated threshold values (*SPECIFIED THRESHOLD*) and the expected number of exceptions (*EXCEPTIONS GENERATED*) for various exception percentages. These percentages are in multiples of 0.1, 0.25, 0.5, 1, 1.5, and 2 times the problem exception percentage specified on the Exception Profiling panel. For example, if the problem percentage is 5%, the table columns shown are 0.5%, 1.25%, 2.5%, 5%, 7.5%, and 10%.

Any error messages generated during exception processing are shown on the profiling report.

Chapter 13. Customizing Panels

You can customize the layout of headings, field labels, fields displayed, and the order in which the fields appear on the following panels:

- Thread Detail panel
- DB2 Statistics Detail panel
- DB2 System Parameters Detail panel.

The panels are defined using ISPF. Each field name corresponds to an ISPF variable.

Customize your panels to filter the data shown so that you can focus on particular areas of performance.

If you are adding or removing any fields from these panels, note that you need to add or remove the corresponding field help panels. You might also need to modify the exception processing variables on the same panels.

Panel Customization Example

The Thread Detail panel example shown in Figure 162 demonstrates the flexibility of customizing panels.

```

DGOMTPSM 15:31                Thread Information                PMO1DL0C DSN1 V6
                                GROUP001 MEMBER01
- Thread Identification
  Primauth: USER029  CorrID : CICSPR01A784    LUW Instance : X'A57A0593213D'
  Planname: CUSTINQR  ReqLoc : DUBLIN          CICS Instance: X'A42893CAE930'

- Times          Elapsed          CPU   - SQL Activity
  Class 1        30.000963         0.293748 - Incremental Bind :      0
  Class 2        13.993950         0.221462 - Commit . . . . . :      2
  Class 3         2.691650          N/A     - Rollback . . . . . :      0

- Buffer Manager Activity
  Getpage requests . . . . :      670
  Synchronous Read . . . . :      30
  Sequential Prefetch . . . :      16
  List Prefetch . . . . . :       1
  Dynamic Prefetch . . . . :       0
  Asynchronous Read . . . . :       0

- Serialization Data
  Timeouts . . . . . :      0
  Deadlocks . . . . . :      0
  SQL Statement & DBRM
  Locked Resources
  Distributed Data

Command ==>
F1=Help      F2=Split    F3=Exit     F5=Auto     F6=History  F7=Up
F8=Down      F9=Swap     F12=Cancel  F16=Look    F17=Collect
```

Figure 162. Customized Thread Detail Panel

To view an example of the standard Thread Detail panel, refer to Figure 45 on page 80.

This panel has been tailored to show LUW and CICS instances, and more detailed buffer information. The panel was also tailored to show all desired fields on one panel, thereby removing the need to use the scrolling keys in order to view all the data displayed.

The following general modifications were made to the panel shown in Figure 162:

Customizing Panels

- Fields were added, removed, rearranged, and field labels were changed on the panel.
- The heading of the panel was changed from Thread Detail to Thread Information.

You can also add or remove field help panels and modify the exception processing ISPF variables to match the changes made to the fields.

Note: The DGOMTPSM, DGOMSPSM, and DGOMZPSM panels displayed at your site may have been tailored by your installation and consequently may not necessarily match the panel examples shown in this book.

How to Customize Panels

Before you begin to modify any of the Online Monitor detail panels, you should be familiar with the way ISPF panels are defined. Consult your system programmer before making any change to your ISPF or TSO environment.

You can customize the layout of the following Online Monitor detail panels by changing the headings, field labels, fields displayed, and the order in which the fields appear on the panels.

- Thread Detail panel
- DB2 Statistics Detail panel
- DB2 System Parameters Detail.

The Online Monitor panels are defined using ISPF. The procedure for customizing an Online Monitor panel involves copying the ISPF panel member to your own library, and editing your copy of the panel to match your requirements.

Each field name corresponds to an ISPF variable. If you are adding or removing fields, you also need to add or remove the corresponding help panels for the appropriate fields. For a list of all the Online Monitor fields available and their corresponding help panel names, refer to “Appendix A. Online Monitor Field Table” on page 241.

Tailoring the Thread Detail Panel

You can modify the Thread Detail panel to include the first 200 characters of the currently executing SQL statement. This field is divided into 4 fields of 50 characters each. The names of these fields are:

QW01242T	The first 50 characters of the SQL statement text
QW012422	The second 50-character block of the SQL statement text
QW012423	The third 50-character block of the SQL statement text
QW012424	The fourth 50-character block of the SQL statement text.

The EXPLAIN command can also be made available on the Thread Detail panel so that you can examine the access path methods of the SQL statement text that is shown. To make the command available:

- Add the following line to the INIT section of the panel:
`&SQLONDET='X'`
- Change the following statement:
`) PANEL KEYLIST(MTTABLE,DGOF)`

to:

```
) PANEL KEYLIST(MTSQLKEY,DGOF)
```

The latter change assigns the EXPLAIN command to F18 (Explain).

Editing Exception Fields

Each Online Monitor exception field has a corresponding ISPF variable which indicates the exception status of that field. The ISPF variable has the same name as the DB2 PM field it represents, with the first letter of the field name replaced by an “X” for thread activity fields, and an “E” or a “T” for statistics fields. For example, the thread activity field ADRECETT (Class 1 elapsed time) has a corresponding exception ISPF variable with the name XDRECETT, and the statistics field Q3STABRT (Rollback) has a corresponding exception ISPF variable with the name E3STABRT.

The exception ISPF variables are one character in length and can contain one of the following values:

P Problem level exception
W Warning level exception
blank The corresponding field is not in exception status.

If you want your exception fields to be highlighted when they are in exception, you need to test for an exception condition and highlight the field appropriately. For example, to test and highlight the Q3STABRT field on the Thread Detail panel, you would add the following lines to the panel logic:

```
if (&x3stabrt = 'P')
  .attr(q3stabrt) = 'color(red) hilite(reverse)'
if (&x3stabrt = 'W')
  .attr(q3stabrt) = 'color(yellow) hilite(reverse)'
```

If you are removing an exception field, you should also remove the corresponding code that tests and highlights the field.

Editing Selection Fields

The selection fields on the detail panels provide access to other Online Monitor panels. These fields are selected by typing any nonblank character in the desired selection field and pressing **Enter**.

You can remove or disable any of the selection fields on the Thread Detail panel, DB2 Statistics Detail panel, or DB2 System Parameters Detail panel.

Following is a list of all the selection field names and their corresponding subheadings on the Thread Detail panel:

C01	Thread Identification
C02	Current Package/DBRM
C03	Times
C04	Locking Activity
C05	Locked Resources
C06	RID List Processing
C07	SQL Activity, Commits and Rollbacks
C08	Buffer Manager Activity
C09	SQL Statement and Package/DBRM
C10	Distributed Data
C11	IFI (Class 5) and Data Capture
C12	Query Parallelism Data

Customizing Panels

C13	Data Sharing Locking Activity
C14	Group Buffer Pools Activity
C15	Stored Procedures.

Following is a list of all the selection field names and their corresponding subheadings on the DB2 Statistics Detail panel:

C01T01	EDM Pool
C01T02	Buffer Manager
C01T03	Locking Activity
C01T04	Open/Close Management
C01T05	Bind Processing
C01T06	Plan/Package Allocation, Authorization Management
C01T07	Log Manager
C01T08	Subsystem Services
C01T09	SQL Activity
C01T10	Query Parallelism Data
C01T11	RID List Processing
C01T12	Distributed Data
C01T13	CPU Times and Other Data
C01T14	Data Sharing Locking Activity
C01T15	Group Buffer Pool Activity
C01T16	Global Group Buffer Pool Statistics
C01T17	Stored Procedures.

Following is a list of all the selection field names and their corresponding subheadings on the DB2 System Parameters Detail panel:

C01T1	Virtual and Hiperpool Buffer Sizes
C01T2	Storages Sizes and Connections
C01T3	Operator and DDF Functions
C01T4	Tracing, Data Installation and Pseudo-Close
C01T5	Locking (IRLM)
C01T6	Active Log
C01T7	Archive Log
C01T8	Protection and Data Definition
C01T9	Stored Procedures
C01T10	Group Buffer Pools
C01TA	Data Sharing Parameters
C01TB	Application Programming Defaults
C01T11	Other Parameters.

For more information on defining ISPF panels, refer to *OS/390 ISPF Dialog Developer's Guide and Reference* and the related ISPF documentation.

Chapter 14. Data Collector Purpose and Function

The data collector executes as a started task address space. The purpose of the data collector is to support functions that are not suited to a TSO address space. In addition, the data collector is the host component of the Workstation Online Monitor and its interface to DB2.

The following functions are available if a data collector is installed and active at your site:

- Viewing past data
- Periodic exception processing while you are *not* logged on
- Exception event processing
- Collection of parallel tasks for query CP parallelism
- Data agent for Workstation Online Monitor.

There is one data collector for each DB2 subsystem.

Note: If a data collector is installed, it must match the version and release of the Online Monitor.

Viewing Past Data

Before you can view past data, the data collector needs to be active so that instrumentation data can be gathered.

This data is gathered by the data collector at installation-defined intervals. You can specify the types of data (IFCIDs) gathered and the interval at which the data is collected using the data collector parameters. The data gathered is written to a VSAM history data set or data space where it can be later retrieved and browsed using the HISTORY command.

You can qualify the thread activity data gathered by the data collector to reduce unnecessary system overhead and to limit the quantity of data stored using the data collector parameters.

For information about specifying data collector parameters, refer to the *DB2 PM Installation and Customization* manual. These parameters can be modified online by the administrator user using the administrator dialog panels. See also “Chapter 15. Administrator User” on page 235.

Periodic Exceptions

With the data collector active, you can log off the system while periodic exception processing is running. Any periodic exception messages issued while you are offline are gathered by the data collector and written to the periodic exceptions list, where they can be examined using the LOOK command. You are notified of any periodic exceptions when you next log on to your TSO system.

Exception Events

With exception event processing, you can monitor the DB2 subsystem for the presence of specific events. When a specified event occurs and is detected, you are notified by the Exception Notification window.

You can log off the system while exception event processing is running. Any exception event messages issued while you are offline are gathered by the data collector and written to the exception event list, where they can be examined using the LOOK command. You are notified of any exception events when you next log on to your TSO system.

You can specify the exception event traces to start during data collector startup using the data collector parameters. Refer to *DB2 PM Installation and Customization* for more information. This parameter can be modified online by the administrator user using the administrator dialog panels. Refer to “Chapter 15. Administrator User” on page 235 for details.

Collection of Parallelism Data

The data that the Online Monitor shows for threads exploiting utility parallelism or query CP parallelism comes from three different sources:

1. The originating task
2. All currently active parallel tasks
3. All parallel tasks that have finished processing.

While the first two types of data are readily available from DB2, the third type has to be stored and administered separately. This is accomplished by the data collector if it has been set up to do so. See parameter COLLECTCPUPARALLEL or CCP in the *DB2 PM Installation and Customization* manual.

If your DB2 system exploits query CP parallelism, you have to set CCP to YES to enable the data collector to collect the parallel tasks that have finished processing. Otherwise, the performance data shown by the Online Monitor for a thread might not be correct, because it does not include all parallel tasks of that thread.

Data Agent for Workstation Online Monitor

The DB2 PM Workstation Online Monitor attaches to the data collector running on the host system. All communication between the workstation and the host goes through the data collector. While the data collector is optional for the host-based Online Monitor, it becomes mandatory for the Workstation Online Monitor. If the data collector is started for the Workstation Online Monitor only, it need not be defined as an MVS subsystem. For further information refer to the *DB2 PM Installation and Customization* manual.

Chapter 15. Administrator User

The administrator user is a TSO user with the authority to access various administrator dialog panels. These panels provide the administrator user with the capability to alter the parameters for a DB2 PM data collector while it is active. Changes made to the data collector in this way do not persist across data collector restarts, but take effect when they are changed by the administrator user.

You can define any number of administrator users at your site. These users can be defined in the data collector startup parameters. Refer to *DB2 PM Installation and Customization* for more information on defining the administrator user.

The following sections describe the administrator dialog panels that can be accessed by the administrator users.

Active Data Collector List Window

Use the Active Data Collector List window to view a list of active data collectors. You can select any data collector from the list to display the Data Collector Parameters window where you can change parameters affecting history and other data collector dependent functions.

To display this window, invoke the administrator dialog EXEC from TSO by selecting ISPF option 6 (TSO Command Processor) and entering %DGOJINIT DGOVMAIN, or by selecting the appropriate menu selection configured during installation. Consult your system programmer for more information.

```
DGOVADCL          Active Data Collector List          ROW 1 TO 6 OF 6

Select the Data Collector to use.

   DB2 Subsystem      Data Collector STC      DB2 Release
-   TEST              DB2PMSTC              V6
-   PROD              DB2PMPRD              V5
-   APC2              DB2PMST4              V4
***** BOTTOM OF DATA *****

Command ==>
F1=Help   F2=Split  F3=Exit   F7=Up     F8=Down   F9=Swap
F12=Cancel
```

Figure 163. Active Data Collector List Window

If there are many data collectors listed, you can use **F7** (Up) and **F8** (Down) to browse the list.

Data Collector Parameters Window

Use the Data Collector Parameters window to examine and change parameters affecting the operation of an active data collector. Changes made on this window remain in effect until the data collector is stopped.

Administrator User

To display this window, select any data collector listed on the Active Data Collector List window.

```

DGOVDCPA          Data Collector Parameters
                                                    More:  - +
Change values as required and press Exit to save

DB2 Subsystem ID . . . . . : TEST
Data Collector STC . . . . . : DB2PMSTC
DB2 Release . . . . . : V6
Plan Name . . . . . _____

History
Select to change
_ Qualifications

Active . . . . . _ 1=Yes,2=No
Collection Interval . . . . . _____ Seconds
Maximum Size of History Dataset . . . . . _____ Kilobytes
Dataspace size . . . . . _____ Kilobytes

Select IFCIDs to be collected
_ Statistics
_ System Parameters
_ Thread Summary (147)
_ Thread Detail (148)
_ Locked Resources (150)
_ Thread SQL statement (124)

Select Exception Event Traces to be started
_ EDM Pool
_ DDF
_ Timeout
_ Deadlock
_ Authorization failure
_ CF rebuild
_ Global trace

Command ==> _____
F1=Help      F2=Split    F3=Exit     F7=Up       F8=Down     F9=Swap
F12=Cancel

```

Figure 164. Data Collector Parameters Window

To edit history qualification parameters, type any character in the selection field next to *Qualifications* and press **Enter**. The History Qualification window is then displayed, where you can qualify the thread data gathered for history. Refer to “History Qualification Window” on page 237 for more information.

To activate history, enter 1 in the *History Active* field. When history is active, instrumentation data is collected by the data collector at the interval specified in the *Collection Interval* field, and written to a VSAM history data set or a data space.

Use the *Maximum Size of History Dataset* field to specify the maximum size in kilobytes that the history data set can grow to. The maximum value for this parameter *must* be less than or equal to the maximum possible size of the data set. If this field is set to 0, then no history data is stored in this data set.

Use the *Dataspace size* field to specify the size in kilobytes of the data space to which history data is collected. If this field is set to 0, then no history data is stored in the data space.

The amount of data collected over any period of time depends on the collection interval and the amount of data that is qualified for history. When the data set or table space is full, history data is written to the beginning again, writing over the oldest data gathered.

From this window, you can specify the types of data (IFCIDs) to be collected by the data collector for later viewing with the HISTORY command. To do this, enter any character beside the IFCIDs listed under the subheading *Select IFCIDs to be collected*. Only the selected IFCIDs are gathered by the data collector. If IFCID 148, 150, or 124 is selected, then IFCID 147 is also selected automatically. If IFCID 150 or 124 is selected, then IFCID 148 is also selected. IFCIDs 124 and 150 select IFCID 148 automatically. IFCID 148 selects IFCID 147 automatically.

The current history defaults settings can also be viewed from the History Defaults window. Refer to “History Defaults Window” on page 24 for more information.

You can also specify the types of events to be collected for exception event processing. To do this, enter any character beside the events listed under the subheading *Select Exception Event Traces to be started*.

Currently selected fields are indicated by a slash (/).

History Qualification Window

Use the History Qualification window to filter the thread data gathered by the data collector for history. Filtering the thread data gathered can minimize system overhead and reduce the size of the VSAM history data set or data space required.

To display this window, enter any character in the *Qualifications* field on the Data Collector Parameters window and press **Enter**.

