IBM Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS
IBM Tivoli OMEGAMON XE for DB2 Performance Monitor on z/OS
Version 5.2.0

Monitoring Performance from ISPF
IBM Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS
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Version 5.2.0

Monitoring Performance from ISPF
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About this publication

This publication describes the ISPF Online Monitor of the following products:
- IBM® Tivoli® OMEGAMON® XE for DB2® Performance Expert on z/OS®
- IBM Tivoli OMEGAMON XE for DB2 Performance Monitor on z/OS

For the most current version of this publication, always check the DB2 Tools Product Page and the Tivoli Documentation Central Website.

The technical changes for this edition are summarized under "What's new" on page xix. Specific changes since the previous edition of this publication are indicated by a vertical bar (|) to the left of a change. Editorial changes that have no technical significance are not noted.

**Note:** As a result of an end-user interface-consolidation, the following ISPF Online Monitoring functions are not supported for DB2 11.
- Display Thread Activity (option 3.1)
- Display Statistics (option 3.2)
- Display System Parameters (option 3.3)

Full realtime monitoring support is supported by the VTAM® end user interface, which is described in *IBM Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS: Monitoring Performance from the OMEGAMON Classic Interface*.

Until several unique ISPF Online Monitor functions become available through the OMEGAMON Classic Interface in stages, the ISPF Online Monitor functions and their descriptions are retained in *Monitoring Performance from ISPF*. Nevertheless, you are encouraged to familiarize yourself with the functions available through the OMEGAMON Classic Interface, which is described in *IBM Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS: Monitoring Performance from the OMEGAMON Classic Interface*.

The product often provides context-related online help information that can be invoked from menus, panels, and windows by using the PF key F1 or the Help button. Online help information is not necessarily repeated in this publication, especially if it is very detailed information that is of interest only when you actively work with a function. You are encouraged to use F1 or Help to see the entire available information.

**Conventions used in the OMEGAMON documentation**

This information uses several conventions for special terms and actions, and operating system-dependent commands and paths.

**Panels and figures**

The panels and figures in this document are representations. Actual product panels might differ.
Symbols

The following symbols might appear in command syntax:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The or symbol is used to denote a choice. You can use the argument on the left or the argument on the right. For example: YES</td>
</tr>
<tr>
<td>In this example, you can specify YES or NO.</td>
<td></td>
</tr>
<tr>
<td>()</td>
<td>Denotes optional arguments. Arguments that are not enclosed in square brackets are required. For example: APPLDEST DEST (ALTDEST)</td>
</tr>
<tr>
<td>In this example, DEST is a required argument and ALTDEST is optional.</td>
<td></td>
</tr>
<tr>
<td>{ }</td>
<td>Some documents use braces to denote mandatory arguments, or to group arguments for clarity. For example: COMPARE {workload} - REPORT={SUMMARY</td>
</tr>
<tr>
<td>In this example, the workload variable is mandatory. The REPORT keyword must be specified with a value of SUMMARY or HISTOGRAM.</td>
<td></td>
</tr>
<tr>
<td>_</td>
<td>Default values are underscored. For example: COPY infile outfile - [COMPRESS={YES</td>
</tr>
<tr>
<td>In this example, the COMPRESS keyword is optional. If specified, the only valid values are YES or NO. If omitted, the default is YES.</td>
<td></td>
</tr>
</tbody>
</table>

Notation conventions

The following conventions are used when referring to high-level qualifiers:

hilev A high-level qualifier. The high-level qualifier is the first prefix or set of prefixes in the data set name. Site-specific high-level qualifiers are shown in italics.

For example:
- hilev refers to the high-level qualifier for your target data set.
- rhilev refers to the high-level qualifier for your runtime data set.

For members in target libraries, the high-level qualifier is hilev rather than rhilev.
- shilev refers to the SMP/E library high-level qualifier.

Typeface conventions

This information uses the following typeface conventions:

Bold
- Interface controls (check boxes, push buttons, radio buttons, spin buttons, fields, folders, icons, list boxes, items inside list boxes, multicolumn lists, containers, menu choices, menu names, tabs, property sheets), labels (such as Note)
Keywords and parameters in text

*Italic*

- Words defined in text
- Emphasis of words (for example: Use the word *that* to introduce a restrictive clause.)
- New terms in text (except in a definition list)

*Monospaced*

- Examples and code examples
- File names, programming keywords, and other elements that are difficult to distinguish from surrounding text
- Message text and prompts addressed to the user
- Text that the user must type
- Values for arguments or command options

*Significant elements*

**Recommendation**
Provides guidance when more than one option is available.

**Related reading**
Refers you to other publications that contain relevant information.

**Requirement**
Identifies a condition that must be met to ensure that the product is functional.

**Restriction**
Identifies a restriction or limitation with this product or an associated procedure.

**Terminology used**

IBM Tivoli OMEGAMON XE for DB2 Performance Monitor on z/OS can be considered as a functional subset of IBM Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS. Therefore the abbreviation OMEGAMON XE for DB2 PE or DB2 PE is used for both products. If a distinction is required, OMEGAMON XE for DB2 PM or DB2 PM is used explicitly.

The following table shows the products that are described in this publication and the short names with which they are referred to throughout this publication:

<table>
<thead>
<tr>
<th>Product name</th>
<th>Short name</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS</td>
<td>OMEGAMON XE for DB2 PE or DB2 PE</td>
</tr>
<tr>
<td>IBM Tivoli OMEGAMON XE for DB2 Performance Monitor on z/OS</td>
<td>OMEGAMON XE for DB2 PM or DB2 PM</td>
</tr>
<tr>
<td>IBM DB2 Buffer Pool Analyzer for z/OS or a particular subsystem</td>
<td>Buffer Pool Analyzer</td>
</tr>
<tr>
<td>IBM DB2 database for z/OS</td>
<td>DB2</td>
</tr>
</tbody>
</table>

- Performance Expert Client and Workstation Online Monitor designate the client component of DB2 PE.
The client component of DB2 PE also designates the end user interface of Performance Expert for Multiplatforms, Performance Expert for Workgroups, and DB2 PE.

- OMEGAMON Collector designates the server component of DB2 PE.

How to read syntax diagrams

The rules in this section apply to the syntax diagrams that are used in this publication.

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

- Two right arrows followed by a line indicate the beginning of a statement.
- One right arrow at the end of a line indicates that the statement syntax is continued on the next line.
- One right arrow followed by a line indicates that a statement is continued from the previous line.
- A line followed by a right arrow and a left error indicates the end of a statement.

Conventions
- SQL commands appear in uppercase.
- Variables appear in italics (for example, column-name). They represent user-defined parameters or suboptions.
- When entering commands, separate parameters and keywords by at least one blank if there is no intervening punctuation.
- Enter punctuation marks (slashes, commas, periods, parentheses, quotation marks, equal signs) and numbers exactly as given.
- Footnotes are shown by a number in parentheses, for example, (1).

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

Optional items
Optional items appear below the main path.

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

Repeatable items
An arrow returning to the left above the main line indicates that an item 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 parenthesis, the number represents the maximum number of times that the item can be repeated.

A repeat arrow above a stack indicates that you can specify more than one of the choices in the stack.

Default keywords
IBM-supplied default keywords appear above the main path, and the remaining choices are shown below the main path. In the parameter list following the syntax diagram, the default choices are underlined.

Where to find information
You can access the documentation in several ways.

The documentation for this product is provided in PDF and in HTML format at the following websites:

- [Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS information center](#)
Accessing publications online

IBM posts publications for this and all other Tivoli products, as they become available and whenever they are updated, to the Tivoli software information center website. You can access the Tivoli software information center by going to the Tivoli Documentation Central website and clicking O under Tivoli Documentation A-Z to access all of the IBM Tivoli OMEGAMON product manuals.

Note: If you print PDF documents on other than letter-sized paper, set the option in the File > Print window that allows Adobe Reader to print letter-sized pages on your local paper.

The IBM Software Support website provides the latest information about known product limitations and workarounds in the form of technotes for your product. You can view this information at the Support home website.

Ordering publications

You can order many IBM publications such as product manuals or IBM Redbooks® online at the IBM Publications Center website.

You can also order by telephone by calling one of the following numbers:

- In the United States: 800-879-2755
- In Canada: 800-426-4968

In other countries, contact your software account representative to order Tivoli publications.

Accessing terminology online

The IBM Terminology website consolidates the terminology from IBM product libraries in one convenient location.

Service updates and support information

You can access support information for IBM Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS and IBM Tivoli OMEGAMON XE for DB2 Performance Monitor on z/OS on the Support home website, or you can use the IBM Support Assistant.

Support home

On the Support home website, you can find service updates and support information including software fix packs, PTFs, Frequently Asked Questions (FAQs), technical notes, troubleshooting information, and downloads.

IBM Support assistant

The IBM Support Assistant (ISA) is a free tool that provides access to several IBM support resources in a single location. You can use the ISA tool to quickly access support-related information and serviceability tools for problem determination.

To use ISA, complete the following steps:
1. Download ISA from the IBM Software Support website.
2. Start the ISA tool.
   ISA runs as a web application in the default system-configured web browser.
3. Select the Updater tab.
4. Select the New Products and Tools tab.
   The plug-in features are categorized by product family.
5. Select Tivoli > IBM Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS and IBM Tivoli OMEGAMON XE for DB2 Performance Monitor on z/OS.
6. Check the feature(s) to be installed and click Install.
7. Restart ISA.

To learn more about how to use ISA, click the Help link in the IBM Support Assistant window.

Accessibility features
Accessibility features help people with a physical disability, such as restricted mobility or limited vision, or with other special needs, to use software products successfully. This information center is developed to comply with the accessibility requirements of software products according to Section 508 of the Rehabilitation Act of the United States.

The accessibility features in this information center enable users to do the following tasks:
• Use assistive technologies, such as screen-reader software and digital speech synthesizer, to hear what is displayed on the screen. In this information center, all information is provided in HTML format. Consult the product documentation of the assistive technology for details on using assistive technologies with HTML-based information.
• Operate specific or equivalent features using only the keyboard.
• Magnify what is displayed on the screen.

In addition, all images are provided with alternative text so that users with vision impairments can understand the contents of the images.

Navigating the interface by using the keyboard
Standard shortcut and accelerator keys are used by the product and are documented by the operating system. Refer to the documentation provided by your operating system for more information.

Magnifying what is displayed on the screen
You can enlarge information in the product windows using facilities provided by the operating systems on which the product is run. For example, in a Microsoft Windows environment, you can lower the resolution of the screen to enlarge the font sizes of the text on the screen. Refer to the documentation provided by your operating system for more information.
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 information or any other documentation, you can do one of the following actions:

• Complete and submit the Reader Comment Form.
• Send your comments by e-mail to swsdid@de.ibm.com.
   Include the documentation name, the part number, the version number, and, if applicable, the specific location of the text you are commenting on (for example, a page number or table number).
Who should read this publication

This publication is for IBM data server professionals who use IBM Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS reports and traces to monitor DB2 database activity for:

- Determining system performance and efficiency
- Tuning
- Identifying bottlenecks
- Measuring an application’s performance and resource cost
- Evaluating the effects of application on other applications and the system
What's new

This topic summarizes the significant improvements or enhancements for the product and refers you to the relevant topics for more information.

SH12-6996-00 — October 2013
This edition replaces IBM Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS; IBM Tivoli OMEGAMON XE for DB2 Performance Monitor on z/OS: Monitoring Performance from ISPF, SH12-6968-00.

• This edition mainly contains editorial corrections. Editorial changes that do not have technical significance are not noted.
• In OMEGAMON XE for DB2 PE, DB2 version 8 is no longer supported.
• The following main menu functions are not supported for DB2 11:
  – Display Thread Activity
  – Display Statistics
  – Display System Parameters
Part 1. Overview of the ISPF Online Monitor

The ISPF Online Monitor provides various functions to determine performance problems.
Chapter 1. Introduction to the ISPF Online Monitor

This section describes how to invoke the ISPF Online Monitor and introduces the functions that are accessible through its main menu.

Changed access path to the ISPF Online Monitor

When you start IBM Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS from ISPF (Start EXEC FPEJINIT), the main menu is displayed.

FPEFMENU IBM Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS

Select one of the following.

- 1. Create and execute reporting commands
- 2. View online DB2 activity - Classic Interface
- 3. View online DB2 activity - PE ISPF OLM
- 4. Maintain parameter data sets
- 5. Customize report and trace layouts
- 6. Exception profiling

Command ===> __________________________________________________________________
F1=Help F2=Split F3=Exit F9=Swap F12=Cancel

Figure 1. Main menu

This menu provides access to the OMEGAMON XE for DB2 PE functions and to the ISPF Online Monitor (option 3).

Note: The OMEGAMON XE for DB2 PE options shown on this menu (all, except option 3) are described in detail in Monitoring Performance from the OMEGAMON Classic Interface.

Nevertheless, for the time being, option 3 on the OMEGAMON XE for DB2 PE main menu invokes the ISPF Online Monitor, which was part of the predecessor products IBM DB2 Performance Expert for z/OS and IBM DB2 Performance Monitor for z/OS. The following topics introduce the options that are available for the ISPF Online Monitor.

Performance data generation and online monitoring

DB2 generates trace data about its own performance and events in DB2 subsystems. However, DB2 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 subsystem-wide performance information, such as processor 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.
The Online Monitor displays subsystem-wide 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 effect 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 effects. 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.

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

### Overview of the ISPF Online Monitor functions

When you invoke the ISPF Online Monitor by selecting option 3 on the OMEGAMON XE for DB2 PE main menu, the Online Monitor Main Menu is displayed.

The Online Monitor Main Menu provides access to functions through sets of menus and panels.

---

**Display Thread Activity**

Use this option to view detailed thread and locking information for all threads that are 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 list by using the QUALIFY command (see “QUALIFY command” on page 107 for more information). You can also sort the list by using the SORT command (see “SORT command” on page 110 for more information). 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.

See Chapter 7, “Displaying thread activity,” on page 63 for more information about viewing thread activity.

The headings, field labels, fields displayed, and the order they appear in the Thread Detail panel can be tailored. See Chapter 12, “Customizing panels,” on page 205 for more information.

**Display Statistics**

Use this option 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.


The headings, field labels, fields displayed, and the order they appear in the DB2 Statistics Detail panel can be tailored. See Chapter 12, “Customizing panels,” on page 205 for more information.

**Display System Parameters**

Use this option 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 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.


The headings, field labels, fields displayed, and the order they appear in the DB2 System Parameters panel can be tailored. See Chapter 12, “Customizing panels,” on page 205 for more information.

**Options**

You can use options to change the parameters affecting the behavior of your own Online Monitor session.

For example, you might want to specify the following options:

- Select the DB2 subsystem to be monitored.
• Display your installation-specific history parameters (only available if the data collector is installed at your site). See Chapter 13, “OMEGAMON Collector purpose and function,” on page 211 and the following sections 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 several Interactive Report Facility (IRF) session options.
• Set the current SQLID for Explain processing.
• Allocate a larger storage area for thread summary information, if the default size is not sufficient.

See "Online Monitor options" on page 20 for more information.

**Collect Report Data - General**

Use this option 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 batch reporting. The DB2 traces required are determined by the reports that you want to produce.

See the Reporting User’s Guide for more information.

**Collect Report Data - For Buffer Pool Analysis**

Use this option to collect data for the buffer pool analysis function. The collected data is used to report buffer pool efficiency, and to simulate the effects buffer pool tuning actions before altering a buffer pool’s characteristics.

See the Buffer Pool Analyzer Users Guide for more information.

**Create and execute reporting commands**

This option invokes the Interactive Report Facility (IRF), which you can use to interactively create and execute batch report command streams.

See the Reporting User’s Guide for the description of the IRF and the Report Reference for reports generated by using the IRF.

**Maintain parameter data sets**

Use this option to maintain the Exception Threshold data set, the correlation translation member, the timezone information member, and the MAINPACK definition member.

See the Reporting User’s Guide for more information.

**Explain**

Use this option 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 about 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.

See Chapter 9, “Monitoring the access path with Explain,” on page 163 for more information.
Chapter 2. Monitoring and problem determination

This section describes how to monitor a DB2 subsystem and how to determine performance problems by using batch reports and the Online Monitor functions of OMEGAMON XE for DB2 PE.

You can use OMEGAMON XE for DB2 PE for continuous or periodic monitoring of a DB2 subsystem and for determining specific performance problems in DB2. OMEGAMON XE for DB2 PE 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 among 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 effects of any adjustments made within the DB2 subsystem
- Determining whether performance objectives are being met

OMEGAMON XE for DB2 PE offers different ways to monitor your subsystem depending on whether you want to see current or past activity. Use the Online Monitor to monitor an active subsystem as well as to view events that happened in the recent past. Use the Batch reports 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. OMEGAMON XE for DB2 PE offers several ways of reducing the amount of data that needs to be examined, the most important is exception processing. Exception processing makes it easy for you to focus on possible performance problems by highlighting data that is outside defined thresholds. It is available in Batch reporting and the Online Monitor.

A good 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 exception event processing. 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 to investigate performance trends is by producing Accounting and Statistics reports that are 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 comprehensive performance data that is shown in Thread and Statistics panels. If you assume 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 re-create 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.

OMEGAMON XE for DB2 PE 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® or IMS™, and the MVS™ 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:

- CICSpix System Manager for CICS
- IMS/VS DC Monitor or IMSPIARS for IMS
- RMF™ for MVS

The relationship between the different systems and performance tools is complex, however, it is not within the scope of this documentation. For more information, see the DB2 Administration Guide. 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, 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 query response times and transaction throughput.

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 subcommand option is also useful in determining Accounting exception thresholds.

For example, you can 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 performance

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, OMEGAMON XE for DB2 PE offers several other ways of filtering the data and highlighting potential problems.

The following options are available in Batch reporting:
- Filtering data by date and time (FROM and TO subcommand options)
- Filtering data by identifiers such as user ID (INCLUDE and EXCLUDE subcommand options)
- Filtering data by resource usage (TOP subcommand option)
- Ordering data on reports by interval (INTERVAL subcommand option)
- Summarizing and sorting data on SQL reports
- Tailoring report layouts for your own needs. The User-Tailored Reporting feature (UTR) and its use is described in detail in the Reporting User’s Guide.

The following options are available in the Online Monitor:
- Qualify and sort functions
- History data collection with qualifications

Monitoring using reports

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

Another way to limit the data that needs to be examined is to use the TOP subcommand 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, can identify the threads or users that have required the most use of the resources specified in the TOP subcommand option. Alternatively, you can use the TOP subcommand option with the ONLY keyword to filter entries based on resource usage and produce a report that shows only entries with the highest resource usage.

You can summarize data for certain periods by ordering your Accounting and Statistics reports by interval. For example, you can summarize data for the peak periods during the day.
If 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 several criteria. For example, a problem cursor can be identified by 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 layouts and trace layouts with the User-Tailored Reporting feature (UTR). Use UTR to control the volume, contents, and layout of your traces and reports. The User-Tailored Reporting feature (UTR) and its use is described in detail in the Reporting User’s Guide.

**Monitoring using the ISPF Online Monitor**

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

Use the qualify function to filter threads by OMEGAMON XE for DB2 PE identifiers, thread status, and thread type, and to effectively reduce the amount of data that needs to be examined. For example, to view only the active threads in lock wait status, qualify the threads by selecting the 1 field on the DB2 Thread Qualification Parameters window.

Use the sort function to specify the order in which the threads are listed. For example, 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 performance trends**

You can use reports and graphs to summarize data over periods of several days, weeks, or months to observe trends in performance. Pay special attention to peak periods of activity, 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 processor usage
- Changing workload patterns over a period
- Changes in the transaction distribution and frequency
- Changes in the SQL activity pattern

**Determining performance problems**

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

**Problems detected in periodic exception processing**

If you use periodic exception processing in the Online Monitor and you are notified about a problem, examine the information in the Thread Activity panels or Statistics panels, depending on the type of problem.

- For system related problems, examine the Statistics panel and the DB2 System Parameters panel.
• For application related problems, examine the Thread Activity panels.

To view the past events surrounding the problem online, you can use the HISTORY command. The amount of available historical data 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 exception event processing and the Online Monitor panels do not provide sufficient information to determine the cause, collect the appropriate trace data to produce Locking reports, I/O Activity reports, Audit reports, or Record Trace reports. This section describes how to proceed with specific exception events.

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 obtain 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 a Record trace on the Statistics Class 4 IFCIDs to see details of communication problems. These are likely to be either VTAM or DB2 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 a Record trace for this IFCID. You can get more details about coupling facility behavior from RMF reports.

Problems detected in exception reports
If you use an Accounting exception report to monitor your system, produce this report using the TOP or the INTERVAL subcommand option so that you can immediately focus on potential problem areas.

If you use an Statistics exception report to monitor your system, produce this report using the INTERVAL subcommand option 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, generate Utility Activity reports. If the number of deadlocks is high, 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, which is typically indicated as an elapsed time problem for an application or a user, use Explain reports to determine the access path of the suspected plan. In addition, if necessary, generate Accounting traces by using the TOP subcommand option.
- If the Explain reports and the Accounting traces do not identify the reason for poor SQL performance, use SQL Activity reports for detailed information about the specific statement, such as scans or I/O per page set or sort specifics.
- If the Accounting traces indicate a locking problem, run Locking reports.
- 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.

Other uses for OMEGAMON XE for DB2 PE
You can also use OMEGAMON XE for DB2 PE 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 that are 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.
Part 2. How to use the ISPF Online Monitor

The following information describes how to use the ISPF Online Monitor, its parameters, help, keys, panels, and commands. It also describes some common problems that you might encounter when you use OMEGAMON XE for DB2 PE.
Chapter 3. Using the ISPF Online Monitor

This section outlines the privileges and traces required to use the ISPF Online Monitor, shows how to change parameters that affect the behavior of an Online Monitor session, describes the online help, the default function key settings, how to move between Online Monitor panels, how to issue DB2 commands, global commands, and how to treat some common errors.

Required authority

The information in this section 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 Installation Guide applies.

To use the Online Monitor, you need the following authorities:

- Access to a DB2 subsystem
- EXECUTE authority on the Online Monitor plan. The plan name is KO2PLAN.
- 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: Granting MONITOR2 privilege enables access to potentially sensitive data, for example, the SQL statement being executed.

Input data from DB2 monitor traces

To use the Online Monitor, ensure that the DB2 monitor trace is active. Monitor trace class 1 is required to display data. Monitor trace classes 2, 3, 7, and 8 should 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 processor and elapsed times for the Thread Activity panels and class 7 provides DB2 processor and elapsed times for packages. Monitor trace class 2 is also required for class 1 TCB time.

Monitor trace class 3 provides DB2 suspension times for the Thread Activity panels and class 8 provides DB2 suspension times for packages.

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 about how to reallocate the DB2 load library at your site, consult your system programmer.

**Accessing the ISPF Online Monitor**

To access the ISPF Online Monitor, start your IBM Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS session from the TSO/ISPF environment (Start EXEC FPEJINIT).

When the IBM Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS main menu (see Figure 1 on page 3) is displayed, select option 3 (View online DB2 activity - PE ISPF OLM). This presents the Online Monitor Main Menu (see Figure 2 on page 4).