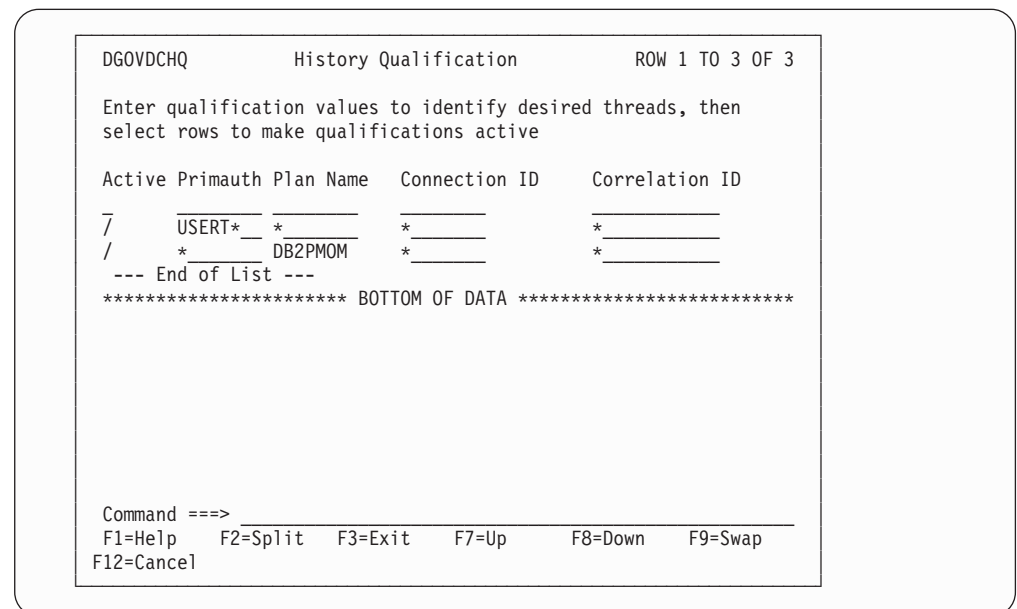


Figure 165. History Qualification Window

Administrator User

To qualify the history data collected, enter the required parameters on the History Qualification window and place any character in the *Active* column to activate the desired qualification entry. To deactivate any entry, type a blank in the *Active* column.

Wildcards can be used for the identifier values. Place an asterisk (*) in the field to indicate that any value in that character position is valid. The following rules apply:

- An asterisk in the first character position, followed by blanks, processes all values in that field.
- An asterisk at the end of a character string processes all values beginning with that character string.
- An asterisk in the middle of a character string processes any value in that single character position.

Fields that are not specified default to an asterisk (*).

You may consider collecting only history data for particularly sensitive applications, otherwise the volume of data can be very large.

History qualification parameter settings and the period during which these settings were active can be viewed from the History Thread Qualification window. Refer to “History Thread Qualification Window” on page 25 for more information.

Part 5. Appendixes

Appendix A. Online Monitor Field Table

Diagnosis, Modification, or Tuning Information

The tables in this appendix provide a list of the Online Monitor thread activity fields, statistics fields, and system parameters fields. You can use these tables to cross-reference exception field names for periodic and display exception processing, or to look up a field help panel name when customizing Online Monitor panels.

Note: The exception fields used in the Online Monitor differ from the exception fields used by Batch. Refer to the *DB2 PM Report Reference* for a list of valid Batch exception fields.

The following is a description of the table columns:

Field Name

The name of the field.

Field Description

The field title as the field appears on the panel. Note that the field titles vary slightly from panel to panel depending on the context in which the fields are used.

Help Panel Name

The member name of the associated help panel.

Exception

Indicates if the field is an Online Monitor exception field.

DB2 6.1, DB2 5.1, DB2 4.1

These columns indicate the DB2 release to which the field is applicable.

Table 5. Accounting - Buffer Pool Activity

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
ABCLSPR	Prefetch Reads	DGO0231	●	●	●	●
ABCRWIO	Synchronous I/O	DGO0232		●	●	●
ADRGPRIO	Getpage/Synchronous Reads	DGO0233	●	●	●	●
QBACDPF	Dynamic Prefetch Requests	DGO0222		●	●	●
QBACGET	Getpage Requests	DGO0217	●	●	●	●
QBACHPG	Pages Moved From Hiperpool	DGO0230		●	●	●
QBACHRE	Successful Hiperpool Reads	DGO0223		●	●	●
QBACHRF	Unsuccessful Hiperpool Reads	DGO0224	●	●	●	●
QBACHWF	Unsuccessful Hiperpool Writes	DGO0228	●	●	●	●
QBACHWR	Successful Hiperpool Writes	DGO0227		●	●	●
QBACIMW	Synchronous Writes	DGO0226	●	●	●	●
QBACLPF	List Prefetch Requests	DGO0221		●	●	●
QBACPID	Buffer Pool ID	DGO0215		●	●	●
QBACRIO	Synchronous Read I/O	DGO0219	●	●	●	●
QBACSEQ	Sequential Prefetch Requests	DGO0220		●	●	●
QBACSIO	Asynchronous Pages Read	DGO0229		●	●	●

Field Table

Table 5. Accounting - Buffer Pool Activity (continued)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QBACSWs	Buffer Updates	DGO0225	●	●	●	●

Table 6. Accounting - Data Capture Activity and Class-5 Times

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
ADIFICAL	IFI Calls	DGO0775	●	●	●	●
QIFAAIET	Class 5 Elapsed Time	DGO0202	●	●	●	●
QIFAAITT	Class 5 TCB Time	DGO0203	●	●	●	●
QIFAAMBT	Describe Time	DGO0204		●	●	●
QIFAAMLT	Log Extraction Time	DGO0205		●	●	●
QIFAANDD	Data Descriptions Returned	DGO0211		●	●	●
QIFAANDR	Data Rows Returned	DGO0210		●	●	●
QIFAANLR	Log Reads Performed	DGO0207		●	●	●
QIFAANMB	Describes Performed	DGO0212		●	●	●
QIFAANRC	Log Records Captured	DGO0208		●	●	●
QIFAANRR	Log Records Returned	DGO0209		●	●	●
QIFAANTB	Tables Returned	DGO0213		●	●	●

Table 7. Accounting - Data Sharing Locking Activity

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
ABUFFRAT	Buffer Pool Hit Ratio (%)	DGO1769		●	●	●
AFLSERAT	False Contention Rate (%)	DGO1768		●	●	●
AGLOBRAT	Global Contention Rate (%)	DGO1767		●	●	●
QTGACPLK	Change Requests	DGO1399		●	●	●
QTGACSLM	Change Requests - XES	DGO1402		●	●	●
QTGADRTA	Incompatible Retained Lock	DGO1408	●	●	●	●
QTGAFLSE	Suspensions - False Contention	DGO1407		●	●	●
QTGAIGLO	Suspensions - IRLM Global Contention	DGO1403		●	●	●
QTGALPLK	Lock Requests	DGO1397		●	●	●
QTGALSML	Lock Requests - XES	DGO1400		●	●	●
QTGANTFY	Notify Messages Sent	DGO1409		●	●	●
QTGASGLO	Suspensions - XES Global Contention	DGO1406		●	●	●
QTGAUPLK	Unlock Requests	DGO1398		●	●	●
QTGAUSLM	Unlock Requests - XES	DGO1401		●	●	●

Table 8. Accounting - Distributed Data Facility Activity

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
ADDSCNVC	Current DDF Conversions	DGO0270		●	●	●
ADDSELSR	Remote Elapsed	DGO0263	●	●	●	●
ADDSSRSR	Remote CPU	DGO0264	●	●	●	●
ADPROTOC	Method	DGO0235		●	●	●

Table 8. Accounting - Distributed Data Facility Activity (continued)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QLACLOCN	Remote Location	DGO0234		●	●	●
QW0148CT	Type	DGO0833		●	●	●
QW0148EL	Requester Elapsed	DGO1195	●	●	●	●
QW0148MR	Messages Received	DGO0272		●	●	●
QW0148MS	Messages Sent	DGO0271		●	●	●
QW0148PT	Product ID	DGO0804		●	●	●
QW0148PV	Product Version	DGO1556		●	●	●
QW01488A	Conversation Active Flag	DGO0266		●	●	●
QW01488C	Conversation ID	DGO0269		●	●	●
QW01488L	Remote Location	DGO0836		●	●	●
QW01488N	Network Connection Type	DGO1722		●	●	
QW01488S	Connection ID	DGO0268		●	●	●
QW01488T	Time of Last Message	DGO0267		●	●	●
QW01488U	State	DGO0265		●	●	●

Table 9. Accounting - Group Buffer Pools Activity

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
ABGAMR	Read (Not Found)-No Data Returned	DGO1832	●	●	●	●
ABGAXR	Read (Cross Inval.)-No Data Returned	DGO1833	●	●	●	●
QBGADG	Unregister Page	DGO1721		●	●	
QBGAGN	Group Buffer Pool ID	DGO1579		●	●	●
QBGAMD	Read (Not Found) - Data Returned	DGO1413	●	●	●	●
QBGAMN	Read Prefetch	DGO1415	●	●	●	
QBGASW	Changed Pages Written	DGO1418	●	●	●	●
QBGAWC	Clean Pages Written	DGO1417	●	●	●	●
QBGAXD	Read (Cross Invalidation) - Data Returned	DGO1410	●	●	●	●

Table 10. Accounting - Locking Activity

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
ALCLKET	Lock Escalations	DGO0190	●	●	●	●
ALRSUSLL	Number of Lock and Latch Suspensions	DGO0179	●	●	●	●
ALRSUSP	Total Suspensions	DGO0178	●	●	●	●
QTXACHG	Change Requests	DGO0186		●	●	●
QTXACLNO	Claim Requests	DGO0192		●	●	●
QTXACLUN	Unsuccessful Claim Requests	DGO0193	●	●	●	●
QTXADEA	Deadlocks	DGO0176	●	●	●	●
QTXADRNO	Drain Requests	DGO0194		●	●	●
QTXADRUN	Unsuccessful Drain Requests	DGO0195	●	●	●	●
QTXAIRLM	Other IRLM Requests	DGO0187		●	●	●

Field Table

Table 10. Accounting - Locking Activity (continued)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QTXALES	Lock Escalations - shared	DGO0188	●	●	●	●
QTXALEX	Lock Escalations - Exclusive	DGO0189	●	●	●	●
QTXALOCK	Lock Requests	DGO0183		●	●	●
QTXANPL	Maximum Page or Row Locks Held	DGO0191	●	●	●	●
QTXAQRY	Query Requests	DGO0185		●	●	●
QTXASLAT	Suspensions - Latch	DGO0181		●	●	●
QTXASLOC	Suspensions - Lock	DGO0180	●	●	●	●
QTXASOTH	Suspensions - Other	DGO0182		●	●	●
QTXATIM	Timeouts	DGO0175	●	●	●	●
QTXAUNLK	Unlock Requests	DGO0184		●	●	●
T3ANCHOR	Anchor	DGO1840		●	●	●
T3BPID	Buffer pool Id	DGO1845		●	●	●
T3COLL	Collection ID	DGO0842		●	●	●
T3CONST	Consistency Token	DGO0843		●	●	●
T3DBNAME	Database	DGO0844		●	●	●
T3DURAT	Duration	DGO0845		●	●	●
T3FUNCT	Function	DGO0846		●	●	●
T3HASH	Hash Class	DGO1843		●	●	●
T3LOCKS	Count	DGO0847		●	●	●
T3OBNAME	Object	DGO0848		●	●	●
T3PACK	Package ID	DGO0849		●	●	●
T3PAGE	Page	DGO1837		●	●	●
T3PART	Partition	DGO1844		●	●	●
T3PLAN	Plan ID	DGO0850		●	●	●
T3PLLCK	Attribute	DGO1792		●	●	●
T3RMID	Resource Manager Id	DGO1842		●	●	●
T3ROW	Row	DGO1839		●	●	●
T3STATE	Status	DGO0851		●	●	●
T3SUBP	Subpage	DGO1838		●	●	●
T3SUSP	Suspended	DGO0852		●	●	●
T3TYPE	Type	DGO0853		●	●	●
T3UID	Utility UID	DGO1841		●	●	●
T5SUBS	Subsystem	DGO1815		●	●	●

Table 11. Accounting - Package Data

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
ADALPSSC	Archive Log (quiesce)	DGO0720		●	●	●
ADARPSSC	Other Read I/O - Events	DGO0711	●	●	●	●
ADAWPSSC	Other Write I/O	DGO0714	●	●	●	●

Table 11. Accounting - Package Data (continued)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
ADCMPSSC	Claim Release	DGO0726		●	●	●
ADCPCL7T	CPU Time (Class 7) - Par.Tasks - Tot.Exec.	DGO1631		●	●	●
ADCPCL8T	Suspension Time (Class 8) - Parallel Tasks	DGO1665		●	●	●
ADCPUTP	CPU Time (Class 7) - Total Execution	DGO1432	●	●	●	●
ADDRPSSC	Drain Lock	DGO0723		●	●	●
ADELCL7C	Elapsed Time (Class 7) - Current Execution	DGO0697		●	●	●
ADGCPSSC	Global Contention - Suspensions	DGO1381		●	●	●
ADIOPSSC	Synchronous I/O - Events	DGO0708	●	●	●	●
ADLLPSSC	Locks and Latches - Events	DGO0705	●	●	●	●
ADLRPSSC	Archive Log Read	DGO0732		●	●	●
ADNACL7T	Not Accounted	DGO0738		●	●	●
ADNOPSSC	Notify Messages - Suspensions	DGO1378		●	●	●
ADPGPSSC	Page Latch	DGO0729		●	●	●
ADSPSSC	Stored Procedures - Suspensions	DGO1389		●	●	●
ADSTPSSC	Services Task Switch	DGO0717	●	●	●	●
ADTCBCL8	Suspension Time (Class 8) - TCB	DGO1664		●	●	●
ADTCCL7L	TCB Time Spent In DB2	DGO0700		●	●	●
ADTSUSCP	Suspensions (Class 8) - Events	DGO0735	●	●	●	●
ADTSUSTP	Suspension Time (Class 8)	DGO0736	●	●	●	●
ADWTCL7T	Waiting Time - Total Execution	DGO1666	●	●	●	●
QPACALOG	Archive Log (quiesce)	DGO0721		●	●	●
QPACARNA	DB2 Entry/Exit Events	DGO0810		●	●	●
QPACAWAR	Archive Log Read	DGO0733		●	●	●
QPACAWCL	Claim Release	DGO0727		●	●	●
QPACAWDR	Drain Lock	DGO0724		●	●	●
QPACAWTE	Services Task Switch	DGO0718	●	●	●	●
QPACAWTG	Notify Messages - Time	DGO1377		●	●	●
QPACAWTI	Synchronous I/O - Elapsed Time	DGO0709	●	●	●	●
QPACAWTJ	Global Contention - Time	DGO1380		●	●	●
QPACAWTL	Locks and Latches - Elapsed Time	DGO0706	●	●	●	●
QPACAWTP	Page Latch	DGO0730		●	●	●
QPACAWTR	Other Read I/O - Elapsed Time	DGO0712	●	●	●	●
QPACAWTW	Other Write I/O	DGO0715	●	●	●	●
QPACCAST	Stored Procedures - Time	DGO1388		●	●	●
QPACCOLN	Collection ID	DGO0696		●	●	●
QPACCONT	Consistency Token	DGO0694		●	●	●
QPACLOCN	Location	DGO0692		●	●	●
QPACPKID	Program Name	DGO0693		●	●	●
QPACSCT	Elapsed Time (Class 7) - Total Execution	DGO0699	●	●	●	●

Field Table

Table 11. Accounting - Package Data (continued)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QPACSQLC	SQL Statements Issued	DGO0695	●	●	●	●
QPACTJST	CPU Time TCB - Class 7- Total Execution	DGO0701		●	●	●

Table 12. Accounting - Query Parallelism

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
ADPARDIS	Parallelism Disabled by RLF	DGO1637		●	●	●
ADPARLEV	Parallelism	DGO1596		●	●	●
ADTOTPFL	Fall Back To Sequential Mode	DGO0684	●	●	●	●
AXXCRAT	Member Skipped (%)	DGO1783		●	●	
QXCOORNO	One DB2 COORDINATOR Parm = NO	DGO1680		●	●	
QXDEGBUF	Fall Back To Sequential Mode - No Buffer	DGO0683	●	●	●	●
QXDEGCUR	Fall Back To Sequential Mode - Cursor	DGO0774	●	●	●	●
QXDEGENC	Fall Back to Seq. - MVS/ESA Enclave Services	DGO1429	●	●	●	●
QXDEGESA	Fall Back To Sequential Mode - No ESA	DGO0682	●	●	●	●
QXISORR	One DB2 Isolation Level	DGO1681		●	●	
QXMAXDEG	Maximum Degree of Parallelism	DGO0171	●	●	●	●
QXNORGRP	Planned Parallel Degree	DGO0174		●	●	●
QXREDGRP	Reduced Parallel Degree	DGO0173	●	●	●	●
QXTOTGRP	Parallel Groups Executed	DGO0773		●	●	●