**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 in 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
- =6a Jumps to Collect Report Data - General
- =6b Jumps to Collect Report Data - For Buffer Pool Analysis
- =7 Jumps to Create and execute reporting commands
- =8 Jumps to Maintain parameter data sets
- =9 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 if:
• Any OMEGAMON XE for DB2 PE or ISPF command is entered on the command line
• Windows are selected for display
• Function keys are used

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

### Leaving the ISPF Online Monitor

To exit the ISPF Online Monitor from the 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. See Figure 3 for an example of an Asynchronous Task Termination panel and to Chapter 13, “OMEGAMON Collector purpose and function,” on page 211 and the following sections for a description of the data collector.

```
FPEMPG01 Asynchronous Task Termination
Command ===> _________________________________________________________________
Press Enter to exit the Online Monitor or request Exit or Cancel to return to the Online Monitor Main Menu.
Select an Exception task to keep it active. All non-selected tasks will be terminated when leaving the Online Monitor as well as all the DB2 traces started by the Collect Facility will be stopped.

<table>
<thead>
<tr>
<th>Exception/Collect tasks</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periodic Exception</td>
<td>Not active</td>
</tr>
<tr>
<td>Exception Event</td>
<td>Not active</td>
</tr>
<tr>
<td>run 3pm today</td>
<td>Active</td>
</tr>
<tr>
<td>run at 10 today</td>
<td>Active</td>
</tr>
<tr>
<td>Collect Task C</td>
<td>Not active</td>
</tr>
<tr>
<td>Collect Task D</td>
<td>Not active</td>
</tr>
<tr>
<td>Collect Task for BPA</td>
<td>Not active</td>
</tr>
</tbody>
</table>

F1=Help   F2=Split   F3=Exit   F9=Swap   F12=Cancel
F17=Collect
```

*Figure 3. Asynchronous Task Termination panel*

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

To return to the 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 Online Monitor Main Menu.

![Figure 4. Options menu](image)

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

- Select option 1 (DB2 Subsystem) to display either the DB2 Subsystems List window or DB2 Subsystem window, where you can select the DB2 subsystem to be monitored.
- Select option 2 (History Defaults) 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. See Chapter 13, “OMEGamon Collector purpose and function,” on page 211 and the following sections for a description of the data collector.
- Select option 3 (Monitor Output) to display the Monitor Output window, where you can control the writing of monitor records to an output data set.
- Select option 4 (Auto Display) to display the Auto Display window, where you can set the default interval for the AUTO command.
- Select option 5 (Session Options) to display the Session Options window, where you can set several options controlling the environment of your IRF session.
- Select option 6 (Current SQLID) 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.
- Select option 7 (ISPF Online Monitor Memory Usage) to increase the default size of the internal storage area for displaying thread summary information from 1 MB to up to 4 MB. This might become necessary in large environments, if the amount of active DB2 threads cannot be displayed in the Thread Summary panel (typically revealed by message FPEM103 or FPEM546).

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 (see Chapter 13, “OMEGamon
To display this window, select option 1 (DB2 Subsystem) from the Options menu.

### Data Collector List Window

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

<table>
<thead>
<tr>
<th>DB2 Subsystem</th>
<th>Data Collector DB2 Location</th>
<th>DB2 Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSN1</td>
<td>DSN8 PM01D811 V9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DSN7 PM01D711 V9</td>
<td></td>
</tr>
</tbody>
</table>

---

**Figure 5. 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 no data collectors are active on your MVS system, the window shown in Figure 6 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 6. 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. See Figure 7.

If you work 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.

<table>
<thead>
<tr>
<th>DGOMGP03 Asynchronous Task Termination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press Enter to change Subsystem or request Cancel to restore the Subsystem ID to its previous value.</td>
</tr>
<tr>
<td>Changing the Subsystem results in the termination of all active tasks as well as the stopping of all the DB2 traces started by the Collect Report Data facility.</td>
</tr>
<tr>
<td><strong>Exception/Collect tasks</strong></td>
</tr>
<tr>
<td>Periodic Exception</td>
</tr>
<tr>
<td>Exception Event</td>
</tr>
<tr>
<td>Collect data for acct/io/stats/audit</td>
</tr>
<tr>
<td>CICS problem</td>
</tr>
<tr>
<td>Collect Task C</td>
</tr>
<tr>
<td>Collect Task D</td>
</tr>
<tr>
<td><strong>Command ===</strong></td>
</tr>
<tr>
<td>F17=Collect</td>
</tr>
</tbody>
</table>

*Figure 7. Asynchronous Task Termination panel*

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

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.
By using the HISTORY command, you can view thread activity, statistics, and system parameters data previously gathered by the data collector. See Chapter 5, “Viewing past data,” on page 41 for a complete description about how to view past performance data.

The History Collected field shows either YES or NO to indicate if any past data is 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.

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, see Chapter 5, “Viewing past data,” on page 41. For more information about data collector installation options, see the DB2 Installation Guide.

### 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 in the Online Monitor panels are written to a data set whenever the display is updated. Output from the
Statistics and System Parameters 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 a 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 9. Monitor Output window*

Use the Write output field 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 in the Online Monitor panels. When auto display is active, the values displayed in the current panel are updated periodically, as specified in 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.
Use the **Units** field to specify the unit of time that is to be associated with the value in the **Interval** field.

Use the **1** 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 several options controlling the environment of your Interactive Report Facility (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.

The field values shown in Figure 11 are the default settings.

Use the **1** field to specify whether or not you want to be prompted each time you issue a delete, replace, or reset request.

Use the **1** field to specify the panel you want to start on. Possible values for this field are:

1. Create and execute reporting commands (DGOMENU)
2. View online DB2 activity - Classic Interface (KO2MPSF)
3. View online DB2 activity - PE ISPF OLM (FPEMMENU)
4 View online DB2 activity - PE ISPF OLM (FPEMMENU)
5 Customize report and trace layouts (DGOBMENU)
6 Exception profiling (DGOFEP00)

Blank Performance Expert main menu (FPEFMENU).

The 1 field applies to the execution of batch jobs.

Use the 1 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.

**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.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current SQLID</td>
<td>Specify the current SQLID, then press Enter.</td>
</tr>
</tbody>
</table>

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

*Figure 12. Current SQLID window*

If the 1 field in this window is not specified, it defaults to your user ID.

**Online Monitor Memory Usage window**

Use the ISPF Online Monitor Memory Usage window to specify a different size of the internal storage area that the Online Monitor uses to display active thread information. You can specify a value of 1, 2, 3, or 4, which corresponds to 1 to 4 MB.

Typically, you only need to increase the size of this storage area if the Online Monitor complains about insufficient storage to display active thread information (message FPEM103 or FPEM546).

By default, the Online Monitor uses a 1 MB storage area. When you change the size, the change takes place when you select again option 3 (View online DB2 activity - PE ISPF OLM) from the OMEGamon XE for DB2 PE main menu (shown in [Figure 1 on page 3](#)). The specified value becomes the new default value and remains in effect until it is replaced by a different value.

To display this window, select option 7 (ISPF Online Monitor Memory Usage) from the Options menu.
Accessing online help

You can access comprehensive panel help from any Online Monitor panel and field help from fields in these panels. Panel help shows general information that describes the purpose of the panel and the commands that are 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). 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

Note:
1. In 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.

Function key default settings

Use the function key default settings to view help, move between panels, or access certain Online Monitor and ISPF functions with a single keystroke.

Note:
• The Online Monitor is an ISPF application, and all normal ISPF behaviors apply.
• The default function key settings in help panels follow the standard conventions for help in the ISPF environment.

Table 2 on page 28 describes the Online Monitor function keys, their default settings, their functions, and the Online Monitor panels on which they are available.
Table 2. Function key default settings

<table>
<thead>
<tr>
<th>Function key</th>
<th>Default setting</th>
<th>Function</th>
<th>Online Monitor panels</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>HELP</td>
<td>Used to view help information for a panel or field.</td>
<td>All panels</td>
</tr>
<tr>
<td>F2</td>
<td>SPLIT</td>
<td>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.</td>
<td>All panels</td>
</tr>
<tr>
<td>F3</td>
<td>EXIT</td>
<td>Used to validate and save the data entered in a panel, exit the panel, and return to the previous panel.</td>
<td>All panels that contain a command line</td>
</tr>
<tr>
<td>F4</td>
<td>PROMPT</td>
<td>Used to view a list of possible values for a field. The prompt fields are followed by a plus sign (+).</td>
<td>Some Collect Report Data panels and Exception Threshold Field Details panel</td>
</tr>
<tr>
<td>F5</td>
<td>AUTO</td>
<td>Used to refresh the data shown in the current panel periodically.</td>
<td>All Thread and Statistics panels</td>
</tr>
<tr>
<td></td>
<td>ADD</td>
<td>Used to add a new exception threshold entry.</td>
<td>Exception Threshold Field Details panel</td>
</tr>
<tr>
<td>F6</td>
<td>HISTORY</td>
<td>Used for viewing historical data in panels.</td>
<td>All Thread Activity, Statistics, and System Parameters panels</td>
</tr>
<tr>
<td></td>
<td>DELETE</td>
<td>Used to delete an exception threshold entry.</td>
<td>Exception Threshold Field Details panel</td>
</tr>
<tr>
<td>F7</td>
<td>UP</td>
<td>Used to scroll toward the top of the data.</td>
<td>All scrolling panels</td>
</tr>
<tr>
<td>F8</td>
<td>DOWN</td>
<td>Used to scroll toward the bottom of the data.</td>
<td>All scrolling panels</td>
</tr>
<tr>
<td>F9</td>
<td>SWAP</td>
<td>Used to switch between ISPF sessions.</td>
<td>All panels</td>
</tr>
<tr>
<td>F10</td>
<td>QUALIFY</td>
<td>Used to filter the threads listed in the Thread Summary panel.</td>
<td>Thread Summary panel</td>
</tr>
<tr>
<td></td>
<td>DELTA</td>
<td>Used to begin delta processing mode that calculates the statistics values between the last two times you pressed Enter.</td>
<td>All Statistics panels</td>
</tr>
<tr>
<td></td>
<td>PREVIOUS</td>
<td>Used to display the previous exception threshold entry for a field.</td>
<td>Exception Threshold Field Details panel</td>
</tr>
<tr>
<td>F11</td>
<td>SORT</td>
<td>Used to sort the threads listed in the Thread Summary panel.</td>
<td>Thread Summary panel</td>
</tr>
<tr>
<td></td>
<td>INTERVAL</td>
<td>Used to establish a base point in time from which statistics are to be calculated.</td>
<td>All Statistics panels</td>
</tr>
<tr>
<td></td>
<td>NEXT</td>
<td>Used to display the next exception threshold entry for a field.</td>
<td>Exception Threshold Field Details panel</td>
</tr>
<tr>
<td>F12</td>
<td>CANCEL</td>
<td>Used to exit a panel without saving the entries, and return to the previous panel canceling all related panels.</td>
<td>All panels</td>
</tr>
<tr>
<td>F14</td>
<td>PURGE</td>
<td>Used to purge a thread currently processing in the DB2 subsystem you are monitoring. You require the DB2 privilege to perform CANCEL THREAD.</td>
<td>All Thread Activity panels</td>
</tr>
</tbody>
</table>
### Table 2. Function key default settings (continued)

<table>
<thead>
<tr>
<th>Function key</th>
<th>Default setting</th>
<th>Function</th>
<th>Online Monitor panels</th>
</tr>
</thead>
</table>
| F16          | LOOK            | Used to view the following exception information and authorization failures:  
\- Periodic exceptions  
\- Periodic exceptions messages  
\- Display exceptions  
\- Authorization failure summary  
\- Exception event summary  
\- Exception event messages | All panels (except LOOK and related 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 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 |
| F21          | EXPAND          | Used to expand a field content that is too long to fit in a panel into a separate window where the entire field content can be shown. | All panels that contain information of a length that cannot be shown in the available panel space. |
| F22          | LEFT            | Used to scroll through a field content that is too long to fit in a panel, if the cursor is positioned on such a field. | All panels that contain information of a length that cannot be shown in the available panel space. |
| F22          | RIGHT           | Used to scroll through a field content that is too long to fit in a panel, if the cursor is positioned on such a field. | All panels that contain information of a length that cannot be shown in the available panel space. |

You can use the following ISPF commands 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.