Table 13. Accounting - RID List Processing

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
ARTTERM	Unsuccessful - Any Reason	DGO0170	●	●	●	●
QXMIAP	Successful	DGO0167		●	●	●
QXMRMIAP	Not Used - Limit Exceeded	DGO0169	●	●	●	●
QXNSMIAP	Not Used - No Storage	DGO0168	●	●	●	●

Table 14. Accounting - SQL Activity (DML, DCL, DDI)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
ADTDDL	Total DDL	DGO0166	●	●	●	●
ASCDCL	Total DCL	DGO0137	●	●	●	●
ASCDML	Total DML	DGO0122	●	●	●	●
ASRIUDCA	Changes/Commit	DGO0127	●	●	●	●
ASTOTALT	Number of Alter Statements Executed	DGO0165		●	●	●
ASTOTCRT	Total	DGO0163		●	●	●
ASTOTDRP	Total	DGO0164		●	●	●
QW0124SP	Stored Procedure	DGO1846		●	●	●
QW01482T	SQL Statement	DGO1863		●	●	●
QXALDAB	Alter Database	DGO0155		●	●	●

Table 14. Accounting - SQL Activity (DML, DCL, DDI) (continued)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QXALOCC	Allocate Cursor	DGO1720		●	●	
QXALOCL	Associate Locators	DGO1719		●	●	
QXALTIX	Alter Index	DGO0149		●	●	●
QXALTST	Alter Stogroup	DGO0152		●	●	●
QXALTTA	Alter Table	DGO0143		●	●	●
QXALTTS	Alter Tablespace	DGO0146		●	●	●
QXCALLAB	Procedure Abends	DGO1392	●	●	●	●
QXCALLRJ	Call Statements Rejected	DGO1394	●	●	●	●
QXCALLTO	Call Statement Timeouts	DGO1393	●	●	●	●
QXCLOSE	Close	DGO0121		●	●	●
QXCMTON	Comment On	DGO0139		●	●	●
QXCON1	Connect Type 1	DGO0133		●	●	●
QXCON2	Connect Type 2	DGO0134		●	●	●
QXCRALS	Create Alias	DGO0160		●	●	●
QXCRDAB	Create Database	DGO0153		●	●	●
QXCRGTT	Create Temp. Table	DGO1654		●	●	
QXCRINX	Create Index	DGO0147		●	●	●
QXCRSTG	Create Stogroup	DGO0150		●	●	●
QXCRSYN	Create Synonym	DGO0156		●	●	●
QXCRTAB	Create Table	DGO0141		●	●	●
QXCTABS	Create Tablespace	DGO0144		●	●	●
QXDEFVU	Create View	DGO0158		●	●	●
QXDELETE	Delete	DGO0115		●	●	●
QXDESC	Describe	DGO0116		●	●	●
QXDRPAL	Drop Alias	DGO0161		●	●	●
QXDRPDB	Drop Database	DGO0154		●	●	●
QXDRPIX	Drop Index	DGO0148		●	●	●
QXDRPPKG	Drop Package	DGO0162		●	●	●
QXDRPST	Drop Stogroup	DGO0151		●	●	●
QXDRPSY	Drop Synonym	DGO0157		●	●	●
QXDRPTA	Drop Table	DGO0142		●	●	●
QXDRPTS	Drop Tablespace	DGO0145		●	●	●
QXDRPVU	Drop View	DGO0159		●	●	●
QXDSCRTB	Describe Table	DGO1626		●	●	●
QXFETCH	Fetch	DGO0120		●	●	●
QXGRANT	Grant	DGO0129		●	●	●
QXINSRT	Insert	DGO0113		●	●	●
QXLABON	Label On	DGO0140		●	●	●
QXLOCK	Lock Table	DGO0128		●	●	●

Field Table

Table 14. Accounting - SQL Activity (DML, DCL, DDI) (continued)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QXOPEN	Open	DGO0119		●	●	●
QXPREP	Prepare	DGO0118		●	●	●
QXREL	Release	DGO0135		●	●	●
QXREVOK	Revoke	DGO0130		●	●	●
QXRNTAB	Rename Table	DGO1851		●	●	
QXSELECT	Select	DGO0112		●	●	●
QXSETCDG	Set Current Degree	DGO0772		●	●	●
QXSETCON	Set Connection	DGO0136		●	●	●
QXSETCRL	Set Current Rules	DGO1390		●	●	●
QXSETHV	Set Host Variable	DGO0132		●	●	●
QXSETSQL	Set Current SQLID	DGO1627		●	●	●
QXUPDTE	Update	DGO0114		●	●	●
RDISTNUM	Statement Number	DGO0837		●	●	●
RDISTYPE	Statement Type	DGO0838		●	●	●
TCONTOK	Consistency Token	DGO0839		●	●	●
TPACKAGE	Package Name	DGO0840		●	●	●
TPKGDDBRM	DBRM Being Executed	DGO0841		●	●	●
TVERSION	Version	DGO0855		●	●	●
T4STMT	SQL Statement	DGO0854		●	●	●

Table 15. Accounting - SQL Nested Activity

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QXCALL	SQL Call	DGO1391		●	●	●

Table 16. Accounting - Termination Conditions, Commit/Rollback, Incremental Binds

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
ADCICSIN	CICS Token Instance	DGO0016		●	●	●
ADCICSLU	CICS Token LU Name	DGO0015		●	●	●
ADCICSNI	CICS Token Network ID	DGO0014		●	●	●
ADCORNMB	Correlation Number	DGO0008		●	●	●
ADCORNME	Correlation Name	DGO0007		●	●	●
ADTHRSTA	Thread Status	DGO0033		●	●	●
ADTHRTYP	Thread Type	DGO0050		●	●	●
QMDAACCT	MVS Accounting Token	DGO0019		●	●	●
QMDAAPPL	Client Application Name	DGO1552		●	●	●
QMDAASTR	Accounting String	DGO0029		●	●	●
QMDAATID	Client Authid	DGO1553		●	●	●
QMDAAUTH	Primauth	DGO0024		●	●	●
QMDACNAM	Connection ID	DGO0827		●	●	●

Table 16. Accounting - Termination Conditions, Commit/Rollback, Incremental Binds (continued)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QMDACORR	Correlation ID	DGO0028		●	●	●
QMDACTYP	Connection Type	DGO0025		●	●	●
QMDALOCN	Location	DGO0021		●	●	●
QMDALUNM	LU Name	DGO0023		●	●	●
QMDANETN	Network ID	DGO0022		●	●	●
QMDAPLAN	Plan Name	DGO0828		●	●	●
QMDAPLAT	Client Platform	DGO1551		●	●	●
QMDAPTYP	Product ID	DGO0020		●	●	●
QMDAPVER	Product Version	DGO1555		●	●	●
QMDASUFEX	DDCS Accounting Suffix	DGO1550		●	●	●
QWACABRT	Rollback	DGO0058	●	●	●	●
QWACCOMM	Commit	DGO0057	●	●	●	●
QWACNID	Recovery Token	DGO0829		●	●	●
QWHCAID	Primauth	DGO0006		●	●	●
QWHCATYL	Connection Type	DGO0830		●	●	●
QWHCATYP	Conntype	DGO0013		●	●	●
QWHCATYS	Connection Type	DGO0831		●	●	●
QWHCCN	Connection ID	DGO0010		●	●	●
QWHCCV	Correlation ID	DGO0009		●	●	●
QWHCOPID	Origauth	DGO0012		●	●	●
QWHCPLAN	Planname	DGO0011		●	●	●
QWHCTOKN	RRSAF Accounting Token	DGO1737		●	●	
QWHDPDPTYP	Product ID	DGO0018		●	●	●
QWHDPDVER	Product Version	DGO1554		●	●	●
QWHDRQNM	Requesting Location	DGO0017		●	●	●
QWHSLOCN	Reporting Location	DGO0001		●	●	●
QWHSLUCC	LUW Sequence Number	DGO0800		●	●	●
QWHSLUNM	LUW LU Name	DGO0798		●	●	●
QWHSLUUV	LUW Instance Number	DGO0799		●	●	●
QWHSNID	LUW Network ID	DGO0797		●	●	●
QW0148RQ	Request Count	DGO0034		●	●	●
QXINCRB	Incremental Bind	DGO0059	●	●	●	●
QXSTDEXP	Cache Limit Exceeded	DGO1806		●	●	
QXSTDINV	Prepare Statement Purged	DGO1807		●	●	
QXSTFND	Prepare Statement Match	DGO1802		●	●	
QXSTIPRP	Implicit Prepare	DGO1804		●	●	
QXSTNFND	Prepare Statement No Match	DGO1803		●	●	
QXSTNPRP	Prepare from Cache	DGO1805		●	●	
QXSTREOP	Reoptimization	DGO1801		●	●	

Field Table

Table 17. Accounting - Timing Data (Elapsed, TCB, Suspensions, and so on)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
ADALSUSC	Archive Log (Quiesce) - Event	DGO0092		●	●	●
ADARSUSC	Other Read I/O - Event	DGO0083	●	●	●	●
ADAWSUSC	Other Write I/O - Event	DGO0086	●	●	●	●
ADCMSUSC	Claim Release - Event	DGO0098		●	●	●
ADCPCL3T	Suspension Time Par. Tasks - Class 3	DGO1668		●	●	●
ADCPUPLL	CPU Time Parallel Tasks - Class 1	DGO1629		●	●	●
ADCPUT	CPU Time - Class 1 in Application	DGO1425	●	●	●	●
ADDBCPC2	CPU Time Parallel Tasks - Class 2	DGO1636		●	●	●
ADDBCPUT	CPU Time - Class 2 in DB2	DGO1426	●	●	●	●
ADDBSRBT	Class 2 SRB Time	DGO0070		●	●	●
ADDBTCBT	CPU Time TCB - Class 2 in DB2	DGO0068		●	●	●
ADDB2ETT	Elapsed Time - Class 2 in DB2	DGO0066	●	●	●	●
ADDRSUSC	Drain Lock - Event	DGO0095		●	●	●
ADDSTOTT	Requester Elapsed Time	DGO0825	●	●	●	●
ADGCSUSC	Global Contention - Event	DGO1376		●	●	●
ADIOSUSC	Synchronous I/O - Event	DGO0079	●	●	●	●
ADLLSUSC	Locks and Latches - Event	DGO0076	●	●	●	●
ADLRSUSC	Archive Log Read - Event	DGO0688		●	●	●
ADNOSUSC	Notify Messages - Event	DGO1374		●	●	●
ADNOTACC	Not Accounted - Class 2 in DB2	DGO0107		●	●	●
ADPGSUSC	Page Latch - Event	DGO0803		●	●	●
ADRECETT	Elapsed Time - Class 1 in Application	DGO0063	●	●	●	●
ADSPSUSC	Stored Procedures - Event	DGO1387		●	●	●
ADSRBT	Class 1 SRB Time	DGO0065		●	●	●
ADSTSUSC	Services Task Switch - Event	DGO0089	●	●	●	●
ADTCBCL3	Suspension Time TCB - Class 3 in DB2	DGO1667		●	●	●
ADTCBT	CPU Time TCB - Class 1	DGO1580		●	●	●
ADTSRBOD	SRB Time Outside DB2	DGO0071		●	●	●
ADTSUSC	Suspensions (Class 3) - Event	DGO0104	●	●	●	●
ADTSUST	Suspension Time (Class 3)	DGO0105	●	●	●	●
ADTTCBOD	CPU Time TCB - Outside DB2	DGO0069		●	●	●
ADTTOTOD	Elapsed Time - Outside DB2	DGO0067		●	●	●
ADTWTAP	Waiting Time - Class 1 in Application	DGO0072	●	●	●	●
ADTWTDB	Waiting Time - Class 2 in DB2	DGO0073	●	●	●	●
ADTWTODB	Waiting Time - Outside DB2	DGO0074		●	●	●
QWACALOG	Archive Log (Quiesce) - Time	DGO0093		●	●	●
QWACARNA	DB2 Entry/Exit - Non Stored Procedures	DGO0075		●	●	●
QWACAWAR	Archive Log Read - Time	DGO0689		●	●	●
QWACAWCL	Claim Release - Time	DGO0099		●	●	●

Table 17. Accounting - Timing Data (Elapsed, TCB. Suspensions, and so on) (continued)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QWACAWDR	Drain Lock - Time	DGO0096		●	●	●
QWACAWTE	Services Task Switch - Time	DGO0090	●	●	●	●
QWACAWTG	Notify Messages - Time	DGO1373		●	●	●
QWACAWTI	Synchronous I/O - Time	DGO0081	●	●	●	●
QWACAWTJ	Global Contention - Time	DGO1375		●	●	●
QWACAWTL	Locks and Latches - Time	DGO0077	●	●	●	●
QWACAWTP	Page Latch - Time	DGO0102		●	●	●
QWACAWTR	Other Read I/O - Time	DGO0084	●	●	●	●
QWACAWTW	Other Write I/O - Time	DGO0087	●	●	●	●
QWACCAST	Stored Procedures - Time	DGO1386		●	●	●
QWACSPCP	CPU Time TCB Stored Proc - Class 1 in Applic.	DGO1383		●	●	●
QWACSPNE	DB2 Entry/Exit - Stored Procedures	DGO1385		●	●	●
QWACSPPT	CPU Time TCB Stored Proc - Class 2 in DB2	DGO1384		●	●	●

Table 18. Statistics - Authorization Management

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QTAUCCH	Authorization Succ. W/o Catalog Access	DGO0460		●	●	●
QTAUCHK	Authorization Attempts	DGO0458		●	●	●
QTAUPUB	Authorization Successful Public Plan	DGO0461		●	●	●
QTAUSUC	Authorization Successful	DGO0459		●	●	●
QTPACAUT	Package Authorization Management - Successful	DGO1774		●	●	
QTPACNOT	P. A. M. Unsuccessful - Catalog Required	DGO1776		●	●	
QTPACOW1	P. A. M. - Overwritten Authid in Cache	DGO1777		●	●	
QTPACOW2	P. A. M. - Overwritten in Cache	DGO1778		●	●	
QTPACPUB	P. A. M. - Successful Public	DGO1775		●	●	

Table 19. Statistics - Buffer Pool Activity

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QBSTARA	Hiperpool Reads Asynchr. With ADMF	DGO0753		●	●	●
QBSTARF	Hiperpool Reads Unsucc. With ADMF	DGO0752	●	●	●	●
QBSTAWA	Hiperpool Pages Written Asynchr. with ADMF	DGO0751		●	●	●
QBSTAWF	Hiperpool Pages Written Unsucc. With ADMF	DGO0750	●	●	●	●
QBSTCBA	Current Active Buffers	DGO0331	●	●	●	●
QBSTDIO	Dynamic Prefetch Reads	DGO0359	●	●	●	●
QBSTDMC	DM Critical Threshold Reached	DGO0376	●	●	●	●
QBSTDPF	Dynamic Prefetch Requested	DGO0358	●	●	●	●
QBSTDPP	Dynamic Prefetch Pages Read	DGO0360	●	●	●	●
QBSTDSO	Successful Data Set Opens	DGO0335	●	●	●	●

Field Table

Table 19. Statistics - Buffer Pool Activity (continued)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QBSTDWT	Deferred Write Threshold Reached	DGO0373	●	●	●	●
QBSTDWV	Thresholds Reached - Vertical Deferred Write	DGO0374	●	●	●	●
QBSTGET	Getpage Request Total	DGO0343		●	●	●
QBSTHBE	Hiperpool Buffers Backed	DGO0754		●	●	●
QBSTHPA	Hiperpool Expansions or Contractions	DGO0342	●	●	●	●
QBSTHPL	Buffers Allocated for Hiperpool	DGO0340	●	●	●	●
QBSTHRA	Hiperpool Reads Asynchr. W/o ADMF	DGO0366		●	●	●
QBSTHRE	Hiperpool Read Sequential	DGO0364		●	●	●
QBSTHRF	Hiperpool Reads Unsucc. W/o ADMF	DGO0365	●	●	●	●
QBSTHWA	Hiperpool Pages Written Asynchr. Without ADMF	DGO0379		●	●	●
QBSTHWF	Hiperpool Pages Written Unsucc. Without ADMF	DGO0378	●	●	●	●
QBSTHWR	Hiperpool Pages Written Synchronously	DGO0377		●	●	●
QBSTIMW	Synchronous Writes	DGO0370	●	●	●	●
QBSTJIS	Pref. I/O Streams - Reduced - Buffer Shortage	DGO0384	●	●	●	●
QBSTLIO	List Prefetch Reads	DGO0355	●	●	●	●
QBSTLPP	List Prefetch Pages Read	DGO0356	●	●	●	●
QBSTLPP	List Prefetch Pages Read	DGO0356	●	●	●	●
QBSTLPP	List Prefetch Pages Read	DGO0356	●	●	●	●
QBSTMAX	Not Created - No Buffer	DGO0394	●	●	●	●
QBSTMIG	DFHSM Migrated Data Sets	DGO0336	●	●	●	●
QBSTNGT	Unsuccessful Page Requests	DGO1862		●	●	●
QBSTPID	Buffer Pool ID	DGO0330		●	●	●
QBSTPIO	Sequential Prefetch Reads	DGO0351	●	●	●	●
QBSTPL1	Prefetch Quantity Reduced To 1/2	DGO0387	●	●	●	●
QBSTPL2	Prefetch Quantity Reduced To 1/4	DGO0388	●	●	●	●
QBSTPQF	Reduced Parallel Query Requests	DGO0386	●	●	●	●
QBSTPQO	Parallel Query Requests	DGO0385		●	●	●
QBSTPWS	Pages Written	DGO0368	●	●	●	●
QBSTREE	Prefetch Disabled No Read Engine	DGO0363	●	●	●	●
QBSTRIO	Synchronous Reads Total	DGO0346	●	●	●	●
QBSTRPI	Page-ins Required for Read I/O	DGO0815	●	●	●	●
QBSTRTO	DFHSM Recall Timeouts	DGO0337	●	●	●	●
QBSTSEQ	Sequential Prefetch Requested	DGO0350	●	●	●	●
QBSTSGT	Getpage Request Sequential Access Only	DGO0344		●	●	●
QBSTSIO	Synchronous Reads Sequential Access Only	DGO0347	●	●	●	●
QBSTSPD	Prefetch Disabled No Buffer	DGO0362	●	●	●	●
QBSTSPP	Sequential Prefetch Pages Read	DGO0352	●	●	●	●
QBSTSWS	Buffer Updates	DGO0367	●	●	●	●

Table 19. Statistics - Buffer Pool Activity (continued)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QBSTVPA	Alter Buffer Pool Expansions and Contractions	DGO0341	●	●	●	●
QBSTVPL	Buffers Allocated for Virtual Buffer Pool	DGO0339		●	●	●
QBSTWBVQ	Pages Not Written	DGO0398	●	●	●	●
QBSTWDRP	Pages Marked To Destruct	DGO0397	●	●	●	●
QBSTWEE	Write Engine Not Available	DGO0375	●	●	●	●
QBSTWFD	Workfile Request Rejected - Low Buffers	DGO0392	●	●	●	●
QBSTWFF	Degraded - Low Buffers	DGO0391	●	●	●	●
QBSTWFM	Maximum Concurrent Work Files	DGO0389	●	●	●	●
QBSTWFR	Merge Passes Requested	DGO0390		●	●	●
QBSTWFT	Requested for All Merge Pass	DGO0393		●	●	●
QBSTWIO	Asynchronous Writes	DGO0371	●	●	●	●
QBSTWKPD	Prefetch Not Scheduled - Zero Quantity	DGO0396	●	●	●	●
QBSTWPI	Page-ins Required for Write I/O	DGO0816	●	●	●	●
QBSTXFL	Buffer Pool Full	DGO0333	●	●	●	●
QBSTXFV	Virtual Storage Unavailable	DGO0334	●	●	●	●
QBSTXIS	Prefetch I/O Streams, Concurrent Str. - HWM	DGO0383	●	●	●	●
SBRBUPW	Buffer Updates / Pages Written	DGO0369		●	●	●
SBRBUTP	Virtual Buffer Pool Pages in Use (%)	DGO0805	●	●	●	●
SBRGPRIO	Getpage per Synchronous Read Random	DGO0349		●	●	●
SBRPPRIO	Seq. Prefetch Pages Read / Seq. Prefetch Read	DGO0353		●	●	●
SBRPWWIO	Pages Written per Write I/O	DGO0372		●	●	●
SDDPPPIO	Dynamic Prefetch Pages Read / Dyn. Pref. Read	DGO0361		●	●	●
SDGETRAN	Getpage Request - Random	DGO0345		●	●	●
SDLPPPIO	List Prefetch Pages Read / List Prefetch Read	DGO0357		●	●	●
SDSTRAN	Synchronous Reads - Random	DGO0348	●	●	●	●

Table 20. Statistics - Data Capture Activity

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QWSDCDDD	Data Descriptions Returned	DGO0634		●	●	●
QWSDCDDR	Data Rows Returned	DGO0632		●	●	●
QWSDCDLC	Log Records Captured	DGO0629		●	●	●
QWSDCDLR	Log Reads Performed	DGO0630		●	●	●
QWSDCDMB	Describes Performed	DGO0633		●	●	●
QWSDCDRR	Log Records Returned	DGO0631		●	●	●
QWSDCDTB	Tables Returned	DGO0635		●	●	●

Field Table

Table 21. Statistics - Data Sharing Locking Activity

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QTGSCHNP	P-lock Negotiation - Change	DGO1335		●	●	●
QTGSCPLK	P-locks - Change Requests	DGO1319		●	●	●
QTGSCSLM	Synchronous XES - Change Requests	DGO1321		●	●	●
QTGSDRTA	Incompatible Retained Lock	DGO1327	●	●	●	●
QTGSFLSE	Suspensions - False Contention	DGO1326		●	●	●
QTGSIGLO	Suspensions - IRLM Global Contention	DGO1324		●	●	●
QTGSKIDS	Asynchronous XES - Resources	DGO1323		●	●	●
QTGSLPLK	P-locks - Lock Requests	DGO1317		●	●	●
QTGSLSLM	Synchronous XES - Lock Requests	DGO1320		●	●	●
QTGSNTFR	Notify Messages Received	DGO1329		●	●	●
QTGSNTFY	Notify Messages Sent	DGO1328		●	●	●
QTGSOTPE	P-lock Negotiation - Other	DGO1334		●	●	●
QTGSPEMX	P-Lock/Notify Exists - Maximum Engines	DGO1330		●	●	●
QTGSPEQW	P-locks/Notify Exists - Engines Unavailable	DGO1331	●	●	●	●
QTGSPGPE	P-lock Negotiation - Page	DGO1333		●	●	●
QTGSPPE	P-lock Negotiation - Pageset/Partition	DGO1332		●	●	●
QTGSSGLO	Suspensions - Global Contention	DGO1325		●	●	●
QTGSUPLK	P-locks - Unlock Requests	DGO1318		●	●	●
QTGSUSLM	Synchronous XES - Unlock Requests	DGO1322		●	●	●
SBUFFRAT	Buffer Pool Hit Ratio (%)	DGO1772		●	●	●
SFLSERAT	False Contention Rate (%)	DGO1771		●	●	●
SGLOBRAT	Global Contention Rate (%)	DGO1770		●	●	●

Table 22. Statistics - DB2 Application Programming Interface

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QWSDSCA	Abends	DGO0583	●	●	●	●
QWSDSCCO	Command Requests	DGO0585		●	●	●
QWSDSCRA	READA Requests	DGO0586		●	●	●
QWSDSCRS	READS Requests	DGO0587		●	●	●
QWSDSCU	Unrecognized	DGO0584		●	●	●
QWSDSCWR	WRITE Requests	DGO0588		●	●	●
SDIFITOT	Total number of calls made to IFI	DGO0589	●	●	●	●

Table 23. Statistics - DB2 Commands

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
Q9STCTRA	Stop DB2	DGO0552		●	●	●
Q9STCTRB	Term Utility	DGO0557		●	●	●
Q9STCTRC	Display Trace	DGO0539		●	●	●
Q9STCTRD	RESET GENERICLU	DGO1545		●	●	●

Table 23. Statistics - DB2 Commands (continued)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
Q9STCTRE	Start RLIMIT	DGO0548		●	●	●
Q9STCTRF	Stop RLIMIT	DGO0553		●	●	●
Q9STCTRG	DISPLAY RLIMIT	DGO0540		●	●	●
Q9STCTRH	Modify Trace	DGO0555		●	●	●
Q9STCTRI	Start DDF	DGO0549		●	●	●
Q9STCTRJ	Stop DDF	DGO0554		●	●	●
Q9STCTRK	Cancel DDF Thread	DGO0556	●	●	●	●
Q9STCTRL	Display Location	DGO0541		●	●	●
Q9STCTRM	Archive Log	DGO0561		●	●	●
Q9STCTRN	Alter Bufferpool	DGO0544	●	●	●	●
Q9STCTRO	Display Bufferpool	DGO0543		●	●	●
Q9STCTRP	Set Archive	DGO0562		●	●	●
Q9STCTRQ	Display Archive	DGO0542		●	●	●
Q9STCTRR	Reset Indoubt	DGO0560		●	●	●
Q9STCTRS	ALTER GROUPBUFFERPOOL	DGO1361	●	●	●	●
Q9STCTRRT	DISPLAY GROUPBUFFERPOOL	DGO1360		●	●	●
Q9STCTRU	DISPLAY PROCEDURE	DGO1456		●	●	●
Q9STCTRV	START PROCEDURE	DGO1457		●	●	●
Q9STCTRW	STOP PROCEDURE	DGO1458		●	●	●
Q9STCTRX	DISPLAY GROUP	DGO1544		●	●	●
Q9STCTR0	Display Database	DGO0536		●	●	●
Q9STCTR1	Display Thread	DGO0537		●	●	●
Q9STCTR2	Display Utility	DGO0538		●	●	●
Q9STCTR3	Recover BSDS	DGO0558		●	●	●
Q9STCTR4	Recover Indoubt	DGO0559		●	●	●
Q9STCTR5	Start Database	DGO0545		●	●	●
Q9STCTR6	Start Trace	DGO0546	●	●	●	●
Q9STCTR7	Start DB2	DGO0547		●	●	●
Q9STCTR8	Stop Database	DGO0550		●	●	●
Q9STCTR9	Stop Trace	DGO0551		●	●	●
Q9STEROR	Unrecognized Commands	DGO0563		●	●	●
SDSTOTL	Total number of DB2 commands issued	DGO0564	●	●	●	●

Table 24. Statistics - DB2 Destination Data

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
SDIGTFNW	GTF Not Written	DGO0596		●	●	●
SDIGTFRA	GTF Not Accepted	DGO0597		●	●	●
SDIGTFWF	GTF Write Failure	DGO0598		●	●	●
SDIGTFWR	GTF Written	DGO0595		●	●	●

Field Table

Table 24. Statistics - DB2 Destination Data (continued)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
SDIOP1NW	OP1 Not Written	DGO0600		●	●	●
SDIOP1RA	OP1 Not Accepted	DGO0601		●	●	●
SDIOP1WR	OP1 Written	DGO0599		●	●	●
SDIOP2NW	OP2 Not Written	DGO0603		●	●	●
SDIOP2RA	OP2 Not Accepted	DGO0604		●	●	●
SDIOP2WR	OP2 Written	DGO0602		●	●	●
SDIOP3NW	OP3 Not Written	DGO0606		●	●	●
SDIOP3RA	OP3 Not Accepted	DGO0607		●	●	●
SDIOP3WR	OP3 Written	DGO0605		●	●	●
SDIOP4NW	OP4 Not Written	DGO0609		●	●	●
SDIOP4RA	OP4 Not Accepted	DGO0610		●	●	●
SDIOP4WR	OP4 Written	DGO0608		●	●	●
SDIOP5NW	OP5 Not Written	DGO0612		●	●	●
SDIOP5RA	OP5 Not Accepted	DGO0613		●	●	●
SDIOP5WR	OP5 Written	DGO0611		●	●	●
SDIOP6NW	OP6 Not Written	DGO0615		●	●	●
SDIOP6RA	OP6 Not Accepted	DGO0616		●	●	●
SDIOP6WR	OP6 Written	DGO0614		●	●	●
SDIOP7NW	OP7 Not Written	DGO0618		●	●	●
SDIOP7RA	OP7 Not Accepted	DGO0619		●	●	●
SDIOP7WR	OP7 Written	DGO0617		●	●	●
SDIOP8NW	OP8 Not Written	DGO0621		●	●	●
SDIOP8RA	OP8 Not Accepted	DGO0622		●	●	●
SDIOP8WR	OP8 Written	DGO0620		●	●	●
SDIRTTWR	RES Written	DGO0623		●	●	●
SDISMFBF	SMF Buffer Overrun	DGO0593	●	●	●	●
SDISMFNW	SMF Not Written	DGO0591		●	●	●
SDISMFRA	SMF Not Accepted	DGO0592		●	●	●
SDISMFWF	SMF Write Failure	DGO0594		●	●	●
SDISMFWR	SMF Written	DGO0590		●	●	●
SDTOTNA	Total number of IFC records not accepted	DGO0626	●	●	●	●
SDTOTNW	Total number of IFC records not written	DGO0625	●	●	●	●
SDTOTW	Total number of IFC records succ. written	DGO0624	●	●	●	●
SDTOTWF	Total number of IFC write failures	DGO0628	●	●	●	●

Table 25. Statistics - DB2 Instrumentation

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
SDBSCRNW	System Parameters - Buffer Pools	DGO0578		●	●	●
SDBSCRSW	System Parameters - Buffer Pools	DGO0577		●	●	●

Table 25. Statistics - DB2 Instrumentation (continued)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
SDIACTN	Accounting (not written)	DGO0570		●	●	●
SDIACTW	Accounting (written)	DGO0569		●	●	●
SDIAUDN	Audit (not written)	DGO0580		●	●	●
SDIAUDW	Audit (written)	DGO0579		●	●	●
SDIDRRN	Database Related (not written)	DGO0568		●	●	●
SDIDRRW	Database Related (written)	DGO0567		●	●	●
SDISRRN	System Related (not written)	DGO0566		●	●	●
SDISRRW	System Related (written)	DGO0565		●	●	●
SDISTPN	Stop Trace (not written)	DGO0574		●	●	●
SDISTPW	Stop Trace (written)	DGO0573		●	●	●
SDISTRN	Start Trace (not written)	DGO0572		●	●	●
SDISTRW	Start Trace (written)	DGO0571		●	●	●
SDIZPMN	Dsnzparm (not written)	DGO0576		●	●	●
SDIZPMW	Dsnzparm (written)	DGO0575		●	●	●
SDTSCRNW	Total count of all DB2 records not written	DGO0582	●	●	●	●
SDTSCRSW	Total count of all DB2 records written	DGO0581	●	●	●	●

Table 26. Statistics - Distributed Data Facility - per Location

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QLSTABRR	Rollbacks Received	DGO0650		●	●	●
QLSTABRS	Rollbacks Sent	DGO0649		●	●	●
QLSTBKRC	Two Phase Backout Requests Received	DGO0668		●	●	●
QLSTBKSE	Two Phase Backout Requests	DGO0667		●	●	●
QLSTBRBF	Blocks Received	DGO0660	●	●	●	●
QLSTBROW	Message Buffer Rows	DGO0658	●	●	●	●
QLSTBTBF	Blocks Sent	DGO0659	●	●	●	●
QLSTBYTR	Bytes Received	DGO0656		●	●	●
QLSTBYTS	Bytes Sent	DGO0655		●	●	●
QLSTCBLB	Limited Block Fetch	DGO0657	●	●	●	●
QLSTCNVQ	Conversations Queued	DGO0643	●	●	●	●
QLSTCNVR	Conversations Received	DGO0642		●	●	●
QLSTCNVS	Conversations Sent	DGO0641		●	●	●
QLSTCOMR	Commits Received	DGO0648		●	●	●
QLSTCOMS	Commits Sent	DGO0647		●	●	●
QLSTCPTR	Commits Performed	DGO0676		●	●	●
QLSTCRRC	Two Phase Commit Requests Received	DGO0666		●	●	●
QLSTCRSE	Two Phase Commit Requests Sent	DGO0665		●	●	●
QLSTINDT	Thread Went Indoubt	DGO0675	●	●	●	●
QLSTLARC	Last Agent Requests Received	DGO0664		●	●	●

Field Table

Table 26. Statistics - Distributed Data Facility - per Location (continued)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QLSTLASE	Last Agent Requests Sent	DGO0663		●	●	●
QLSTLOCN	Remote Location	DGO0638		●	●	●
QLSTMSGR	Messages Received	DGO0654		●	●	●
QLSTMSGGS	Messages Sent	DGO0653		●	●	●
QLSTPRRC	Prepare Requests Received	DGO0662		●	●	●
QLSTPRSE	Prepare Requests Sent	DGO0661		●	●	●
QLSTRBND	Statements Bound	DGO0644	●	●	●	●
QLSTRBTR	Rollbacks Performed	DGO0677		●	●	●
QLSTROWR	Rows Received	DGO0652		●	●	●
QLSTROWS	Rows Sent	DGO0651		●	●	●
QLSTRRRC	Forget Responses Received	DGO0670		●	●	●
QLSTRRSE	Forget Responses Sent	DGO0669		●	●	●
QLSTSQLR	SQL Statements Received	DGO0646	●	●	●	●
QLSTSQLS	SQL Statements Sent	DGO0645	●	●	●	●
QLSTTRNR	Transactions Received	DGO0640		●	●	●
QLSTTRNS	Transactions Sent	DGO0639		●	●	●
QLSTVNRC	Backout Responses Received	DGO0674		●	●	●
QLSTVNSE	Backout Responses Sent	DGO0673		●	●	●
QLSTVYRC	Commit Responses Received	DGO0672		●	●	●
QLSTVYSE	Commit Responses Sent	DGO0671		●	●	●