### Issuing DB2 commands

Use the command DB2 to execute any DB2 command during your Online Monitor session. You can enter this command on the command line of any Online Monitor panel.

The command syntax is:

```
DB2 [command text]
```

*Figure 14. 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 *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 15 on page 31](#).
If you issue the command DB2 without any parameters, the DB2 Command window is displayed.

<table>
<thead>
<tr>
<th>PM01IDLOC</th>
<th>DSN1 V9</th>
<th>GROUP001 MEMBER01</th>
</tr>
</thead>
</table>

![DB2 Command Output window](image)

Figure 15. DB2 Command Output window

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

![DB2 Command window](image)

Figure 16. DB2 Command window

This window displays command lines on which you can issue DB2 commands. The window shows a list of the last ten DB2 commands that you entered.
You can retrieve a command that is stored in the list by positioning the cursor under the command and pressing Enter. Then, the command is shown on the 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.

### Using the 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:

```
/SM590000/SM590000 COLLECT
```

To issue the COLLECT command, type `COLLECT` on the command line and press Enter. COLLECT can be truncated to a minimum of COL.

For more information about collecting report data, see the *Reporting User’s Guide*.

### Using the OPTIONS command

Use OPTIONS to display the Session Options window, where you can set several options controlling the environment of your Interactive Report Facility (IRF) session.

The command syntax is:

```
/SM590000/SM590000 OPTIONS
```

To issue the OPTIONS command, type `OPTIONS` on any command line and press Enter. OPTIONS can be truncated to a minimum of OPT.

*Figure 17. Syntax of the OPTIONS command*

### Correlation ID translation

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

The correlation ID contains:

- **Batch jobs**
  - Jobname

- **TSO applications**
  - Original authorization ID (the logon user ID)

- **Applications using the DB2 call attachment facility**
  - Original authorization ID (the logon user ID)
CICS transactions
  Connection type, thread type, thread number, and the transaction ID

IMS applications
  PST number and PSBNAME of the application

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).

The default translation
OMEGAMON XE for DB2 PE breaks the correlation ID into parts 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.

Table 3. The 12-Byte Correlation ID field and the default translation

<table>
<thead>
<tr>
<th>Connection Type</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batch</td>
<td></td>
<td></td>
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<tr>
<td>TSO, DB2 call attach</td>
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<tr>
<td>CICS</td>
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<td>IMS</td>
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<tr>
<td>RRS</td>
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</tr>
</tbody>
</table>

Changing the default translation
You can override this default translation by using option 8 (Maintain parameter data sets) from the Online Monitor Main Menu. The correlation translation information is kept in the member CORRDATA of the DPMPARMS data set.

Each record in the CORRDATA member specifies the translation that is to be used for a specific connection ID. 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 OMEGAMON XE for DB2 PE 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 window.
**How large and missing values are displayed**

Values shown in panels are 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 - \(10^9\))
- **TT** trillion (tera - \(10^{12}\))

The letter is displayed directly after the number, without blank spaces. There can, however, be decimal places, as in the following examples:

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

If a counter value or specific information in reports, in windows, or in panels is not shown, the following notation is used to indicate the reason:

- **N/A** Not applicable is shown if DB2 never produces a counter value in a specific context. Examples are:
  - A counter is not available in one DB2 version.
  - Counters are mutually exclusive.

- **N/C** Not calculated is shown for a derived field where the value cannot be calculated or is useless. Examples are:
  - A divide by zero (percentages, ratios).
  - Suppression of negative elapsed time values.
  - Required counter values for calculation marked as N/A or N/P.
  - Insufficient data or small counter values to allow significant statements (meaningless or misleading averages).

- **N/P** Not present is shown for a field where DB2 can present values, but does not in this instance. Examples are:
  - When counter values are not generated because of operational conditions (a trace class is not active).
  - An application does not provide a value because it is optional.

**Elapsed time formats**

This section shows the different time formats in which time values are presented.

- **\(dd hh:mm:ss.ffffffff\)**, where:
  - \(dd\) represents days
  - \(hh\) represents hours
  - \(mm\) represents minutes
  - \(ss\) represents seconds
  - \(fffffff\) 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 reports that use this format might not report days (\(dd\)) or hours (\(hh\)).

- **\(ssssssss,fffffff\)**, where:
  - \(ssssssss\) represents seconds
  - \(fffffff\) 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 print a time value, the time is rounded by removing decimal places as required. For elapsed times, a rounded value is printed.

## Date formats

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

## Displaying long names and values in scrollable fields

Beginning with DB2 version 8, certain identifiers, such as authorization IDs and program and collection names, can be up to 128 characters long. In general, if an identifier or any applicable field value is too long for the space available in a panel, the Online Monitor displays the information in a so-called scrollable field. To view the non-visible section of a scrollable field, you can place the cursor on the field and use an assigned function key to scroll through the information.

**Figure 18** shows a fictitious example of a panel with possible variations of scrollable fields. Relevant parts of the panel are in italics. The string `abcdefghijklmnopqrstuvwxyz` represents a hypothetical field value that is too long to fit into the available space (of whatever field).

- Variation 1 shows that the string is left-aligned and truncated at the right side (`uvwxyz` is not shown). A plus sign (+) follows the string, which indicates that more of the field's content is available on the right side.
- Variation 2 shows that the string is right-aligned and truncated at the left side (`abcdef` is not shown). A minus sign (−) follows the string, which indicates that more of the field's content is available on the left side.
- Variation 3 shows that the string is centered and truncated at the left and right sides (`abc` and `xyz` are not shown). A plus sign and a minus sign (+−) follow the string, which indicates that more of the field's content is available on both sides.

**Figure 18. Fictitious panel with scrollable field variations**

The plus and minus signs next to fields act as *scroll indicators*. 
• If shown, they indicate that the content of a field is shown in part. No scroll indicator is shown if the complete field content can be presented.

• Whether more of a field's content is available on the left, on the right, or on both sides. Minus (-) associates the left side, plus (+) associates the right side.

Initially, all field values are shown left-aligned, which means that only the plus sign is shown. The minus sign is shown after you scrolled through a field by means of the function keys described next.

To view non-visible sections of an appropriate field, you need to position the cursor on the field and use the following function keys (the default function key settings are assumed).

• F21 (Expand) shows the field's content in a separate window, which is overlaid on the current panel. If the content exceeds the available width of this window, it continues on the next line. Pressing F3 (Exit) or F12 (Cancel) closes the window.

• F22 (Left) moves the begin of the shown field content toward the start of the actual content. The increment is the length of the available space, until the shown field content is left-aligned in the available space.

• F23 (Right) moves the end of the shown field content toward the end of the actual content. The increment is the length of the available space, until the shown field content is right-aligned in the available space.

These keys can be used in any meaningful order, provided the cursor is positioned on a scrollable field. Otherwise, pressing a key has no effect.

The mechanism described so far is applicable to input fields and output fields. When you type information in a field, you can use the same function keys to position the content of a field. However, a subtle distinction should be noted: In output fields potentially existing trailing space characters are treated as nonexistent. This means, you cannot accidentally scroll to a non-visible section of the field content. In input fields trailing space characters are considered valid. This means, when you scroll through an input field with a long sequence of space characters, the field might appear empty but in fact is not.

Finally, you can get help about the use of scrollable fields by positioning the cursor on the scroll indicator area (reserved for the +/- indicators) and pressing F1 (Help).
Chapter 4. Common errors using OMEGAMON XE for DB2 PE

This section describes problems often encountered when you use OMEGAMON XE for DB2 PE. If you come across a problem, read this section before contacting IBM service.

STEPLIB missing from IRF-generated JCL

Symptom
The STEPLIB DD statement is missing from the Interactive Report Facility-generated JCL.

Probable Cause
Wrong option selected while running FPEJVARS.

Explanation
FPEJVARS is an EXEC provided with OMEGAMON XE for DB2 PE that displays a panel for setting up certain defaults. One of the options in this panel specifies whether the OMEGAMON XE for DB2 PE load library is in the system LNKLST concatenation. If this option is selected, no STEPLIB DD statement is in the IRF-generated JCL.

Command not found

Symptom
Message IKJ5650I Command xxx not found is issued during the execution of OMEGAMON XE for DB2 PE.

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

Explanation
The PCF performs a security check on all commands to examine 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.

If you are running the ACF2 security program, the Command Limiting Table needs to be updated by adding FPEFMAIN, FPEMMAIN, and FPEF000.

Insufficient storage to display thread activity information

Symptom
Message FPEM103 Insufficient storage available for thread processing or message FPEM546 The area for handling all IFCID records is not large enough. VI IFCID records are suppressed is issued when one of the Thread Activity panels is invoked.

Probable Cause
Insufficient storage allocated to hold all active thread information.

Explanation
By default, the Online Monitor allocates at least 1 MB of storage to hold active thread information. If the amount of active threads grows, more storage might become necessary. Use the Options panel, option 7 \(15PF\)
Online Monitor Memory Usage) and allocate a larger storage area. See
"Online Monitor options" on page 20 for more information. The new size
is kept in member FPEFPROF of the ISPF profile data set (parameter
IFIRALEN) and becomes active when the Online Monitor is restarted.

**STEPLIB missing from IRF-generated JCL**

**Symptom:** The STEPLIB DD statement is missing from the Interactive Report
Facility-generated JCL.

**Probable Cause:** Wrong option selected while running FPEJVARs.

**Explanation:** FPEJVARs is an EXEC provided with OMEGAMON XE for DB2 PE
that displays a panel for setting up certain defaults. One of the options in this
panel specifies whether the OMEGAMON XE for DB2 PE load library is in the
system LNKLIST concatenation. If this option is selected, no STEPLIB DD statement
is in the IRF-generated JCL.
Part 3. Monitoring and tuning with the ISPF Online Monitor

The following information describes how to perform monitoring and tuning tasks with the ISPF Online Monitor, such as viewing past data and statistics, monitoring exceptions and thread activities, explaining SQL statements, and evaluating DB2 system parameters.
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.

See Chapter 13, “OMEGAMON Collector purpose and function,” on page 211 and the following sections for a description of the data collector.

You can view past data by issuing the HISTORY command or pressing F6 (History) in 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 19.

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). For more information, see the DB2 Installation Guide.

The data collector parameters can also be modified by the administrator user.

The syntax of the HISTORY command is:
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 no data is available, data from the current time is displayed and processing continues as if HISTORY is 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 default is the time of the earliest available history record for the specified date. The seconds do not need to be specified.

**Note:** HISTORY can be truncated to a minimum of HIS.

If no data is 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.

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

**Note:** When monitoring with HISTORY OFF, it is possible to view data that cannot be viewed by using 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.
A sample JCL is provided in library RK02SAMP(DGOMMJCCL) that can be used to unload history VSAM data sets created by the data collector. After unloading, you can use the data as input to the batch Record trace function for problem determination. The sample JCL might need to be modified.
Chapter 6. Exception processing

Exception processing is the most effective way of identifying 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 with values outside defined thresholds. This allows better management of service levels by identifying problems in the DB2 subsystem and threads causing performance problems.

By using display exception processing and periodic exception processing, you can monitor and identify:

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

By 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 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...
exceptions, and statistics exceptions in interval or delta processing mode. See “Statistics processing modes” on page 116 for an explanation of delta and interval processing.