Table 27. Statistics - Distributed Data Facility - Global

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QDSTCNAT	Active DBATs - Currently	DGO1616		●	●	●
QDSTCSTR	Cold Start Connections	DGO0762	●	●	●	●
QDSTHWAT	Active DBATs - high water mark	DGO1617	●	●	●	●
QDSTHWDT	Total DBATs - high water mark	DGO1618	●	●	●	●
QDSTQCIT	Inactive DBATs - Currently	DGO0760		●	●	●
QDSTQCRT	Conversions Deallocated-Maximum Connected	DGO0759		●	●	●
QDSTQDBT	DBAT Queued-Maximum Active	DGO0758	●	●	●	●
QDSTQMIT	Inactive DBATs - HWM	DGO0761	●	●	●	●
QDSTRSAT	Resynchronization Attempted	DGO0764	●	●	●	●
QDSTRSSU	Resynchronization Succeeded	DGO0765	●	●	●	●
QDSTWSTR	Warm Start Connections	DGO0763	●	●	●	●

Table 28. Statistics - EDM Pool Activity

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QISECT	Pages Used for CT	DGO0402		●	●	●
QISECTG	Requests for CT Sections	DGO0408		●	●	●

Table 28. Statistics - EDM Pool Activity (continued)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QISECTL	CT Section Not Found In EDM Pool	DGO0409	●	●	●	●
QISEDDBD	Pages Used for DBD	DGO0403		●	●	●
QISEDDBG	Requests for DBD Sections	DGO0414		●	●	●
QISEDBDL	DBD Section Not Found In EDM Pool	DGO0415	●	●	●	●
QISEDYNI	Inserts for Dynamic Cache	DGO1825		●	●	
QISEDYNP	Pages Used for Cache	DGO1827		●	●	
QISEDYNR	Requests for Dynamic Cache Section	DGO1826		●	●	
QISEFAIL	EDM Pool Full	DGO0407	●	●	●	●
QISEFREE	Free Pages In Free Chain	DGO0401		●	●	●
QISEKT	Pages Used for PT	DGO0405		●	●	●
QISEKTG	Requests for PT Sections	DGO0411		●	●	●
QISEKTL	PT Sections Not Found In EDM Pool	DGO0412	●	●	●	●
QISEPAGE	Pages In EDM Pool	DGO0399		●	●	●
QISESKCT	Pages Used for Skct	DGO0404		●	●	●
QISESKPT	Pages Used for Skpt	DGO0406		●	●	●
QXSTDEXP	Kept Dynamic Statement Discarded	DGO1823		●	●	
QXSTDINV	Dynamic Cache Statement Purged	DGO1824		●	●	
QXSTFND	Prepares Satisfied	DGO1819		●	●	
QXSTIPRP	Prepares Implicit	DGO1821		●	●	
QXSTNFND	Prepares Received	DGO1820		●	●	
QXSTNPRP	Prepares Avoided	DGO1822		●	●	
SERBUTP	EDM Pool Pages In Use (%)	DGO0400		●	●	●
SERCTLR	CT Requests / CT Not In EDM Pool	DGO0410	●	●	●	●
SERDBLR	DBD Requests / DBD Not In EDM Pool	DGO0416	●	●	●	●
SERPTLR	PT Requests / PT Not In EDM	DGO0413	●	●	●	●

Table 29. Statistics - Global Group Buffer Pool Statistics

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QBGBGCK	Checkpoint Interval (Minutes)	DGO1587		●	●	●
QBGBGCT	Class Castout Threshold (%)	DGO1585		●	●	●
QBGBGDR	Actual Directory Entries	DGO1588		●	●	●
QBGBGDT	Actual Data Entries	DGO1589		●	●	●
QBGBGGT	Buffer Pool Castout Threshold (%)	DGO1586		●	●	●
QBGBGR1	Current Directory to Data Ratio	DGO1584		●	●	●
QBGBGR2	Pending Directory to Data Ratio	DGO1590		●	●	●
QBGBGSZ	Allocated Buffer Pool Size (4k)	DGO1583		●	●	●
QW0254CC	Castout	DGO1575	●	●	●	●
QW0254DE	Directory Entry	DGO1576	●	●	●	●
QW0254DR	Directory Entry Reclaim	DGO1571	●	●	●	●

Field Table

Table 29. Statistics - Global Group Buffer Pool Statistics (continued)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QW0254GN	Group Buffer Pool Name	DGO1562		●	●	●
QW0254RD	Read Miss Directory Hit	DGO1565	●	●	●	●
QW0254RF	Read Miss Cache Full	DGO1567	●	●	●	●
QW0254RH	Read Hit	DGO1563	●	●	●	●
QW0254RN	Read Miss Name Assignment	DGO1566	●	●	●	●
QW0254RS	Read Miss Assignment Suppressed	DGO1564	●	●	●	●
QW0254TC	Total Changed	DGO1578	●	●	●	●
QW0254TE	Data Entry	DGO1577	●	●	●	●
QW0254TR	Data Entry Reclaim	DGO1570	●	●	●	●
QW0254WC	Clean Page Write Hit	DGO1569	●	●	●	●
QW0254WF	Write Miss Cache Full	DGO1572	●	●	●	●
QW0254WH	Changed Page Write Hit	DGO1568	●	●	●	●
QW0254XR	XI Directory Entry Reclaim	DGO1573	●	●	●	●

Table 30. Statistics - Group Buffer Pools Activity

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QBGLAC	Clean Pages Written Asynchronously	DGO1356	●	●	●	●
QBGLAD	Asynchronous Reads - Data Returned	DGO1342	●	●	●	●
QBGLAN	Asynchronous reads - No read/write interest	DGO1344		●	●	●
QBGLAW	Changed Pages Written Asynchronously	DGO1346	●	●	●	●
QBGLAX	Register page list request	DGO1656	●	●	●	●
QBGLAY	Changed pages - Read after register page list	DGO1657	●	●	●	●
QBGLAZ	Clean pages - Read after register page list	DGO1658	●	●	●	●
QBGLCC	Read Castout Class	DGO1731		●	●	
QBGLCK	GBP Checkpoints Triggered	DGO1733		●	●	
QBGLCN	Castout Engine Unavailable	DGO1350	●	●	●	●
QBGLCS	Read Castout Statistics	DGO1732		●	●	
QBGLCT	Castout Class Threshold	DGO1348	●	●	●	●
QBGLDG	Unregister Page	DGO1729		●	●	
QBGLDN	Delete Name	DGO1726		●	●	
QBGLGN	Group Bufferpool ID	DGO1366		●	●	●
QBGLGT	Group Bufferpool Castout Threshold	DGO1349	●	●	●	●
QBGLMD	Synchronous Reads Not Found - Data Returned	DGO1339	●	●	●	●
QBGLMN	Synchr. Reads Not Found - No R/W Interest	DGO1341		●	●	●
QBGLMR	Sync. Read (Not Found) - No Data Returned	DGO1340		●	●	●
QBGLOS	Read Storage Statistics	DGO1760		●	●	
QBGLRB	Participation in GBP Rebuild	DGO1734		●	●	
QBGLRC	Pages Castout	DGO1347	●	●	●	●
QBGLRD	Read Directory Info	DGO1727		●	●	

Table 30. Statistics - Group Buffer Pools Activity (continued)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QBGLRF	Read Failed - No Storage	DGO1352	●	●	●	●
QBGLRG	Register Page	DGO1728		●	●	
QBGLSU	Write Engine Unavailable	DGO1351	●	●	●	●
QBGLSW	Changed Pages Written Synchronously	DGO1345	●	●	●	●
QBGLUN	Unlock Castout	DGO1730		●	●	
QBGLWC	Clean Pages Written Synchronously	DGO1355	●	●	●	●
QBGLWF	Write Failed - No Storage	DGO1353	●	●	●	●
QBGLXD	Synchr. Reads Cross Valid. - Data Returned	DGO1336	●	●	●	●
QBGLXN	Synchr. Reads Cross Valid. - No R/W Interest	DGO1338		●	●	●
QBGLXR	Synchronous Read (XI) - No Data Returned	DGO1337		●	●	●

Table 31. Statistics - Locking Activity

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QTXACHG	Change Requests	DGO0480		●	●	●
QTXACLNO	Claim Requests	DGO0486		●	●	●
QTXACLUN	Unsuccessful Claim Requests	DGO0487	●	●	●	●
QTXADEA	Deadlocks	DGO0476	●	●	●	●
QTXADRNO	Drain Requests	DGO0484		●	●	●
QTXADRUN	Unsuccessful Drain Requests	DGO0485	●	●	●	●
QTXAIRLM	Other Requests	DGO0481		●	●	●
QTXALES	Lock Escalation (shared)	DGO0482	●	●	●	●
QTXALEX	Lock Escalation (exclusive)	DGO0483	●	●	●	●
QTXALOCK	Lock Requests	DGO0477		●	●	●
QTXAQRY	Query Requests	DGO0479		●	●	●
QTXASLAT	Suspensions (latch only)	DGO0473		●	●	●
QTXASLOC	Suspensions (lock only)	DGO0472	●	●	●	●
QTXASOTH	Suspensions (other)	DGO0474		●	●	●
QTXATIM	Timeouts	DGO0475	●	●	●	●
QTXAUNLK	Unlock Requests	DGO0478		●	●	●
SLCLKET	Lock Escalations	DGO0768	●	●	●	●
SLRLCRLS	Lock and Change Requests per Lock Suspension	DGO0808		●	●	●
SLRSUSP	Suspensions (all)	DGO0471	●	●	●	●

Table 32. Statistics - Log Activity

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QJSTALR	Archive Log Read Allocations	DGO0519		●	●	●
QJSTALW	Archive Log - Write Allocations	DGO0520		●	●	●
QJSTBFFL	Control Intervals Created	DGO0518		●	●	●
QJSTBFWR	Write Output Log Buffers	DGO0515		●	●	●

Field Table

Table 32. Statistics - Log Activity (continued)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QJSTBSDS	Total BSDS Access Request	DGO0516		●	●	●
QJSTCIOF	Archive Log - Control Intervals Offloaded	DGO0807		●	●	●
QJSTLAMA	Look Ahead Mounts Attempted	DGO0512		●	●	●
QJSTLAMAS	Look Ahead Mount Successful	DGO0513		●	●	●
QJSTRACT	Reads Satisfied - Active Log	DGO0505	●	●	●	●
QJSTRARH	Reads Satisfied - Archive Log	DGO0507	●	●	●	●
QJSTRBUF	Reads Satisfied - Output Buffer	DGO0503	●	●	●	●
QJSTTVVC	Reads Delayed - Tape Volume Contention	DGO0510	●	●	●	●
QJSTWRNW	Write-no-wait	DGO0514		●	●	●
QJSTWTB	Unavailable Output Log Buffers	DGO0517	●	●	●	●
QJSTWUR	Reads Delayed - Unavailable Resource	DGO0511	●	●	●	●
SARLRACT	Reads Satisfied - Active Log(%)	DGO0506		●	●	●
SARLRARC	Reads Satisfied - Archive Log(%)	DGO0508		●	●	●
SARLRBUF	Reads Satisfied - Output Buffer(%)	DGO0504		●	●	●
SARWBAC	Out Log Buf Writes / Act. Log Cntl I'val	DGO0806	●	●	●	●

Table 33. Statistics - Miscellaneous

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QISTCOLS	Columns Bypassed	DGO0770		●	●	●
QWSDLR	Log RBA	DGO0636		●	●	●
QWSDRINV	Reason Invoke	DGO0637		●	●	●

Table 34. Statistics - Open/Close Activity

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QTDSDRN	Data Sets Closed Threshold Reached	DGO0426	●	●	●	●
QTDSOPN	Open Data Sets - Current	DGO0418	●	●	●	●
QTMAXDS	Open Data Sets - HWM	DGO0417	●	●	●	●
QTMAXPB	Open Data Sets - Not In Use, Not Closed (HWM)	DGO0422	●	●	●	●
QTPCCT	Data Sets Converted R/W To R/O	DGO0755	●	●	●	●
QTREOPN	Successful Logical Reopens	DGO0429		●	●	●
QTSLWDD	Open DSs - Not In Use, Not Closed (current)	DGO0420	●	●	●	●
SDINUSEC	Open Data Sets In Use	DGO0757	●	●	●	●

Table 35. Statistics - Plan/Package Processing

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QTABIND	Autobind Plan Successful	DGO0442	●	●	●	●
QTABINDA	Autobind Plan Attempts	DGO0441	●	●	●	●
QTALLOC	Plan Allocation Successful	DGO0431		●	●	●
QTALLOCA	Plan Allocation Attempts	DGO0430		●	●	●

Table 35. Statistics - Plan/Package Processing (continued)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QTAUTOBA	Auto Bind Package Attempts	DGO0444	●	●	●	●
QTBINDA	Bind Plan Add Subcommands	DGO0435		●	●	●
QTBINDPA	Bind Package Add Subcommand	DGO0439		●	●	●
QTBINDPR	Bind Package Replace Subcommand	DGO0440		●	●	●
QTBINDR	Bind Plan Replace Subcommands	DGO0436		●	●	●
QTFREE	Free Plan Subcommands	DGO0452		●	●	●
QTFREEA	Free Plan Attempts	DGO0453		●	●	●
QTFREEAP	Free Package Attempts	DGO0456		●	●	●
QTFREEP	Free Package Subcommands	DGO0455		●	●	●
QTINVRID	Autobind Plan Invalid Resource ID	DGO0443	●	●	●	●
QTPKABND	Auto Bind Packages Successful	DGO0445	●	●	●	●
QTPKALL	Package Allocation Successful	DGO0433		●	●	●
QTPKALLA	Package Allocation Attempts	DGO0432		●	●	●
QTPKGBD	Packages Bound	DGO0438		●	●	●
QTPKGFRD	Free Package Successful	DGO0457		●	●	●
QTPKGRBD	Rebind Package Successful	DGO0451		●	●	●
QTPLNBD	Plans Bound	DGO0434		●	●	●
QTPLNFRD	Free Plan Successful	DGO0454		●	●	●
QTPLNRBD	Rebind Plan Successful	DGO0448		●	●	●
QTRBINDA	Rebind Plan Attempts	DGO0447		●	●	●
QTRBINDP	Rebind Package Subcommands	DGO0449		●	●	●
QTRBNDPA	Rebind Package Attempts	DGO0450		●	●	●
QTRBIND	Rebind Plan Subcommands	DGO0446		●	●	●
QTTESTB	Test Binds No Plan-ID	DGO0437		●	●	●

Table 36. Statistics - Query Parallelism

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QXCOORNO	One DB2 - COORDINATOR Parm = NO	DGO1672		●	●	
QXDEGBUF	Fall To Sequential Mode (no buffer)	DGO0327	●	●	●	●
QXDEGCUR	Fall To Sequential Mode Cursor	DGO0748	●	●	●	●
QXDEGENC	MVS/ESA Enclave Services	DGO1359	●	●	●	●
QXDEGESA	Fall To Sequential Mode No ESA	DGO0747	●	●	●	●
QXISORR	One DB2 - Isolation Level	DGO1673		●	●	
QXMAXDEG	Maximum Degree of Parallelism	DGO0326		●	●	●
QXNORGRP	Planned Parallel Degree	DGO0329		●	●	●
QXREDGRP	Reduced Parallel Degree	DGO0328	●	●	●	●
QXTOTGRP	Parallel Groups Executed	DGO0749		●	●	●
SDTOTPFL	Parallel Fall To Sequential	DGO0746	●	●	●	●
SXXCRAT	Member Skipped (%)	DGO1798		●	●	

Field Table

Table 37. Statistics - RID List Processing

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QISTRCUR	RID Blocks Allocated - Current	DGO0466		●	●	●
QISTRHIG	RID Blocks Allocated - Maximum	DGO0465	●	●	●	●
QISTRLLM	Terminated - RDS Limit Exceeded	DGO0468	●	●	●	●
QISTRMAX	Terminated - Process Limit Exceeded	DGO0470	●	●	●	●
QISTRPLM	Terminated - DM Limit Exceeded	DGO0469	●	●	●	●
QISTRSTG	Terminated - No Storage	DGO0467	●	●	●	●
SRTTERM	Number of Times RID List Processing Not Used	DGO0767	●	●	●	●

Table 38. Statistics - SQL Activity (DCL)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QXALOCC	Allocate Cursor	DGO1740		●	●	
QXALOCL	Associate Locators	DGO1739		●	●	
QXCON1	Connect Type 1	DGO0296		●	●	●
QXCON2	Connect Type 2	DGO0297		●	●	●
QXGRANT	Grant	DGO0292		●	●	●
QXLOCK	Lock Table	DGO0291		●	●	●
QXREL	Release	DGO0298		●	●	●
QXREVOK	Revoke	DGO0293		●	●	●
QXSETCDG	Set Current Degree	DGO0742		●	●	●
QXSETCON	Set Connection	DGO0299		●	●	●
QXSETCRL	Set Current Rules	DGO1357		●	●	●
QXSETHV	Set Host Variable	DGO0295		●	●	●
QXSETSQL	Set Current SQLID	DGO0294		●	●	●
SSCDCL	Total DCL	DGO0300	●	●	●	●

Table 39. Statistics - SQL Activity (DDL)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QXALDAB	Alter Database	DGO0312		●	●	●
QXALTIX	Alter Index	DGO0310		●	●	●
QXALTST	Alter Stogroup	DGO0313		●	●	●
QXALTTA	Alter Table	DGO0309		●	●	●
QXALTTS	Alter Tablespace	DGO0311		●	●	●
QXCMTON	Comment On	DGO0323		●	●	●
QXCRALS	Create Alias	DGO0308		●	●	●
QXCRDAB	Create Database	DGO0306		●	●	●
QXCRGTT	Temp. Table	DGO1671		●	●	
QXCRINX	Create Index	DGO0302		●	●	●
QXCRSTG	Create Stogroup	DGO0307		●	●	●
QXCRSYN	Create Synonym	DGO0304		●	●	●

Table 39. Statistics - SQL Activity (DDL) (continued)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QXCRTAB	Create Table	DGO0301		●	●	●
QXCTABS	Create Tablespace	DGO0305		●	●	●
QXDEFVU	Create View	DGO0303		●	●	●
QXDRPAL	Drop Alias	DGO0321		●	●	●
QXDRPDB	Drop Database	DGO0319		●	●	●
QXDRPIX	Drop Index	DGO0315		●	●	●
QXDRPPKG	Drop Package	DGO0322		●	●	●
QXDRPST	Drop Stogroup	DGO0320		●	●	●
QXDRPSY	Drop Synonym	DGO0317		●	●	●
QXDRPTA	Drop Table	DGO0314		●	●	●
QXDRPTS	Drop Tablespace	DGO0318		●	●	●
QXDRPVU	Drop View	DGO0316		●	●	●
QXLABON	Label On	DGO0324		●	●	●
QXRNTAB	Rename Table	DGO1828		●	●	
SDTOTALT	Alters	DGO0743		●	●	●
SDTOTCRT	Creates	DGO0745		●	●	●
SDTOTDRP	Drops	DGO0744		●	●	●
SSCDDL	Total DDL	DGO0325	●	●	●	●

Table 40. Statistics - SQL Activity (DML)

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QXCLOSE	Close Cursor	DGO0288		●	●	●
QXDELET	Delete	DGO0283		●	●	●
QXDESC	Describe	DGO0285		●	●	●
QXDSCRTB	Describe Table	DGO0286		●	●	●
QXFETCH	Fetch	DGO0289		●	●	●
QXINSRT	Insert	DGO0281		●	●	●
QXOPEN	Open Cursor	DGO0287		●	●	●
QXPREP	Prepare	DGO0284		●	●	●
QXSELECT	Select	DGO0280		●	●	●
QXUPDTE	Update	DGO0282		●	●	●
SSCDML	Total DML	DGO0290	●	●	●	●

Table 41. Statistics - SQL Nested Activity

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QXCALL	Call Statements Executed	DGO1358		●	●	●
QXCALLAB	Procedure Abends	DGO1363	●	●	●	●
QXCALLRJ	Call Statement Rejected	DGO1365	●	●	●	●
QXCALLTO	CALL Statement Timeouts	DGO1364	●	●	●	●

Field Table

Table 42. Statistics - Subsystem Services

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
QWSDCKPT	System Event Checkpoint	DGO0535	●	●	●	●
Q3STABRT	Rollback	DGO0525	●	●	●	●
Q3STCOMM	Commits Phase 2	DGO0527		●	●	●
Q3STCTHD	Create Thread	DGO0522	●	●	●	●
Q3STCTHW	Queued At Create Thread	DGO0532	●	●	●	●
Q3STIDEN	Identify	DGO0521		●	●	●
Q3STINDT	Units of Recovery Gone Indoubt	DGO0529	●	●	●	●
Q3STMEOM	Subsystem Allied Memory End of Memory	DGO0534	●	●	●	●
Q3STMEOT	Subsystem Allied Memory End of Task	DGO0533	●	●	●	●
Q3STPREP	Commits Phase 1	DGO0526		●	●	●
Q3STRDON	Commits Read Only	DGO0528		●	●	●
Q3STRIUR	Units of Recovery Indoubt Resolved	DGO0530		●	●	●
Q3STSIGN	Signon	DGO0523	●	●	●	●
Q3STSYNC	Synchs (single phase commit)	DGO0531		●	●	●
Q3STTERM	Terminate	DGO0524		●	●	●

Table 43. Statistics - Times

Field Name	Field Description	Help Panel Name	Exception	DB2 6.1	DB2 5.1	DB2 4.1
SDDFSRBT	DDF Address Space SRB Time	DGO0498		●	●	●
SDDFTCBT	DDF Address Space TCB Time	DGO0497		●	●	●
SDDFTOTT	DDF Address Space Total Time	DGO0499	●	●	●	●
SDISRBT	IRLM SRB Time	DGO0495		●	●	●
SDITCBT	IRLM TCB Time	DGO0494		●	●	●
SDITOTT	IRLM Total Time	DGO0496	●	●	●	●
SDSRBT	Database Services SRB Time	DGO0492		●	●	●
SDTCBT	Database Services TCB Time	DGO0491		●	●	●
SDTLRBT	Total	DGO0501		●	●	●
SDTLTCBT	Total	DGO0500		●	●	●
SDTLTOTT	Total	DGO0502		●	●	●
SDTOTT	Database Services Total Time	DGO0493	●	●	●	●
SSSRBT	System Services SRB Time	DGO0489		●	●	●
SSTCBT	System Services TCB Time	DGO0488		●	●	●
SSTOTT	System Services Total Time	DGO0490	●	●	●	●

Table 44. System Parameters - Application Programming Defaults

Field Name	Field Description	Help Panel Name	DB2 6.1	DB2 5.1	DB2 4.1
QWPBAGID	ASCII GBCS CCSID	DGO1741	●	●	
QWPBAMID	ASCII MBCS CCSID	DGO1742	●	●	
QWPBAR	Default Decimal Arithmetic	DGO1748	●	●	

Table 44. System Parameters - Application Programming Defaults (continued)

Field Name	Field Description	Help Panel Name	DB2 6.1	DB2 5.1	DB2 4.1
QWPBASID	ASCII SBCS CCSID	DGO1743	●	●	
QWPBCHAR	Default Character Set	DGO1763	●	●	
QWPBDATE	Date Format	DGO1755	●	●	
QWPBDE	Decimal Point Option	DGO1747	●	●	
QWPBDL	Default Delimiter	DGO1749	●	●	
QWPBDLEN	Local Date Length	DGO1757	●	●	
QWPBDSD	Distributed SQL String Delimiter	DGO1754	●	●	
QWPBENS	Default Encoding Scheme	DGO1750	●	●	
QWPBGID	EBCDIC GBCS CCSID	DGO1744	●	●	
QWPBGRA	Default Mixed Graphic	DGO1752	●	●	
QWPBLANG	Default Host Language	DGO1751	●	●	
QWPBMID	EBCDIC MBCS CCSID	DGO1745	●	●	
QWPBSDL	Default SQL Delimiter	DGO1753	●	●	
QWPBSID	EBCDIC SBCS CCSID	DGO1746	●	●	
QWPBSQL	SQL Language Support Level	DGO1759	●	●	
QWPBTIME	Time Format	DGO1756	●	●	
QWPBTLEN	Local Time Length	DGO1758	●	●	
QWP4CDEG	Current Degree (CDSSRDEF)	DGO1659	●	●	
QWP4CDYN	Cache Dynamic SQL Statements	DGO1809	●	●	
QWP4RCHL	Release Cursor Hold Locks	DGO1814	●	●	

Table 45. System Parameters - Archive Log Installation Parameters

Field Name	Field Description	Help Panel Name	DB2 6.1	DB2 5.1	DB2 4.1
QWP2ADL	Number of Copies	DGO1416	●	●	●
QWP2ARCL	Maximum Data Sets Recorded In BSDS	DGO1242	●	●	●
QWP2MRTU	Maximum Read Tape Units	DGO1248	●	●	●
QWP3BKSZ	Archive Log Block Size	DGO1251	●	●	●
QWP3COMP	Compact Data	DGO1252	●	●	●
QWP3CTLG	Catalog Archive Data Sets	DGO1253	●	●	●
QWP3CYL	Space Allocation Method	DGO1420	●	●	●
QWP3DTIM	Timestamp Archive Log Data Sets	DGO1254	●	●	●
QWP3MQP	Quiesce Period (seconds)	DGO1255	●	●	●
QWP3MSV1	Archive Copy 1 Mass Storage Group Name	DGO1256	●	●	●
QWP3MSV2	Archive Copy 2 Mass Storage Group Name	DGO1257	●	●	●
QWP3RETN	Days To Retain Archive Log Data Sets	DGO1258	●	●	●
QWP3RE1N	Copy 1 Prefix	DGO1259	●	●	●
QWP3RE2N	Copy 2 Prefix	DGO1260	●	●	●
QWP3RISP	Primary Space	DGO1261	●	●	●
QWP3SECS	Secondary Space	DGO1263	●	●	●

Field Table

Table 45. System Parameters - Archive Log Installation Parameters (continued)

Field Name	Field Description	Help Panel Name	DB2 6.1	DB2 5.1	DB2 4.1
QWP3UNT1	Copy 1 Archive Log Device Type	DGO1264	●	●	●
QWP3UNT2	Copy 2 Archive Log Device Type	DGO1419	●	●	●
QWP3WTOR	Issue WTOR Before Mount for Archive Volume	DGO1265	●	●	●
ZWP2TIME	Tape Unit Deallocation Period	DGO1424	●	●	●

Table 46. System Parameters - Buffer Pool Information Page

Field Name	Field Description	Help Panel Name	DB2 6.1	DB2 5.1	DB2 4.1
QDBPCAST	Castout Attribute	DGO1210	●	●	●
QDBPDWQT	Deferred Write Threshold	DGO1211	●	●	●
QDBPHPSH	Hiperpool Sequential Threshold	DGO1212	●	●	●
QDBPHPSZ	Hiperpool Size	DGO1213	●	●	●
QDBPNM	Buffer Pool Name	DGO1214	●	●	●
QDBPPSQT	Parallel Sequential Threshold	DGO1215	●	●	●
QDBPVDQT	Vertical Deferred Write Threshold	DGO1216	●	●	●
QDBPVPSH	Virtual Sequential Threshold	DGO1217	●	●	●
QDBPVPSZ	Virtual Pool Size	DGO1218	●	●	●
QDBPXSQT	Assisting Parallel Sequential Threshold	DGO1660	●	●	●

Table 47. System Parameters - Data Definition Control Support

Field Name	Field Description	Help Panel Name	DB2 6.1	DB2 5.1	DB2 4.1
QWP4ESC	Escape Character	DGO1273	●	●	●
QWP4REGA	Application Registration Table	DGO1286	●	●	●
QWP4REGC	Register Table Owner	DGO1287	●	●	●
QWP4REGD	Control All Applications	DGO1288	●	●	●
QWP4REGI	Install DD Control	DGO1289	●	●	●
QWP4REGN	DDL Registration Database Name	DGO1290	●	●	●
QWP4REGO	Object Registration Table	DGO1291	●	●	●
QWP4REGQ	Require Full Names	DGO1292	●	●	●
QWP4REGU	Unregistered DDL Default	DGO1293	●	●	●

Table 48. System Parameters - Data Installation Parameters

Field Name	Field Description	Help Panel Name	DB2 6.1	DB2 5.1	DB2 4.1
QWP6CATN	Icf Catalog Qualifier	DGO1303	●	●	●

Table 49. System Parameters - Data-Sharing Parameters

Field Name	Field Description	Help Panel Name	DB2 6.1	DB2 5.1	DB2 4.1
QWPAASST	Parallelism Assistant	DGO1780	●	●	
QWPACOOOR	Query coordinator	DGO1675	●	●	
QWPAGRPN	Group name	DGO1455	●	●	●
QWPAIOPT	Data Sharing enabled	DGO1548	●	●	●

Table 49. System Parameters - Data-Sharing Parameters (continued)

Field Name	Field Description	Help Panel Name	DB2 6.1	DB2 5.1	DB2 4.1
QWPAMAXM	Maximum number of members	DGO1549	●	●	●
QWPAMBRN	Member name	DGO1547	●	●	●
QWPASUCV	SU conversion factor	DGO1676	●	●	

Table 50. System Parameters - Distributed Data Facility Parameters

Field Name	Field Description	Help Panel Name	DB2 6.1	DB2 5.1	DB2 4.1
QWP1SCER	Extended Security	DGO1674	●	●	●
QWP4HOP	Hop Site Authorization	DGO1274	●	●	●
QWP9CMST	DBAT Status	DGO1304	●	●	●
QWP9RLFN	Resource Limit Spec. Table Error Action (DDF)	DGO1305	●	●	●
QWP9RYC	Resynchronization Interval (minutes)	DGO1306	●	●	●
QWP9STRT	DB2 Startup Option	DGO1307	●	●	●
QWP9TTO	Idle Thread Timeout Interval	DGO1435	●	●	●

Table 51. System Parameters - Group Buffer Pools Parameters Page

Field Name	Field Description	Help Panel Name	DB2 6.1	DB2 5.1	DB2 4.1
QBGBGAS	AUTOREC (automatic recovery)	DGO1725	●	●	
QBGBGDR	Actual Directory Entry	DGO1559	●	●	●
QBGBGDT	Actual Data Entry	DGO1560	●	●	●
QBGBGR2	Pending Directory to Data Ratio	DGO1561	●	●	●
QBGBGSZ	Allocated Buffer Pool Size (4K)	DGO1558	●	●	●

Table 52. System Parameters - IRLM Installation Parameters

Field Name	Field Description	Help Panel Name	DB2 6.1	DB2 5.1	DB2 4.1
QWP4IAUT	Automatic Start	DGO1405	●	●	●
QWP4IPRC	Start Procedure Name	DGO1276	●	●	●
QWP4ISID	Subsystem Name	DGO1277	●	●	●
QWP4ISWT	Time DB2 Will Wait for Start (seconds)	DGO1278	●	●	●
QWP4TOUT	Resource Timeout (seconds)	DGO1299	●	●	●
QWP4UTO	Utility Timeout Factor	DGO1300	●	●	●

Table 53. System Parameters - Lock Escalation Parameters

Field Name	Field Description	Help Panel Name	DB2 6.1	DB2 5.1	DB2 4.1
QWP4LKTS	Maximum Locks per Table Space	DGO1279	●	●	●
QWP4LKUS	Maximum Locks per User	DGO1280	●	●	●
QWP4WAIT	Wait For Retained Locks	DGO1738	●	●	●

Table 54. System Parameters - Log Installation Parameters

Field Name	Field Description	Help Panel Name	DB2 6.1	DB2 5.1	DB2 4.1
QWP2DUAL	Number of Copies	DGO1431	●	●	●

Field Table

Table 54. System Parameters - Log Installation Parameters (continued)

Field Name	Field Description	Help Panel Name	DB2 6.1	DB2 5.1	DB2 4.1
QWP2IBPS	Input Buffer Size (KB)	DGO1246	●	●	●
QWP2OBPS	Output Buffer Size (KB)	DGO1249	●	●	●
QWP2WRTH	Write Threshold On Filled Buffers	DGO1250	●	●	●

Table 55. System Parameters - Operator Functions Installation Parameters

Field Name	Field Description	Help Panel Name	DB2 6.1	DB2 5.1	DB2 4.1
QWP1RLF	Resource Limit Facility Automatic Start	DGO1228	●	●	●
QWP1RLFN	Resource Limit Spec. Table Error Action	DGO1230	●	●	●
QWP1RLFT	Resource Limit Specification Table Suffix	DGO1231	●	●	●
QWP1SMRC	WTO Route Codes	DGO1236	●	●	●
QWP4ABN	Allow Autobind Operations	DGO1266	●	●	●
QWP4ABX	Allow Explain At Autobind	DGO1267	●	●	●
QWP4ENF	DPROP Support	DGO1404	●	●	●
QWP4SIT	Site Type	DGO1296	●	●	●
QWP9TCPA	TCP/IP Already Verified	DGO1761	●	●	