With display exception checking, fields shown in 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. These colors can differ if you have changed your ISPF default colors. Selection fields in 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 thread activity fields 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 that 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 use the Online Monitor the next time, any periodic exceptions that were 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
- Data set extension
- Unit of recovery problem
- Log space shortage

The events must be specified with the EXCEPTIONEVENT data collector parameter or in the Data Collector Parameters window before exception event
processing can be activated from the Exception Processor panel. For more information, see the *DB2 Installation Guide*.

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 since the last exception notification or since exception processing was started.

If exception event processing is active, the Exception Notification window is shown, as in the following figure.

![Exception Notification window (exception event processing active)](image_url)

If exception event processing is not active, the Exception Notification window is shown, as in the following figure.
To exit the Exception Notification window and return to the panel you were viewing, press Enter or F12 (Cancel).

The Periodic Exceptions section of this window shows the number of Problem and Warning level periodic exceptions 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 batch exception processing 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**

This information has been consolidated in the Reporting User’s Guide for consistency reasons.

For more information, see the Reporting User’s Guide at the following website:


**How to start exception processing**

Exception processing is started from the Exception Processor panel. All exception processing functions are activated from this panel.

Figure 24 on page 50 shows the Exception Processor panel.

Alternatively, exception processing can automatically be started when the OMEGAMON Collector is started.
Starting exception processing when the OMEGAMON Collector is started

When the OMEGAMON Collector is started, its startup parameters determine whether exception events are to be processed. Dependent on which exception events are specified, the appropriate traces are started. If an Exception Threshold data set with exception criteria is already available, it can be specified in the OMEGAMON Collector startup parameters. By this means, exception processing automatically starts with predefined exception thresholds whenever the OMEGAMON Collector is started.

For more information about the Exception Threshold data set, a sample data set provided with the product, its data set attributes, and how its content can be modified, see the Reporting User’s Guide.

For more information about OMEGAMON Collector startup parameters, see the topic about configuring OMEGAMON Collector for exception processing in Configuration and Customization. The EXCEPTIONEVENT startup parameter determines the events, and the AUTOEXCPTHNAME startup parameter specifies the name of the Exception Threshold data set that is to be used at startup. In product versions released later than 2005, much of the configuration and customization specifications are done by means of the Configuration Tool, which also generates the necessary default data sets. See the Configuration Tool Help (F1) for more information.

If this means of starting exception processing is used, and if the content of the Exception Threshold data set is modified while the OMEGAMON Collector is running, remember to refresh the environment if you want the new exception criteria to be recognized.

Refer to “How to restart exception processing (REINIT command)” on page 53 for more details.

Starting exception processing from the 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 Online Monitor Main Menu.
Use the 1 field to specify whether the 1 field value is in seconds or minutes. This field is only required for periodic exception processing.

The 1 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 refreshed. After the elapsed period, if any periodic exceptions have occurred, the Exception Notification window is displayed and shows 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. When you request a log or DPMOUT file, the Exception Output Data Sets window is displayed. See “Exception Output Data Sets window” on page 51 for details.

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 in the Exception Processor panel before activating display exception, periodic exception, or exception event processing.

Exception processing user exit
OMEGAMON XE for DB2 PE supports a user exit to enhance the exception processing capabilities. This exit can handle 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 in 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. 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.

OMEGAMON XE for DB2 PE 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 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 information, see the DB2 Installation Guide.

**Exception Output Data Sets window**
The Exception Output Data Sets window is displayed whenever you have requested a Log File or DPMOUT data set in the Exception Processor panel.

![Exception Output Data Sets window](image)

Use this window to enter the names of the Exception Log data set and DPMOUT data set 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 in 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 where exception conditions are written. An entry is 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 Exception Log print utility. See "Printing the Exception Log File data set" on page 59 for more information.

For the layout of the Exception Log File data set, see Chapter 15, "Layout of the Exception Log File output record," on page 247.

You can enter the name of an output DPMOUT data set where DPMOUT-formatted records that contain exception conditions are written. This data set can be used as input to a batch Record trace or Statistics trace for a more detailed analysis of exception conditions. See the Report Reference for information about 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 to activate the selected functions. If there are any errors during this process, a panel is displayed that shows the errors.

**Starting display exception processing**

Display exception processing is started from the Exception Processor panel under Activate/Deactivate Exception Processing.

The Exception Processor panel is shown in Figure 24 on page 50.

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.

The Exception Processor panel is shown in Figure 24 on page 50.

Enter any character in the 1 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.
The Exception Processor panel is shown in Figure 24 on page 50.

Enter any character in the Exception event notification field to activate exception event notification.

The events must be specified with the EXCEPTIONEVENT data collector parameter or from the Data Collector Parameters window of the administrator user dialog before exception event processing can be activated.

### How to restart exception processing (REINIT command)

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 in the Exception Processor panel as shown in Figure 24 on page 50. You can reinitialize exception processing by stopping and starting exception processing from the Exception Processor panel.

You can also reinitialize exception processing by using the REINIT command. The command syntax is:

```
REINIT
```

*Figure 26. Syntax of the REINIT command*

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

### Examining exception messages (LOOK command)

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
```

*Figure 27. Syntax of the LOOK command*

The LOOK parameters 1 to 6 correspond to the options on the Look Selections menu in Figure 28 on page 54.
To display the Look Selections menu, type L00K and press Enter on any command line, or press F16 (LOOK).

Use the Look Selections menu to reach 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 and shows the most recent exceptions that occurred.

The following topics describe the windows that can be accessed from the Look Selections menu.

**Examining the Periodic Exceptions**

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.
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 in 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) 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 about history, see Chapter 5, “Viewing past data,” on page 41.

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

Examining the Periodic Exceptions Messages

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

**Examining the Display Exceptions**

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

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 the Authorization Failure Summary

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

```
DGOMLAFLS Authorization Failure Summary ROW 1 TO 3 OF 3

Reporting Started ...............: 03/30/08 08:52:04
Last Interval ..................: 03/30/08 09:01:23

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

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Authorization ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>03/30/08</td>
<td>08:52:04</td>
<td>USER300</td>
</tr>
<tr>
<td>03/30/08</td>
<td>08:52:34</td>
<td>USER300</td>
</tr>
<tr>
<td>03/30/08</td>
<td>08:53:07</td>
<td>USER300</td>
</tr>
</tbody>
</table>

******************************************************************************

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

Command ===> ___________________________________________________________

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

Figure 32. 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.

Examining the Exception Event Summary

To display the Exception Event Summary window, select option 5 (Exception Event Summary) from the Look Selections menu or type LOOK 5 and press Enter on any command line.
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
- Data Set Extension Data window
- Unit of Recovery Inflight or Indoubt Data window
- Active Log Space Shortage Data window

For IFCID 337 (Lock Escalation) an IFCID 359 (Index Split) exception events no details are available because the ISPF Online Monitor runs in DB2 10 toleration mode only.

**Examining the 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.
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 where 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:**

- 4096

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


**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 RKO2SAMP library. This member is provided as an example and can be modified as required.
**Performance Database**
Exception data can be loaded into OMEGAMON XE for DB2 PE’s Performance Database.

You can find CREATE TABLE DDL, LOAD, CREATE VIEW statements, and sample SQL queries in the RKO2SAMP library, in the following members:

**CREATE TABLE statement:**
DGOECFIL

**LOAD utility control statement:**
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 a 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

See the Report Reference for information about 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.

Figure 24 on page 50 shows the Exception Processor panel.

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.

See "Leaving the ISPF Online Monitor" on page 19 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.

See “DB2 Subsystem windows” on page 20 for more information.

If you work in 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

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

Note: This function is not supported for DB2 11.

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 in 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 some more detailed values. If you select a category, a new window opens, with all information pertaining to this category.

The following table lists all Thread Activity panels shown in this section.

<table>
<thead>
<tr>
<th>Thread Activity panel name</th>
<th>Thread Activity panel content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thread Summary panel</td>
<td>Figure 36 on page 67</td>
</tr>
<tr>
<td>Thread Detail panel</td>
<td>Figure 40 on page 71</td>
</tr>
<tr>
<td>Thread Identification window</td>
<td>Figure 41 on page 73</td>
</tr>
<tr>
<td>Requester Correlation Data window</td>
<td>Figure 42 on page 75</td>
</tr>
<tr>
<td>Current Package/DBRM window</td>
<td>Figure 43 on page 76</td>
</tr>
<tr>
<td>Thread Times window</td>
<td>Figure 45 on page 79</td>
</tr>
<tr>
<td>Locking (IRLM) Activity window</td>
<td>Figure 46 on page 81</td>
</tr>
<tr>
<td>Locked Resources window</td>
<td>Figure 47 on page 84</td>
</tr>
<tr>
<td>Threads Holding Resource window</td>
<td>Figure 48 on page 85</td>
</tr>
<tr>
<td>RID List Processing window</td>
<td>Figure 49 on page 85</td>
</tr>
<tr>
<td>SQL Activity window</td>
<td>Figure 50 on page 87</td>
</tr>
<tr>
<td>Buffer Manager Activity window</td>
<td>Figure 51 on page 89</td>
</tr>
<tr>
<td>Buffer Pool Detail window</td>
<td>Figure 52 on page 90</td>
</tr>
<tr>
<td>SQL Statement and Package window</td>
<td>Figure 53 on page 91</td>
</tr>
<tr>
<td>Distributed Data window</td>
<td>Figure 56 on page 93</td>
</tr>
<tr>
<td>Distributed Location Detail window</td>
<td>Figure 57 on page 94</td>
</tr>
<tr>
<td>Distributed Conversation Detail window</td>
<td>Figure 58 on page 95</td>
</tr>
<tr>
<td>IFI (Class 5) and Data Capture window</td>
<td>Figure 59 on page 96</td>
</tr>
<tr>
<td>Query Parallelism Data window</td>
<td>Figure 60 on page 97</td>
</tr>
<tr>
<td>Data Sharing Locking Activity window</td>
<td>Figure 61 on page 99</td>
</tr>
<tr>
<td>Group Buffer Pools Activity window</td>
<td>Figure 62 on page 100</td>
</tr>
<tr>
<td>Group Buffer Pool Detail window</td>
<td>Figure 63 on page 101</td>
</tr>
<tr>
<td>Stored Procedures window</td>
<td>Figure 64 on page 102</td>
</tr>
<tr>
<td>DB2 Thread Qual. Parameters window</td>
<td>Figure 74 on page 108</td>
</tr>
</tbody>
</table>
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.

You can select individual threads for viewing from the Thread Summary panel, the Threads Holding Resource window, or the Periodic Exceptions List panel. 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 in 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, ensure 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 obtain class 5, 7, or 8 information, 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. See “PURGE command” on page 105 for more information about purging a thread.

For a DB2 thread that exploits parallelism, OMEGAMON XE for DB2 PE reports aggregated values across all parallel tasks that are created to execute SQL statements within the thread. Therefore, and because of the nature of parallel work, some counters (particularly processor and suspension fields) can show unexpected large values, which do not necessarily indicate problems. Sometimes these values are even larger than the entire wall-clock elapsed time. Besides query parallelism OMEGAMON XE for DB2 PE 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 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.

<table>
<thead>
<tr>
<th>Thread Activity panel name</th>
<th>Thread Activity panel content</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB2 Thread Sort Specification window</td>
<td>Figure 77 on page 112</td>
</tr>
</tbody>
</table>
- 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 because of waits for locks and latches or waits for I/O.

Figure 35 shows the relationship between the different Accounting times.

**Parallelism considerations**

This section applies to threads that exploit 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 about non-parallel work within the thread and also some parallel
work-related data.

OMEGAMON XE for DB2 PE summarizes all Accounting records generated for
such a thread and presents them as one logical Accounting record. Table 5
describes which values are a combination of the originating task’s and parallel
tasks’ values and which are taken from the originating task only.