Table 56. System Parameters - Other System Parameters

Field Name	Field Description	Help Panel Name	DB2 6.1	DB2 5.1	DB2 4.1
MZDBSTRT	Databases and Table Spaces	DGO1208	●	●	●
QWP1DFRQ	Checkpoints Level ID Updates	DGO1434	●	●	●
QWP2DBSD	Dual BSDS Mode	DGO1243	●	●	●
QWP4DSMX	Maximum Open Data Sets (DSMAX)	DGO1271	●	●	●
QWP4DSST	Static describe (DESCSTAT)	DGO1701	●	●	
QWP4ISWI	IRLM Initial Inquiry by DB2	DGO1433	●	●	●
QWP4MDDN	Asynchronous Drain Stop (%DSMAX)	DGO1281	●	●	●
QWP4TDDN	Asynchronous Drain Start (%DSMAX)	DGO1298	●	●	●
QWP4WBMP	IMS/BMP time-out factor (BMPTOUT)	DGO1669	●	●	●
QWP4WDLI	IMS/DLI time-out factor (DLITOUT)	DGO1670	●	●	●
XWP4CDEG	Current Degree (CDSSRDEF)	DGO1859			●

Table 57. System Parameters - Protection Installation Parameters

Field Name	Field Description	Help Panel Name	DB2 6.1	DB2 5.1	DB2 4.1
QWP1RLFA	Resource Limit Table Creator Authid	DGO1229	●	●	●
QWP3RTCT	RACF Protect Archive Log	DGO1262	●	●	●
QWP4ADM2	System Administrator 2 Authid	DGO1268	●	●	●
QWP4AUCA	Plan Authorization Cache Size	DGO1428	●	●	●
QWP4AUTH	DB2 Authorization Enabled	DGO1269	●	●	●
QWP4BNVA	Bind New Version	DGO1430	●	●	●
QWP4DFID	Default (unknown) User Authid	DGO1270	●	●	●
QWP4OPR1	System Operator 1 Authid	DGO1283	●	●	●

Table 57. System Parameters - Protection Installation Parameters (continued)

Field Name	Field Description	Help Panel Name	DB2 6.1	DB2 5.1	DB2 4.1
QWP4OPR2	System Operator 2 Authid	DGO1284	●	●	●
QWP4PAC	Package Authorization Cache Size	DGO1779	●	●	
QWP4SADM	System Administrator 1 Authid	DGO1294	●	●	●

Table 58. System Parameters - Storage Sizes Installation Parameters

Field Name	Field Description	Help Panel Name	DB2 6.1	DB2 5.1	DB2 4.1
QWP1CDB	Maximum Remote	DGO1220	●	●	●
QWP1CT	Maximum Concurrent Threads	DGO1221	●	●	●
QWP1IDB	Maximum Batch	DGO1223	●	●	●
QWP1IDF	Maximum TSO	DGO1224	●	●	●
QWP1RMT	Maximum Remote Active	DGO1232	●	●	●
QWP4EDPL	Maximum Size of EDM Pool	DGO1272	●	●	●
QWP4IXTP	Default Index Type	DGO1546	●	●	●
QWP4MXKD	Maximum Kept Dynamic Statements	DGO1810	●	●	
QWP4PST	Utility Cache Option	DGO1766	●	●	●
QWP4RMAX	Maximum Size of RID Pool	DGO1396	●	●	●
QWP4SCAC	3990 Cache	DGO1295	●	●	●
QWP4SPOL	Maximum Size of Sort Pool	DGO1297	●	●	●

Table 59. System Parameters - Stored Procedures Parameters

Field Name	Field Description	Help Panel Name	DB2 6.1	DB2 5.1	DB2 4.1
QWP1SPAB	Abends Allowed	DGO1437	●	●	●
QWP1SPPN	MVS Procedure Name	DGO1436	●	●	●
QWP1SPTO	Timeout Value	DGO1438	●	●	●

Table 60. System Parameters - Tracing, Checkpoint and Pseudo-Close Parameters

Field Name	Field Description	Help Panel Name	DB2 6.1	DB2 5.1	DB2 4.1
QWP1AUDT	Start Audit Trace	DGO1219	●	●	●
QWP1FREQ	Pseudo-Close Frequency	DGO1222	●	●	●
QWP1LOGL	Checkpoint Frequency	DGO1225	●	●	●
QWP1MON	Start Monitor Trace	DGO1226	●	●	●
QWP1MONS	Monitor Buffer Size (bytes)	DGO1227	●	●	●
QWP1SMFA	Start SMF Accounting	DGO1234	●	●	●
QWP1SMFS	Start SMF Statistics Trace	DGO1235	●	●	●
QWP1STIM	Statistics Interval (minutes)	DGO1237	●	●	●
QWP1TMR	Pseudo-Close Timer	DGO1238	●	●	●
QWP1TRST	Start Global Trace	DGO1239	●	●	●
QWP1TRSZ	Trace Table Size (4KB multiple)	DGO1240	●	●	●
QWP1URCK	UR Check Frequency	DGO1712	●	●	

Field Table

└ End of Diagnosis, Modification, or Tuning Information _____

Appendix B. Exception Log File Output Record

Diagnosis, Modification, or Tuning Information

The table in this appendix outlines the format of the exception log file data set output record. Use these terms to interpret the table:

Offset Length from the beginning of the record to the start of the field.

Length

Length of the field, in bytes.

DB2 Data Type

The format of the value in the field:

- SMALLINT
- INTEGER
- CHAR
- TIMESTAMP
- DOUBLE PRECISION

End of Diagnosis, Modification, or Tuning Information

Layout of the Exception Log File Output Record

Diagnosis, Modification, or Tuning Information

Table 61. Exception Log File Data Set

Offset (decimal)	Length (bytes)	DB2 Data Type	Description
N/A	2	SMALLINT	Length of record (LL)
N/A	2	SMALLINT	Binary zeros
0	1	CHAR	Log record type: <ul style="list-style-type: none"> • F = Field-level exception record • M = Exception message (Online Monitor only).
1	1	CHAR	Processing origin ID: <ul style="list-style-type: none"> • B = Record written by batch exception processor • S = Record written by online display exception processor • A = Record written by online periodic exception processor.
2	4	CHAR	Per: <ul style="list-style-type: none"> • SYST = System • PROG = Program • PLAN = Plan name
6	16	CHAR	Local location
22	2	CHAR	Reserved
24	8	CHAR	Primary authorization ID
32	8	CHAR	Original authorization ID
40	8	CHAR	Plan name

Exception Log File Record

Table 61. Exception Log File Data Set (continued)

Offset (decimal)	Length (bytes)	DB2 Data Type	Description
48	8	CHAR	Connection ID
56	8	CHAR	Connection type
64	12	CHAR	Untranslated correlation ID
76	8	CHAR	Correlation name
84	8	CHAR	Correlation number
92	8	CHAR	Network ID
100	8	CHAR	VTAM LU name
108	12	CHAR	Instance number
120	2	SMALLINT	LUW sequence number
122	18	CHAR	Main package (MAINPACK)
140	16	CHAR	Requesting location
156	2	CHAR	Reserved
158	4	CHAR	DB2 subsystem ID
162	6	CHAR	DB2 PM VnRnMn
168	6	CHAR	DB2 VnRnMn
174	1	SMALLINT	DB2 release code
175	8	CHAR	Store clock timestamp
183	26	TIMESTAMP	DB2 timestamp
209	8	CHAR	Field name
217	1	CHAR	Field type: <ul style="list-style-type: none"> • Blank = Normal field • B = Buffer pool field • D = DDF field • G = Group buffer pool field • C = Global group buffer pool statistics field • P = Package
218	54	CHAR	Field name qualifier used in the exception threshold data set
272	2	CHAR	Reserved
274	54	CHAR	Actual field name qualifier: <ul style="list-style-type: none"> • Buffer pool ID for buffer pool records • Remote location for DDF records • Package location, connection ID, and program name for package records • Blank for all other records
328	2	CHAR	Reserved
330	1	CHAR	Reserved
331	40	CHAR	Field description (without qualifier)
371	1	CHAR	Compare basis: <ul style="list-style-type: none"> • V = Total value • M = By minute • S = By second • C = By commit • T = By thread

Table 61. Exception Log File Data Set (continued)

Offset (decimal)	Length (bytes)	DB2 Data Type	Description
372	1	CHAR	Operator (> or <)
373	12	CHAR	Exception value (character)
385	12	CHAR	Threshold value (character)
397	1	CHAR	Exception level: • P = Problem • W = Warning
398	8	DOUBLE PRECISION	Exception value (floating point)
406	8	DOUBLE PRECISION	Threshold value (floating point)
414	8	CHAR	Group name
422	8	CHAR	Member name

Note:

The exception and threshold values in floating-point form (offsets 398 and 406 respectively) can contain time or counts fields. For time fields, the value is stored in terms of microseconds. For example, if you entered 0.3 seconds for the threshold value, it is stored as 300 000 microseconds in the exception log file data set. For counts fields, the value is stored as the actual value.

└─ **End of Diagnosis, Modification, or Tuning Information** _____

Exception Log File Record

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Glossary

The following terms and abbreviations are defined as they pertain to DB2 PM. This glossary does not include terms defined in the prerequisite DB2 manuals. If you do not find the term you are looking for, refer to the index, to the glossary of *IBM DB2 Universal Database Server for OS/390 Version 6 Administration Guide*, or to the *IBM Dictionary of Computing*, New York: McGraw-Hill, 1994.

A

accounting by DB2 PM identifier graphs. Graphs provided by IRF graphics. The graphs show plots representing values of selected DB2 PM identifiers.

accounting by field identifier graphs. Graphs provided by IRF graphics. The graphs show plots representing values of selected DB2 fields.

accounting data. Data that provides summary information about DB2 resource use. Accounting data is used to summarize DB2 local and distributed activity associated with the execution of specified application plans, detect potential problem areas within DB2, track resource use on a regular basis, and identify DB2 threads that fail to meet certain user-specified criteria.

accounting report set. A set of DB2 PM reports providing information about DB2 resource activity associated with DB2 applications.

accounting trace data. DB2 trace data that provides summary information about DB2 resource use.

ACE. A DB2 PM identifier denoting agent control element address.

administrator user. A TSO user with the authority to access the administrator dialog panels, where data collector parameters can be altered.

agent control element address (ACE). The absolute hexadecimal address of the DB2 agent control element for the thread. The ACE provides identification for each thread, and can be used to select records for a particular thread. Note that an ACE address can be reused after a thread terminates.

allied thread. A DB2 PM term for a thread that originates and terminates at the same location without requesting data from any other locations.

allied-distributed thread. A DB2 PM term for a thread that originates and terminates at the same location and that requests data from at least one other location.

audit report set. A set of DB2 PM reports that provide a means of tracking DB2 resource access. The audit reports include information on who performed an audited action, when it was performed, and what auditable DB2 objects were involved. The reports can be used to track DB2 resource access, identify potential security breaches and violations, and track granting and revoking of DB2 privileges.

audit trace data. DB2 trace data that identifies resource users, persons issuing use authorization to others, and possible security violations against audited DB2 tables.

AUTHID. A DB2 PM identifier denoting authorization ID.

AUTO command. Used to refresh and redisplay the current thread activity or statistics panel periodically.

auto display. A function that refreshes and redisplay the current thread activity or statistics panel periodically.

B

background processing. The execution of low-priority jobs when higher-priority programs are not using the system resources. In TSO, a background job is entered through the SUBMIT command or through SYSIN. Contrast with foreground processing.

BOUNDARY option. An option of the GLOBAL command and the REDUCE subcommand that specifies the starting time of the intervals used to summarize records in the reduction process, by indicating a number of minutes past the hour.

C

CLASS. A DB2 PM identifier denoting trace class.

CODES option. An option of the DUMP and TAPECOPY commands used to define code values for records to be processed.

COLLECT command. Used to access the collect report data facility.

collect report data. An option used to start one or more DB2 traces, directing the resultant trace data to a data set.

collect task. A task that has been configured to start and stop DB2 traces for collecting specific DB2 instrumentation data and directing this data to a data set. Up to four independent collect tasks can be configured and started using the collect report data facility.

CONNECT. See *connection ID*.

connection ID (CONNECT). A DB2 PM identifier derived from the connection ID of the correlation header. This is the type of subsystem used to interface with DB2, such as CICS, TSO, or IMS.

connection type (CONNTYPE). An identifier showing the type of connection for an associated thread.

CONNTYPE. See *connection type*.

CONVERT. A DB2 PM function to change SAVE data sets into sequential data sets suitable for use by the DB2 Load Utility. See also *save-file utility*.

correlation ID. An identifier consisting of two fields: the correlation name and the correlation number. It is used primarily by CICS and IMS. For some connection types the correlation number is blank. DB2 PM defaults to an 8-byte correlation name, followed by a 4-byte correlation number. You can specify a different translation using the CORRDATA member of the DPMPARMS data set. See also *correlation name*, *correlation number*, and *correlation translation*.

correlation name (CORRNAME). An identifier assigned to a task. This value is a subset of the correlation ID. Its meaning varies with the connection type. See also *correlation ID*.

correlation number (CORRNMBR). An identifier assigned to a task. This field is a subset of the correlation ID. Its meaning varies with the connection type. See also *correlation ID*.

correlation translation. A DB2 PM function that interprets the information contained in the correlation ID. See *correlation ID*, *correlation name*, *correlation number*, and *correlation translation data set*.

correlation translation data set. A DB2 PM data set used to define and interpret the use of the correlation ID for processing within DB2 PM reports and panels. See also *correlation ID*.

CORRNAME. See *correlation ID*.

CORRNMBR. See *correlation ID*.

D

DATABASE. A DB2 PM identifier denoting the name of the DB2 database.

database access thread (DBAT). A DB2 PM term for a thread that performs work at the request of an allied-distributed or DBAT-distributed thread originating at another location.

database identifier (DBID). A decimal identifier of a database.

DATASET. A DB2 PM identifier consisting of the 8-character name of the active log, the archive log, or the bootstrap data set.

DBAT. A DB2 PM identifier denoting database access thread.

DBAT-distributed. A DB2 PM term for a DBAT that requests work from another location.

DB2 instrumentation facility. A DB2 facility that controls and collects DB2 monitoring, auditing, performance, accounting, statistics, and serviceability (global) data. Synonymous with *DB2 trace facility*.

DB2 location. The name assigned to the DB2 subsystem. This name is unique within a set of subsystems that can communicate with each other. See also *local location*.

DB2 trace facility. Synonym for *DB2 instrumentation facility*.

DB2ID. A DB2 PM identifier denoting DB2 subsystem ID. Synonymous with *SUBSYSTEMID*.

DB2 PM command language. A set of commands and subcommands used to control DB2 PM processing.

DB2 PM identifier. A DB2 PM term for an identifier that specifies various attributes of the object upon which DB2 PM is reporting. Used by DB2 PM to group data, order reports, and include or exclude specific data.

DB2 PM logs. Reports that provide summarized information about events during DB2 PM execution. See *exception log*, *message log*, *job summary log*, *IFCID frequency distribution log*, and *DPMLLOG*.

DDNAME option. An option specifying the DDNAME of a data set. With REPORT and TRACE subcommands, the option is used to specify the data set where the report or trace is written; with the SAVE and FILE subcommands, it is used to specify the destination data set to which the save data is written; with RESTORE, it is used to specify the data set from which restored data is read.

DELTA command. Used to invoke delta processing mode for viewing system-wide statistics in time slices.

delta processing mode. A statistics processing mode that reports field values in time slices.

delta record. A data structure describing the activity of a DB2 subsystem over a specific period of time.

delta value. A counter value found in a DB2 PM statistics delta record representing activity in a DB2 system over the time period described by the delta record.

diagnostic view. A function used to analyze a thread's performance data, and to view an online diagnosis of the principal constraints acting on the thread.

display exception list. A list that contains a brief description of each exception condition that was detected by the display exception processor.

display exception processing. An Online Monitor subtask used to check for exception conditions while viewing DB2 activity on the screen.

DISTDD option. An option of the GLOBAL command used to specify the DDNAME for the frequency distribution data set.

DISTRIBUTE command. An auxiliary command used to calculate frequency distributions for selected fields. The results can be viewed or printed using the graphics function of the IRF.

DPMLOG. A DB2 PM log that contains messages about DB2 PM processing.

DPMOUT. The DB2 PM output data set. DB2 PM generates the output data using SMF or GTF data as input. The DPMOUT data set contains data converted to a standardized format, sorted, and written to a format that can be used to create DB2 PM reports, traces, and data sets.

DPMPARMS. A DB2 PM data set that contains information about customized functions.

Dump Name option. An option of the DUMP command used to specify a name to be printed on the dump.

DUMP processing. A DB2 PM function used to provide a printout of an input data set in dump format. All records on the input data set, a selected range of records, or specific record types can be used.

E

exception DPMOUT data set. A data set containing DB2 instrumentation records (in DPMOUT format) with at least one field in exception status. The data set can be used as input to the Batch record trace or statistics trace.

exception event processing. An Online Monitor subtask used to monitor the DB2 subsystem for the presence of particular events.

exception log. A log presenting a list that identifies DB2 accounting and statistics records with at least one field outside user-specified limits.

exception log file data set. A sequential data set suitable for use by the DB2 load utility. The data set

contains a listing of accounting and statistics exception records identical to the listing in the exception log. See *exception log*.

exception processing. Reporting that provides a means to identify DB2 threads and statistics intervals with fields that contain exceptional values. It is used to highlight problems in the DB2 subsystem and in threads causing performance problems. Exception processing is performed against accounting and statistics instrumentation data.

exception profiling. A DB2 PM function that automatically sets exception threshold values to the exception threshold data set. The values are based on user-specified criteria and instrumentation data from a particular DB2 site.

exception reports and traces. Reports and traces that are obtained using the EXCEPTION option of the accounting or statistics REPORT or TRACE subcommands. Exception reports and traces can have different layouts. See also *exception processing*.

exception threshold data set. A data set used to define exception thresholds for statistics and accounting field IDs.

EXEC command. A command that instructs DB2 PM to execute the commands in a job stream.

EXEC option. An option of the DUMP and TAPECOPY commands used to define the DDNAME of the input data set.

EXPLAIN command. Used to invoke the explain function. Explain is a function that describes the access paths and processing methods chosen by DB2 for a given SQL statement.

explain report set. A set of DB2 PM reports containing access path information and catalog information.

F

FIELD. A DB2 PM identifier for a field in the instrumentation record and comparison value, as defined using the FIELD command.

FIELD command. An auxiliary command used to locate exception conditions for individual DB2 records. The command can only be used with the record trace INCLUDE/EXCLUDE options.

FIELDID option. An option of the DISTRIBUTE command used to specify the keyword for the field.

FILE processing. A DB2 PM function used to format accounting, audit, and statistics data and store it in sequential data sets suitable for use with the DB2 load utility.

foreground. In TSO, the environment in which programs are swapped in and out of main storage so that terminal users can share processing time. Contrast with background.

frequency distribution data set. Distribution data set generated as a result of the DISTRIBUTE command.

frequency distribution graph. A graph provided by the IRF graphics. It shows the distribution of a given field's data over user-defined ranges.

FROM/TO option. An option that defines the range of record timestamps processed by DB2 PM. FROM specifies the starting date and time; TO specifies the finishing date and time. The option can be used with the GLOBAL command and the REDUCE, REPORT, TRACE, and FILE subcommands.

G

GLOBAL command. An auxiliary command used as a primary filter for input records, and to specify default values for parameters within the other DB2 PM subcommands.

global parameters function. Used to set the DB2 subsystem ID and the plan name for an Online Monitor session, specify output data sets, and establish defaults for the autodisplay function.

graphics processing. A capability provided by DB2 PM that allows creation of graphs representing statistics, accounting, or frequency distribution information based on previously reduced data. Graphics are part of the Interactive Report Facility.

GROUP. A DB2 PM identifier that specifies the name of a Data Sharing Group.

GROUP command. An auxiliary command that can be used to specify up to ten values of one DB2 PM identifier type.

H

high water mark. A status value found in a DB2 trace record representing the highest value of some aspect of a DB2 system over a period starting when DB2 was started and ending at the timestamp of the trace record.

HISTORY command. Used to recall and view thread activity, statistics, and system parameters data (IFC records) previously collected by the data collector.

I

I/O activity report set. A set of DB2 PM reports reflecting reads, writes, and other I/O activities performed throughout the DB2 subsystem. The reports are used to track I/O volumes and service times and to

summarize I/O activity for the active log, archive log, BSDS, the buffer pool manager, and the EDM pool manager.

ICU. Interactive Chart Utility.

IDENTIFIERS option. An option of the DISTRIBUTE command used to specify the DB2 PM identifiers used in collecting distribution data.

IFCID. A DB2 PM identifier denoting instrumentation facility component identifier.

IFCID frequency distribution log. A DB2 log presenting a count of input and processed records by IFCID, and the percentage of the total number of trace records that each IFCID represents.

INCLUDE/EXCLUDE option. An option used to select records from an input data set. INCLUDE is used to define a list of DB2 PM identifier values that are included in DB2 PM processing, and EXCLUDE to define a list of DB2 PM identifier values that are excluded from processing. The option is available with the GLOBAL command and the REDUCE, REPORT, TRACE, and FILE subcommands.

INPUTDD option. An option of the GLOBAL command used to specify the DDNAME of the input data set.

INSTANCE. A DB2 PM identifier that is part of the LUWID for distributed activity, and can be used to match the activity performed by DBATs, DBAT-distributed threads, and allied-distributed threads.

instance number. A DB2 PM identifier consisting of a unique number assigned to a thread involved in distributed activity. It is used to match an allied-distributed thread to its database access threads.

Interactive Chart Utility (ICU). A charting utility of the graphical data display manager (GDDM).

Interactive Report Facility (IRF). A DB2 PM facility that allows request for reports through a set of menus and interactive panels. The IRF also creates and submits control statements for background generation of DB2 PM reports.

INTERVAL command. Used to invoke Interval mode for viewing an accumulation of statistics data from a specified time.

INTERVAL identifier. A DB2 PM identifier used in accounting and statistics report sets to order data according to the reduction intervals.

INTERVAL option. An option of the GLOBAL command and the REDUCE subcommand that defines the time interval for consolidating records.

interval processing mode. The statistics processing mode that displays an accumulation of statistics data from a specified time.

IRF. Interactive Report Facility.

J

job summary log. A DB2 PM log providing a summary of events during DB2 PM execution. It provides information about the detection of DB2 START/STOP commands, report set reduction interval completion, SAVE and RESTORE subcommand completion by report set, and major errors and messages.

L

LAYOUT option. An option of the accounting and statistics REPORT and TRACE subcommands used to specify the layout of the report and the amount of detail.

LEVEL option. An option of the REPORT, TRACE, and FILE subcommands used to specify the type of report or trace, and the amount of detail.

LIMITS option. An option of the DISTRIBUTE command used to specify the limits of the ten ranges for frequency distribution.

LIST command. An auxiliary command used to define a named list of DB2 PM identifier values. A list can contain up to ten members of one DB2 PM identifier type.

local location. The location that is the focus of the report (the location indicated in the report header). See also *LOCATION*.

LOCATION. A DB2 PM identifier denoting the name assigned to a subsystem. See also *local location*.

locking report set. A set of DB2 PM reports and traces providing lock suspension, lock timeout, and deadlock information.

lockout. DB2 PM uses this term as an aggregate name for both timeout and deadlock.

LOOK command. Used to invoke the Look Selections menu, or to select certain exception processing and trace facility functions.

M

MAINPACK. A DB2 PM identifier used to identify the first or last package or DBRM in a plan. MAINPACK is used in the accounting report set.

MAXDUMP option. An option of the DUMP command used to define the length of dump in bytes.

MEMBER. A DB2 PM identifier that specifies the name of a member in a Data Sharing Group.

merged report. Reports and traces that include, in the same report, the local and distributed activity associated with each thread. Information is provided for allied threads created at the local site, allied-distributed threads created at the local site, and DBATs performed remotely on behalf of allied-distributed threads created at the local site. Merged reports are available in the accounting and SQL activity report sets.

message log. A DB2 PM log that lists messages about DB2 PM internal sort.

MIGRATE. A DB2 PM function to change SAVE data sets produced by previous releases into the current release format. See also *save-file utility*.

monitor data. DB2 trace data that provides thread, statistical, and performance DB2 data to the Online Monitor component of DB2 PM.

multi-site report. Report or trace that contains data from multiple DB2 locations. Multi-site reports can be nondistributed (when no interaction takes place between the DB2 subsystems reported) or distributed (when interaction occurs between DB2 subsystems). Multi-site reports are the default in all report sets. See also *single-site report*.

N

N/A. Not applicable.

N/C. Not calculated.

N/P. Not present.

NAME option. An option of the TAPECOPY command used to define a name identifying the records copied.

NEWCOPY option. An option of the TAPECOPY command used to define the DDNAME of the output data set.

nonmerged report. Reports and traces that separate activity according to the location where the activity occurred. All threads performed at each location are reported together.

O

OFFSET option. An option of the DUMP and TAPECOPY commands used to define the offset of the record code.

Online Monitor. The online monitoring part of DB2 PM used to monitor an active DB2 subsystem.

OPTIONS command. This command can either be used from an Online Monitor panel to set various options controlling the environment of your IRF session,

or from the source explain SQL Statement Selection window to change various source explain processing options.

ORDER option. An option of the REPORT and TRACE subcommands. ORDER is used to specify the DB2 PM identifiers and their sequence, in sorting reported information.

ORIGAUTH. A DB2 PM identifier denoting original authorization ID.

original authorization ID (ORIGAUTH). A DB2 PM identifier consisting of the original value of the Primary Authorization ID when a thread was created (before it could be changed by any authorization exits).

P

PACKAGE. A DB2 PM identifier used to identify a package, regardless of the plan it belongs to. PACKAGE is used in the accounting report set.

PAGESET. A DB2 PM identifier denoting the name of a page set. A page set consists of a collection of tables or an index.

PAGESIZE option. An option of the GLOBAL command used to specify the number of printed lines per page.

performance trace data. DB2 trace data about various subsystem events that are used for program, resource, user, and subsystem-related tuning.

periodic exception list. A list that contains a brief description of each exception condition that was detected by the periodic exception processor.

periodic exception processing. An Online Monitor subtask that gathers DB2 thread activity and statistics information at user-specified intervals and analyzes the data for exception conditions.

PLANNAME. A DB2 PM identifier denoting plan name.

PRESORTED option. An option of the GLOBAL command used to specify whether DB2 PM internal sort is used.

PRIMAUTH. A DB2 PM identifier denoting primary authorization ID.

Q

QUALIFY command. Used to filter the threads listed on the Thread Summary panel.

R

record trace report set. Reports that format each DB2 trace record selected. This report set can be used to format a subset of data obtained from DB2 statistics, accounting, or performance trace information. The reports also provide access to users who need to view DB2 serviceability fields.

REDUCE processing. A DB2 PM function used to decrease the volume of the input data to subsequent REPORT and SAVE processing. REDUCE consolidates individual records with certain common characteristics into one record for reporting purposes.

regular mode. Statistics processing mode that displays values accumulated since DB2 startup.

REINIT command. A command used to restart the Exception Processor using the latest values in the Exception Threshold data set.

remote location. A location requesting or providing data for the local location.

report. A listing that uses summarized data. In reports events are ordered by DB2 PM identifiers, such as authorization ID or plan name.

report set. One or more DB2 PM reports containing the same information in varying degrees of detail. Report set names indicate the nature of the information included. For example, the statistics report set addresses DB2 system-wide data and the I/O activity report set addresses I/O activity.

REQLOC. A DB2 PM identifier denoting requesting location.

request type (REQUESTTYPE). A DB2 PM identifier used to identify a locking-related request.

requesting location (REQLOC). If the thread is an allied thread or the thread is an allied-distributed thread (this location is the requester), the requesting location is the same as the local location. If the thread is a database access thread (this location is a server), the requesting location is the location that made the request.

REQUESTTYPE. A DB2 PM identifier denoting request type.

RESET command. Used to reset the QUALIFY, SORT, DELTA, and INTERVAL commands.

resource manager ID (RMID). The decimal identifier of a DB2 Resource Manager.

resource type (RESOURCETYPE). A DB2 PM identifier used to identify a locked resource.

RESOURCE TYPE. A DB2 PM identifier denoting resource type.

RESTORE processing. A DB2 PM function used to reload a previously saved data set for additional processing. To restore reduced data, DB2 PM takes the saved, reduced data out of the external data sets. Next, DB2 PM places that data in main storage in the same reduced format as it was before it was saved. It is possible to restore previously reduced data, subsequently reduce new raw data, and use both for reporting or additional saving.

RID list. Record identifier list.

RMID. A DB2 PM identifier denoting resource manager ID.

S

SAVE processing. A DB2 PM function used to produce a data set containing reduced records. To save reduced data, DB2 PM copies the reduced data from main storage to external data sets. Save is available in accounting and statistics.

save-file utility. A utility which consists of the MIGRATE and CONVERT functions: to migrate save data sets from one DB2 PM version to another (MIGRATE) and to change SAVE data sets into sequential data sets suitable for use by the DB2 load utility (CONVERT). The save-file utility is used only with accounting and statistics save data sets.

serving location. The name of a DB2 location that performs work on behalf of another (requesting) location. See also *LOCATION*.

single-site report. A single-site report includes data from a single DB2 subsystem only. It is obtained by processing an input data set containing data from a single site or by specifying a single location using INCLUDE/EXCLUDE. See also *multi-site report*.

SKIP option. An option of the DUMP and TAPECOPY commands used to define the number of records to be skipped before processing begins.

snapshot. A status value found in a DB2 trace record representing the status of some aspect of a DB2 system. Snapshot values are also found in DB2 PM statistics delta records. In this case they represent the status of the DB2 system current at the end time of the period described by the delta record.

SORT command. Used to order the threads displayed on the Thread detail panel by one or more field values.

SORTBY. An option of the SQL activity REPORT and TRACE subcommands used to sort SQL events within each summary level.

source explain. A facility used to explain SQL statements that are embedded in a source program or SPUFI input from within an ISPF/PDF editor.

SQL activity report set. A set of reports that provides information on SQL activity taking place during the processing of a DB2 application. The reports are used to analyze SQL calls within a logical unit of work, analyze the access path selected by the DB2 optimizer for local SQL calls, observe the local Data Manager scans, locking activity, and Buffer Manager I/O activity taking place during the execution of SQL requests, and group SQL activities by logical units of work.

statistics graph. A graph provided by the IRF graphics. It shows plots representing values of collected statistics data.

statistics processing. A function of DB2 PM that provides information about the current activity over the entire DB2 subsystem. The data is logged at intervals, specified at DB2 installation. The panels are used to view system-wide statistics for key DB2 components and assess system-wide performance. Details of DB2 statistics fields, buffer pools, and distributed activity can also be viewed. See also *exception processing*.

statistics report set. A report set that provides information collected by the DB2 Instrumentation Facility over the entire DB2 subsystem. The data is logged at intervals specified at DB2 installation. The reports are used to view system-wide statistics for key DB2 components, compare system performance in several reporting intervals, and assess system-wide performance and summarize it in one report. See also *exception processing*.

statistics trace data. DB2 data used for DB2 capacity planning and tuning the entire set of DB2 programs.

STOPAFT option. An option of the DUMP and TAPECOPY commands used to define the number of records to be processed, starting after the number of records to be skipped. See also *SKIP option*.

SUBSYSTEMID. A DB2 PM identifier denoting DB2 subsystem ID. Synonymous with *DB2ID*.

SUMMARIZEBY. An option of the SQL activity REPORT and TRACE subcommands used to summarize SQL events.

SYSPRMDD option. An option of the GLOBAL command used to specify the DDNAME for the System parameters report. See also *system parameters report set*.

system parameters. An option that displays the current DSNZPARM values of a DB2 subsystem. It displays user-assigned control values of key DB2 installation values.

system parameters report set. A report set that shows current values of key DB2 installation values. It shows user-assigned control values of key DB2 installation values. See also *SYSPRMDD option*.

T

TAPECOPY processing. A DB2 PM function used to make a copy of all or part of an SMF input data set.

thread activity. A function that provides information about the current activity of all active threads connected to a DB2 subsystem.

thread type (THREADTYPE). A DB2 PM identifier used to identify the type of thread.

THREADTYPE. A DB2 PM identifier denoting thread type.

time zone information member. A member of the DPMPARMS data set that contains user-specified information about time zone processing.

timestamp. A value that consists of a date, a time, and a number of microseconds.

TIMEZONE option. An option of the GLOBAL command used to specify the time difference between DB2 locations.

TOP option. An option in the accounting report set that can be used to produce a list of applications or users that have required most use of specific DB2 resources.

trace. A listing that uses unreduced data and usually reports individual records. A trace generally produces output in a short or long format; these are similar to the report summary and detail levels.

U

UNITS option. An option of the DISTRIBUTE command used to specify the units for the LIMITS option. See also *LIMITS option*.

user-tailored reporting. A DB2 PM function that allows the users to tailor accounting and statistics report and trace layouts. The tailoring is performed using the IRF.

utility activity report set. A set of DB2 PM reports providing DB2 application work information categorized as bind processing and utilities. These reports are used to determine workload distribution for local and distributed activity and to associate DB2 work with individual users or DB2 PM identifiers.

W

WORKLOAD. An option of the SQL activity REPORT and TRACE subcommands used to display workload detail for SQL events.

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