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 by *S* next
to the program name in the Thread Summary panel.

Especially interesting is the relationship between elapsed time, CPU time, 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 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 5. Query parallelism related data

<table>
<thead>
<tr>
<th>Accounting Data</th>
<th>Derivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifiers (PRIMAUTH, PLANNAME, and so on)</td>
<td>Originating task</td>
</tr>
<tr>
<td>Class 1 elapsed time</td>
<td>Originating task</td>
</tr>
<tr>
<td>Class 1 TCB times</td>
<td>Separate counters for originating task and sum</td>
</tr>
<tr>
<td></td>
<td>of all parallel tasks</td>
</tr>
<tr>
<td>Class 2 elapsed time</td>
<td>Originating task</td>
</tr>
<tr>
<td>Class 2 TCB times</td>
<td>Separate counters for originating task and sum</td>
</tr>
<tr>
<td></td>
<td>of all parallel tasks</td>
</tr>
<tr>
<td>Class 7 elapsed time</td>
<td>Originating task</td>
</tr>
<tr>
<td>Class 7 TCB times</td>
<td>Separate counters for originating task and sum</td>
</tr>
<tr>
<td></td>
<td>of all parallel tasks</td>
</tr>
<tr>
<td>Class 2 and class 7 DB2 entry/exit events</td>
<td>Originating task</td>
</tr>
<tr>
<td>Class 3 and class 8 times</td>
<td>Separate counters for originating task and sum</td>
</tr>
<tr>
<td></td>
<td>of all parallel tasks</td>
</tr>
<tr>
<td>Class 3 and class 8 events</td>
<td>Sum of originating task and all parallel tasks</td>
</tr>
<tr>
<td>Class 5 times</td>
<td>Originating task</td>
</tr>
<tr>
<td>SQL counters</td>
<td>Originating task</td>
</tr>
<tr>
<td>RID List counters</td>
<td>Sum of originating task and all parallel tasks</td>
</tr>
</tbody>
</table>
Table 5. Query parallelism related data (continued)

<table>
<thead>
<tr>
<th>Accounting Data</th>
<th>Derivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Query Parallelism counters</td>
<td>Originating task</td>
</tr>
<tr>
<td>Locking (including data-sharing-specific) counters</td>
<td>Sum of originating task and all parallel tasks</td>
</tr>
<tr>
<td>RLF data</td>
<td>Originating task</td>
</tr>
<tr>
<td>Buffer Pools counters</td>
<td>Sum of originating task and all parallel tasks</td>
</tr>
<tr>
<td>Group Buffer Pools counters</td>
<td>Sum of originating task and all parallel tasks</td>
</tr>
<tr>
<td>DDF counters</td>
<td>Originating task</td>
</tr>
<tr>
<td>Data Capture counters</td>
<td>Originating task</td>
</tr>
</tbody>
</table>

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 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 panel. You can press F20 (Right) to view the portions of the panel that are not displayed. Figure 36, Figure 37 on page 68, Figure 38 on page 68, and Figure 39 on page 69 show the Thread Summary panel with all its possible fields.

Some fields can have values that are longer than the space available to show them in this panel. When this happens, the last character in the field is replaced with an asterisk (*) to indicate that the reported value is truncated.
To display a thread, place any character next to it, then press Enter.

<table>
<thead>
<tr>
<th>Primauth</th>
<th>Planname</th>
<th>name</th>
<th>Class 3</th>
<th>Class 1</th>
<th>Class 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>USERT003</td>
<td>DSNESPCS</td>
<td>DSNES66</td>
<td>1.567556</td>
<td>0.004357</td>
<td>0.001148</td>
</tr>
<tr>
<td>USERT004</td>
<td>DSNUTILS</td>
<td>DSNES66</td>
<td>1.910917</td>
<td>0.006301</td>
<td>0.003724</td>
</tr>
</tbody>
</table>

Figure 37. Thread Summary panel (scrolled right once)

<table>
<thead>
<tr>
<th>Primauth</th>
<th>Planname</th>
<th>name</th>
<th>Count</th>
<th>Type</th>
<th>ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>USERT003</td>
<td>DSNESPCS</td>
<td>DSNES66</td>
<td>4</td>
<td>DB2CALL</td>
<td>USERT003</td>
</tr>
<tr>
<td>USERT004</td>
<td>DSNUTILS</td>
<td>DSNES66</td>
<td>4</td>
<td>DB2CALL</td>
<td>USERT004</td>
</tr>
</tbody>
</table>

Figure 38. Thread Summary panel (scrolled right twice)
When the data collector is active, the Thread Summary panel also shows, besides other threads, the threads initiated by OMEGAMON XE for DB2 PE. Threads are collected for data collector tasks and for each Host Online Monitor user and Workstation Online Monitor user.

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

You can filter threads from being displayed in this panel using the QUALIFY command (see “QUALIFY command” on page 107). You can also specify the order in which the threads are listed using the SORT command (see “SORT command” on page 110).

The 1 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 occurring within the application.

**I/S** The thread is in identify or signon state.

**QUE** The value specified for MAXUSERS in 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 occurring 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 in the Thread Summary panel are highlighted in reverse video when they are in exception status.

An asterisk (*) is shown to the left of the 1 field if the thread type is ALLIED DISTRIBUTED or DBAT.

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

If you are filtering the threads listed in this panel, only the listed threads are checked for exception conditions. Threads in exception status 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 about the thread being monitored. From the Thread Detail panel, you can reach the Category windows, which show selected information about the monitored thread in greater detail.

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

Some fields can have values that are longer than the space available to show them in this panel. When this happens, the last character in the field is replaced with an asterisk (*) to indicate that the reported value is truncated.

**Note:** The Thread Detail panel displayed at your site might have been tailored by your installation and consequently might not necessarily match the panel example shown in this publication.
If you have enabled display exception processing, all fields in exception status 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 in the Thread Detail panel is shown as Current DBRM instead.

The following list describes some of the important fields that are shown in this panel:

**Type**  The type of the thread being monitored.

- **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 whether the thread is involved in distributed activity, because this can affect the fields that should be monitored. For example, if the thread is involved in distributed activity, the class 1 elapsed time is higher than if there was no distributed activity, because 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)

For threads that exploit 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 64.

**Class 3 Times**
This field shows the total time spent waiting because of class 3 suspensions. For threads that exploit 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 64.

**Suspensions**
This field includes all types of lock suspensions.

**Getpage requests**
This field shows the number of Getpage requests. Reducing Getpage 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.

**Synchronous I/O**
This includes both synchronous reads and synchronous writes.
Thread Activity windows

You can access several windows from the Thread Detail panel. To reach a window, type any character in the space beside the desired heading. Several windows can be accessed simultaneously. The windows are overlaid in 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 the identification data about the thread being monitored.

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

Some fields can have values that are longer than the space available to show them in this panel. When this happens, the last character in the field is replaced with an asterisk (*) to indicate that the reported value is truncated.

![Thread Identification window]

Figure 41. 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 that are shown in this window:

**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. Examples of plan names 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 32.

Correlation Number
The correlation number for the thread.
For further details, see “Correlation ID translation” on page 32.

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 about 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.

The following figure shows an example of a Requester Correlation Data window.
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.

Some fields can have values that are longer than the space available to show them in this panel. If this happens, the last character in the field is replaced with an asterisk (*) to indicate that the reported value is truncated.

Figure 42. Requester Correlation Data window for a DB2 Requester
Figure 43. 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.

Some fields can have values that are longer than the space available to show them in this panel. When this happens, the last character in the field is replaced with an asterisk (*) to indicate that the reported value is truncated.
Use the Current DBRM window to view information about the identification and execution times of various functions performed by or on the current DBRM.

See "Accounting times" on page 64 for a discussion of how to interpret the time values for threads that exploit 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 that are shown in this window:

**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, examine the reasons for suspensions that caused the wait. Otherwise, examine 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 because of 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. If service task suspensions overlap other types of suspensions, the other types of suspensions are ignored.

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

Archive log (quiesce)
Included here are waits because of 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 because of drain lock suspensions. If the value is large, it can indicate that the execution of a utility affects 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.

See "Accounting times" on page 64 for a discussion on how to interpret the time values for threads that exploit query parallelism or utility parallelism.

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

<table>
<thead>
<tr>
<th>DGOMTWTI Thread Times</th>
<th>More - +</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>Class 2</td>
</tr>
<tr>
<td>In Appl</td>
<td>In DB2</td>
</tr>
<tr>
<td>Elapsed time</td>
<td>29.504644</td>
</tr>
<tr>
<td>CPU time</td>
<td>0.135267</td>
</tr>
<tr>
<td>TCB</td>
<td>0.135267</td>
</tr>
<tr>
<td>TCB - Stored Proc</td>
<td>0.000000</td>
</tr>
<tr>
<td>Parallel tasks</td>
<td>0.000000</td>
</tr>
<tr>
<td>Waiting time</td>
<td>N/A</td>
</tr>
<tr>
<td>Suspension time</td>
<td>N/A</td>
</tr>
<tr>
<td>TCB</td>
<td>N/A</td>
</tr>
<tr>
<td>Parallel tasks</td>
<td>N/A</td>
</tr>
<tr>
<td>Not accounted</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Time Event**

- Suspensions (Class 3) : 1.121289 73
- Locks and latches : 0.000000 0
- Synchronous I/O : 0.358523 57
- Other read I/O : 0.762766 16
- Other write I/O : 0.000000 0
- Services Task switch : 0.000000 0
- Archive log (quiesce) : 0.000000 0
- Archive log read : 0.000000 0
- 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

**DB2 entry/exit events**

- Non stored procedures : 195
- Stored procedures : 0

**Class 5 (IFI)**

- Elapsed Time : N/P
- TCB Time : N/P

**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 Times window**

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

Class 2 and 3 times are reported only if monitor trace classes 2 and 3 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 that are shown in this window:

**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 not being available immediately on request. If the suspension time is high, examine further the Locking block in the Accounting report.

**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 current DB2 releases 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 because of 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 because of drain lock suspensions. If the value is large, it can indicate that the execution of a utility affects 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 about locking activity for the thread being monitored.

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

#### DGOMTLWK

<table>
<thead>
<tr>
<th></th>
<th>Locking (IRLM) Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locks and latch suspensions</td>
<td>: 1</td>
</tr>
<tr>
<td>Elapsed time</td>
<td>: 0.000355</td>
</tr>
<tr>
<td>Timeouts</td>
<td>: 0</td>
</tr>
<tr>
<td>Deadlocks</td>
<td>: 0</td>
</tr>
<tr>
<td>Lock requests</td>
<td>: 19</td>
</tr>
<tr>
<td>Unlock requests</td>
<td>: 18</td>
</tr>
<tr>
<td>Change requests</td>
<td>: 1</td>
</tr>
<tr>
<td>Query requests</td>
<td>: 0</td>
</tr>
<tr>
<td>Other IRLM requests</td>
<td>: 0</td>
</tr>
<tr>
<td>Suspensions – lock</td>
<td>: 0</td>
</tr>
<tr>
<td>Suspensions – latch</td>
<td>: 1</td>
</tr>
<tr>
<td>Suspensions – other</td>
<td>: 0</td>
</tr>
<tr>
<td>Lock escalations – shared</td>
<td>: 0</td>
</tr>
<tr>
<td>Lock escalations – exclusive</td>
<td>: 0</td>
</tr>
<tr>
<td>Maximum page or row locks held</td>
<td>: 2</td>
</tr>
<tr>
<td>Claim requests</td>
<td>: 6</td>
</tr>
<tr>
<td>Unsuccessful claim requests</td>
<td>: 0</td>
</tr>
<tr>
<td>Drain requests</td>
<td>: 0</td>
</tr>
<tr>
<td>Unsuccessful drain requests</td>
<td>: 0</td>
</tr>
</tbody>
</table>

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. Locking (IRLM) Activity window

Deadlocks and timeouts displayed in 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, if they are locked by another thread, unavailable to, the monitored thread.

The following list describes some of the important fields that are shown in this window:

#### 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 in 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 might not affect 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 these waits can 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 in 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 in 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 exception event 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, you can 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 table space.

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

If escalation occurs when LOCKSIZE ROW or LOCKSIZE PAGE is specified, the lock is escalated to the table level for a segmented table space and to the table space level for a nonsegmented table space.

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 table space in addition to the system-wide NUMLKTS parameter currently provided.

The default is LOCKMAX 0 to ensure that PAGE level locking is consistent with previous releases of DB2. If LOCKSIZE ANY is specified, DB2 chooses LOCKSIZE PAGE LOCKMAX SYSTEM. Before 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 table space locking for segmented and nonsegmented table spaces 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). After 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

See the *DB2 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, if they are locked by another thread, unavailable to, the monitored thread. If many resources are 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.
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. For more information, see "Threads Holding Resource window."

You can use the Locked Resources window and the Threads Holding Resource window to examine potential timeouts and deadlocks and to determine whether DB2 resource contention is the cause for long running threads. Whenever a long class 3 lock/latch elapsed time is indicated in the Thread Detail or Thread Times panels, you can use the Locked Resources window to check for suspensions.

The following list describes some of the important fields that are shown in this window:

**Type**  This field shows the resource involved.

- **PAGES** indicates that the object is either a table space 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, which indicates 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 many threads are 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 in 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 48 shows an example of a Threads Holding Resource window.

---

**Figure 48. Threads Holding Resource window**

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

Use the Threads Holding Resource window and 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.

---

**Figure 49. RID List Processing window (Thread Activity)**
The following list describes some of the important fields that are shown in this window:

**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 might want to look into the access path selection.

**Not used - no storage**
Number of times RID list processing was terminated because of 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 because of 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 might 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.
This information displays the number of times specific SQL statements were executed for the thread being monitored.

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 that contains 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 can 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 that are shown in this window:

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 can 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.

```
DGOMTWBMM  Buffer Manager Activity  ROW 1 TO 4 OF 4

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

<table>
<thead>
<tr>
<th>Buffer Pool ID</th>
<th>Getpage Requests</th>
<th>Buffer Pool hit ratio</th>
<th>Synchronous</th>
<th>Buffer Updates</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP0</td>
<td>111</td>
<td>75.7</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>BP7</td>
<td>200</td>
<td>33.2</td>
<td>0</td>
<td>125</td>
</tr>
<tr>
<td>BP32K7</td>
<td>311</td>
<td>47.3</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>622</td>
<td>47.8</td>
<td>0</td>
<td>200</td>
</tr>
</tbody>
</table>

--- End of Buffer Pool List ---
```

*Figure 51. Buffer Manager Activity window*

You can select any buffer pool ID listed in this window to display the Buffer Pool Detail window, where you can view information about read and write activity both to and from that particular buffer pool, or select **Total** to view information about 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 about 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 buffer pools used by the thread.

To display this window, select a buffer pool ID or **Total** from the Buffer Manager Activity window.
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 that are shown in this window:

**Buffer pool hit ratio (%)**
The total number of Getpage operations, minus the number of pages read from a hard disk drive (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 Program 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.

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.

Some fields can have values that are longer than the space available to show them in this panel. When this happens, the last character in the field is replaced with an asterisk (*) to indicate that the reported value is truncated.

---

**Figure 53. SQL Statement and Program window**

DB2 trace class 9 must be active to show information for the following fields:

- Database name
- Page set name
- Page number
- Elapsed time
- CPU time
- Getpages
- Synch Read I/O
If class 9 is not active N/P is shown.

Use the selection fields to view the complete SQL statement text or information about the buffer pools used during the execution of the query.

**SQL Statement Text window**

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

![Image of SQL Statement Text window]

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 SQL statement text can be truncated, depending on the size of the statement and the DB2 version. If the 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 in this window. To do this, press F18 (Explain) or type EXPLAIN and press Enter on the command line. See Chapter 9, “Monitoring the access path with Explain,” on page 163 for more information.

**Used Buffer Pools window**

This window shows details of the buffer pools used for the execution of the SQL statement. For each buffer pool, the number of Getpage operations and the number of synchronous Read I/O operations is shown.
Distributed Data window

Use the Distributed Data window to view a list of serving locations that are communicating with the thread. If many locations are 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.

Some fields can have values that are longer than the space available to show them in this panel. When this happens, the last character in the field is replaced with an asterisk (*) to indicate that the reported value is truncated.

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 in this window to display the Distributed Location Detail window for further examination.

---

### Distributed Data window

<table>
<thead>
<tr>
<th>Buffer pool name</th>
<th>Getpage requests</th>
<th>Synchronous read I/O requests</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP0</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>17</td>
<td>0</td>
</tr>
</tbody>
</table>

---

![Figure 55. Used Buffer Pools window](image)

**DGOMTWC3** Used Buffer Pools Row 1 to 2 of 2

---

**DGOMTWDD** Distributed Data

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

<table>
<thead>
<tr>
<th>Location</th>
<th>Messages Sent</th>
<th>Messages Received</th>
<th>Elapsed</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSNAPC0</td>
<td>66</td>
<td>66</td>
<td>7.5908</td>
</tr>
<tr>
<td>DSNAPC9</td>
<td>12345</td>
<td>12345</td>
<td>6.2222</td>
</tr>
</tbody>
</table>

---

![Figure 56. Distributed Data window (Thread Activity)](image)

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 in 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 about the serving location selected from the Distributed Data window. This window displays a list of conversations between the thread and this serving location. If many conversations are 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 in the Distributed Data window.

The following list describes some of the important fields that are shown in this window:

- **Requester elapsed**
  This field shows the 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 might 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 because of the manner in which distributed SQL statements are processed internally.
Remote Elapsed
This field shows the 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 the Distributed Relational Database Architecture™ (DRDA®).

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 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.

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 about 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 in the Distributed Location Detail window.

The following list describes some of the important fields that are shown in this window:

**Conversation active flag**
This field indicates either:
- 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.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1=Help</td>
<td>F2=Split</td>
</tr>
<tr>
<td>F6=History</td>
<td>F9=Swap</td>
</tr>
<tr>
<td>F17=Collect</td>
<td>F22=Purge</td>
</tr>
</tbody>
</table>

**Figure 59. IFI (Class 5) and Data Capture window**

**Query Parallelism Data window**
Use the Query Parallelism Data window to view information about 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.
The main objective of query parallelism is to improve query response times. By examining the information displayed in 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 that are shown in this window:

<table>
<thead>
<tr>
<th>Field Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Degree of Parallelism</td>
<td>5</td>
</tr>
<tr>
<td>Parallel Groups Executed</td>
<td>1</td>
</tr>
<tr>
<td>Number of Parallel Groups executed with Planned Parallel Degree</td>
<td>1</td>
</tr>
<tr>
<td>Reduced Parallel Degree No buffer</td>
<td>0</td>
</tr>
<tr>
<td>One DB2 COORDINATOR Parm = NO</td>
<td>0</td>
</tr>
<tr>
<td>Isolation Level</td>
<td>0</td>
</tr>
<tr>
<td>Fall back to sequential mode Cursor</td>
<td>0</td>
</tr>
<tr>
<td>No ESA</td>
<td>0</td>
</tr>
<tr>
<td>No buffer</td>
<td>0</td>
</tr>
<tr>
<td>MVS/ESA Enclave Services</td>
<td>0</td>
</tr>
<tr>
<td>Member skipped (%)</td>
<td>0</td>
</tr>
<tr>
<td>Parallelism Disabled by RLF</td>
<td>NO</td>
</tr>
</tbody>
</table>

Figure 60. Query Parallelism Data window (Thread Activity)

The main objective of query parallelism is to improve query response times.

By examining the information displayed in 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 that are shown in this window:

**Maximum Degree of Parallelism**
Maximum degree of parallelism executed among all 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 because of 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 because of 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 table space
• 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
  – Table space 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 about 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
  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 and conversion ............: 0
  False contention ............................: 0
  Incompatible retained lock ...................: 0
Notify messages sent ...........................: 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 61. Data Sharing Locking Activity window*

The following list describes some of the important fields that are shown in this window:

**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 fields contain the global lock suspend counts for P-locks or L-locks:

**IRLM global contention**
The number of suspends because of IRLM global resource contention. IRLM lock states were in conflict.
XES global contention
The number of suspends because of XES global resource contention, but no IRLM global resource contention. XES lock states were in conflict, but the IRLM lock states were not.

Suspensions - False contention and conversion
Summation of false contentions (see below) and sync-to-async heuristic conversions. Conversions are done when XES determines that it is more efficient to drive the request asynchronously to the CF.

False contention
The number of false contentions encountered on this z/OS image. A false contention occurs when different resource names hash to the same entry in the CF lock table. The CF detects contention within the hash entry, and XES uses inter-system messaging to determine that no actual resource contention exists. This counter is maintained on a per-LPAR basis. Therefore this counter will over-report false contentions in cases where multiple members from the same data sharing group run on the same z/OS image. The counter is not present (N/P) if data is unavailable because of errors from the IXLMG service.

Incompatible retained lock
The number of global lock or change requests denied or suspended because of 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 many group buffer pools are 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.
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 about 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 group buffer pools used by the thread.

<table>
<thead>
<tr>
<th>DGOMTWGD Group Buffer Pool Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Buffer Pool ID .............: GBP0</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Read (Cross invalidation)</td>
</tr>
<tr>
<td>Data returned ....................: 15</td>
</tr>
<tr>
<td>No data returned ..................: 0</td>
</tr>
<tr>
<td>Read (Not Found)</td>
</tr>
<tr>
<td>Data returned ....................: 0</td>
</tr>
<tr>
<td>No data returned ..................: 0</td>
</tr>
<tr>
<td>Read prefetch .....................: N/P</td>
</tr>
<tr>
<td>Changed pages written ............: 0</td>
</tr>
<tr>
<td>Clean pages written ..............: 12</td>
</tr>
<tr>
<td>Unregister page ...................: 0</td>
</tr>
<tr>
<td>Command ====&gt; ____________________</td>
</tr>
<tr>
<td>F1=Help    F2=Split  F3=Exit  F5=Auto</td>
</tr>
<tr>
<td>F6=History F7=Up    F8=Down   F9=Swap</td>
</tr>
<tr>
<td>F12=Cancel F16=Look F17=Collect F22=Purge</td>
</tr>
</tbody>
</table>

*Figure 63. Group Buffer Pool Detail window*

The following list describes some of the important fields that are shown in this panel:

**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 a hard disk drive.

**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 a hard disk drive.

**Read prefetch**

The number of pages read from the group buffer pool because of 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.

**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.

```
DGOMTWSP  Stored Procedures
CALL statements executed: 0
Procedure abends: 0
CALL statement timeouts: 0
CALL statements rejected: 0
```

**Figure 64. 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 because of the procedure being in the STOP ACTION(REJECT) state.

**Thread Activity commands**
The commands in this section 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 in 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:

```
AUTO [integer SECONDS] [integer MINUTES]
```

*Figure 65. Syntax of the AUTO command*

**Parameters of the AUTO command**

The AUTO command accepts the following parameters:

- `integer` Optional. Specifies the auto-display interval. The valid ranges are:
  - 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, `integer` should also be specified.

- `MINUTES` Optional. Specifies the auto-display unit in minutes. If this parameter is specified, `integer` should also be specified.

If no parameters are specified, the values in the Auto Display window are used.

**Starting Auto Display mode**

To start Auto Display mode, type `AUTO` followed by any parameters on the command line and press Enter. You can abbreviate the AUTO command 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.

**Examples of the AUTO command**

- `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 in the Auto Display window

**Examples of the AUTO command**

- `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 in the Auto Display window

**EXPLAIN command**

Use the EXPLAIN command to examine the access path methods that were chosen by DB2 for the currently executing SQL statement of a thread.
The EXPLAIN command can be issued from the following Thread Activity windows:

- SQL Statement and Package
- SQL Statement and DBRM

The EXPLAIN command can also be issued from the Thread Detail panel if it has been tailored to show the SQL statement text.

The command syntax is:

```
EXPLAIN
```

*Figure 66. Syntax of the EXPLAIN command*

**Invoking Explain**

To examine the access path methods chosen by DB2 for an SQL statement shown in a Thread Activity panel, type EXPLAIN on the command line and press Enter. EXPLAIN can be truncated to a minimum of EXP.

For more information about how to explain an SQL statement, see Chapter 9, “Monitoring the access path with Explain,” on page 163.

**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 in the panels that support 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. See Chapter 13, “OMEGAMON Collector purpose and function,” on page 211 for information about the data collector.

The command syntax is:

```
HISTORY

- OFF
- BACK
- FORWARD

[date] [hh:mm:ss]
```

*Figure 67. Syntax of the HISTORY command*

**Parameters of the HISTORY command**

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 no more data is available, data from the current time is displayed and processing continues as if HISTORY is 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 default is the time of the earliest available history record for the specified date. The seconds do not need to be specified.

If no data is 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. The current system date and time are the defaults for the History window.

Viewing past data
To view past data, type HISTORY followed by any parameters on the command line and press Enter. HISTORY can be truncated to a minimum of HIS.

RESET command
Use RESET to stop threads from being qualified and sorted in the Thread Summary panel.

The command syntax is:

```
RESET
```

*Figure 68. Syntax of the RESET command*

Resetting thread display
To issue the RESET command, type RESET on the command line of the Thread Summary panel and press Enter. RESET can be truncated to a minimum of RES.

PURGE command
Use the PURGE command to purge a thread that is currently processing in the DB2 subsystem you are monitoring. You need the DB2 privilege to perform CANCEL THREAD.

The PURGE command can be issued from any Thread Activity panel.

The command syntax is:

```
PURGE
```

*Figure 69. Syntax of the PURGE command*
Purging a thread

To purge a thread listed in the Thread Summary panel, type PURGE on the command line, select the listed thread you want to purge, and press Enter. PURGE can be truncated to a minimum of PUR.

To purge the thread being monitored from the Thread Detail panel or any of its lower level windows, type PURGE on the command line and press Enter.

After issuing the PURGE command, the Purge Thread Confirmation window is displayed.

```
DGOMTCPR        Purge Thread Confirmation
Press Enter to purge thread or request CANCEL

Primauth ... : USERT003 Planname ........ : DSNESPCS
Program name : DSNESM68 Connection Id ......... : DB2CALL

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

Figure 70. 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.

Purging a thread

To purge a thread listed in the Thread Summary panel, type PURGE on the command line, select the listed thread you want to purge, and press Enter. PURGE can be truncated to a minimum of PUR.

To purge the thread being monitored from the Thread Detail panel or any of its lower level windows, type PURGE on the command line and press Enter.

After issuing the PURGE command, the Purge Thread Confirmation window is displayed.

```
DGOMTCPR        Purge Thread Confirmation
Press Enter to purge thread or request CANCEL

Primauth ... : USERT003 Planname ........ : DSNESPCS
Program name : DSNESM68 Connection Id ......... : DB2CALL

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

Figure 71. 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.
QUALIFY command

Use the QUALIFY command to filter the threads shown in the Thread Summary panel. If qualify is active, only threads that match the OMEGAMON XE for DB2 PE identifiers you specified in the DB2 Thread Qualification Parameters window are shown. You can use the QUALIFY command 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:

```
QUALIFY [ON | OFF]
```

Figure 72. Syntax of the QUALIFY command

Parameters of the QUALIFY command

The QUALIFY command provides the parameters ON and OFF.

ON Activates the qualify function based on values previously entered in 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 in the Thread Summary panel, type QUALIFY followed by any parameters on the Thread Summary panel command line and press Enter. QUALIFY can be truncated to a minimum of QUA.

When qualify is active, the word QUALIFY is displayed in the Thread Summary panel header as shown in the following example:

```
Thread Summary QUALIFY ROW 1 TO 1 OF 1
 Thread 1
 PM010DLOC DSN1 V9 GROUP001 MEMBER01
```

Figure 73. Thread Summary panel showing qualify active

When the QUALIFY command is issued without parameters, the DB2 Thread Qualification Parameters window is displayed. The content of the window differs depending on the version of DB2 in use.
Parameters entered in 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 in the DB2 Thread Qualification Parameters window. Only threads that match the specified values are displayed in 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).

**OMEGAMON XE for DB2 PE 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 1 fields, only threads with blank values for these OMEGAMON XE for DB2 PE identifiers are displayed. If
you leave the value blank for any of the other OMEGAMON XE for DB2 PE 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 occurring 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.

**Example with the DB2 Thread Qualification Parameters window**
This section describes the effects of various parameters entered in the DB2 Thread Qualification Parameters window.

The DB2 Thread Qualification Parameters window is shown in Figure 74 on page 108.

**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.

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 1 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 in the Thread Summary panel. The threads can be sorted by one or more OMEGAMON XE for DB2 PE identifiers. You can use this command only from the Thread Summary panel.

The command syntax is:

```
SORT
```

```
| ON |
| OFF |
```

```text
fieldid
```

| DESCENDING |
| ASCENDING |

*Figure 75. Syntax of the SORT command*

**Parameters of the SORT command**

The SORT command provides the parameters ON, OFF, DESCENDING, and ASCENDING.

**ON**

Activates sort.

Values previously specified in the DB2 Thread Sort Specification window are used.

**OFF**

Deactivates sort.
*fieldid* Identifies a field used for sorting threads and activates sort. You can specify multiple fields. The threads are sorted by the order of the specified fields.

**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.

**Note:**
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 you can use with the SORT command. The field identifiers can be truncated. Uppercase letters indicate the shortest valid abbreviation for each field identifier.

<table>
<thead>
<tr>
<th>Field</th>
<th>Field ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Authorization ID</td>
<td>PRImauth</td>
</tr>
<tr>
<td>Plan Name</td>
<td>PLanname</td>
</tr>
<tr>
<td>Package/DBRM Program name</td>
<td>PROgram</td>
</tr>
<tr>
<td>Package Collection ID</td>
<td>COLIction</td>
</tr>
<tr>
<td>Correlation ID</td>
<td>CORrelation</td>
</tr>
<tr>
<td>Connection ID</td>
<td>CONNEct</td>
</tr>
<tr>
<td>Connection Type</td>
<td>CONNType</td>
</tr>
<tr>
<td>Thread Status</td>
<td>Status</td>
</tr>
<tr>
<td>Request Count</td>
<td>REQUests</td>
</tr>
<tr>
<td>Requesting Location</td>
<td>REQLoc</td>
</tr>
<tr>
<td>Class 1 elapsed time</td>
<td>C1ElapsedTime</td>
</tr>
<tr>
<td>Class 1 CPU time</td>
<td>C1Cpu</td>
</tr>
<tr>
<td>Class 2 elapsed time</td>
<td>C2ElapsedTime</td>
</tr>
<tr>
<td>Class 2 CPU time</td>
<td>C2Cpu</td>
</tr>
<tr>
<td>Class 3 time</td>
<td>C3ElapsedTime</td>
</tr>
</tbody>
</table>

**Sorting threads**
To sort the threads shown in 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 in the Thread Summary panel header as shown in the following example:
If sort is issued without any parameters, the DB2 Thread Sort Specification window is displayed. Parameters entered in this window are saved for subsequent sessions.

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).

**Example 1 of the SORT command**

In this example of the DB2 Thread Sort Specification window, the threads are sorted first by Connection type in ascending sequence, and next by Thread status in descending sequence.

**Example 2 of the SORT command**

This example shows a SORT command that specifies to sort the threads by different items and the items in different sorting sequences.

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.
Chapter 8. Viewing DB2 statistics

The Online Monitor statistics panels provide an overview of DB2 system activity. Use these panels to view important ratios and DB2 statistics values.

Note: This function is not supported for DB2 11.

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 116 and “Delta processing mode” on page 117.

List of all Statistics panels

The following list covers all Statistics panels that are described in this section:

- DB2 Statistics Detail panel
- EDM Pool window
- Buffer Manager window
- Buffer Pool window
- Locking Activity window (Statistics)
- Open/Close Management window
- Bind Processing window
- Plan and Package Allocation window
- Log Manager window
- Subsystem Service window
- SQL Activity window (Statistics)
- Query Parallelism Data window (Statistics)
- RID List Processing window (Statistics)
- Distributed Data window (Statistics)
- Remote Location window
- Statistics CPU Times and Other Data window
- DB2 Commands window
- DB2 Instrumentation window
- DB2 IFC Destinations window
- Data Capture window
- Data Sharing Locking Activity window
- Group Buffer Pools Activity window
- Group Buffer Pool Detail window
- Global Group Buffer Pool Statistics window
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 over which delta values are accumulated. Deltas are not calculated in regular mode. Whenever option 2 (Display Statistics) is selected from the 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 in 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 that you specify.

Note: The auto-display function 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 option 2 (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 must 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 (except 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 function can be activated with interval processing mode.
Statistics values are then updated automatically at the time interval that you specified. A new base point can be established by repeating the INTERVAL command.

If 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 figure:

![Figure 78. DB2 Statistics Detail panel showing interval active](image1)

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 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 that occurs 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 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 figure:

![Figure 79. DB2 Statistics Detail panel showing delta active](image2)

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 table in this section lists a selection of snapshot fields and their corresponding Statistics panels.
### Table 7. Snapshot fields

<table>
<thead>
<tr>
<th>Statistics panel</th>
<th>Field</th>
<th>Panel ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB2 Statistics Detail</td>
<td>EDM Pool pages in use (%)</td>
<td>DGOMSPSM</td>
</tr>
<tr>
<td>EDM Pool</td>
<td>EDM Pool pages in use (%)</td>
<td>DGOMSWEP</td>
</tr>
<tr>
<td></td>
<td>Pages in EDM Pool</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Free pages in free chain</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pages used for CT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pages used for SKCT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pages used for PT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pages used for SKPT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pages used for DBD</td>
<td></td>
</tr>
<tr>
<td>Buffer Pool - General</td>
<td>Current active buffers</td>
<td>DGOMSWBR</td>
</tr>
<tr>
<td></td>
<td>Buffers allocated for virtual buffer pool</td>
<td></td>
</tr>
<tr>
<td>Buffer Pool - Work File Operations</td>
<td>Maximum concurrent workfiles</td>
<td>DGOMSWBV</td>
</tr>
<tr>
<td>Open/Close Management</td>
<td>Open data sets - Current</td>
<td>DGOMSOC2</td>
</tr>
<tr>
<td></td>
<td>Open data sets - With CLOSE(NO)</td>
<td>DGOMSWOC</td>
</tr>
<tr>
<td></td>
<td>Open data sets - Not in use</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Data sets on Deferred Close queue - Current</td>
<td></td>
</tr>
<tr>
<td>Query Parallelism Data</td>
<td>Maximum Degree of Parallelism</td>
<td>DGOMSWQP</td>
</tr>
<tr>
<td>RID List Processing</td>
<td>RID blocks allocated - Current</td>
<td>DGOMSWRP</td>
</tr>
<tr>
<td>Distributed Data</td>
<td>Inactive DBATs - Current</td>
<td>DGOMSWDD</td>
</tr>
<tr>
<td></td>
<td>Active DBATs - Current</td>
<td></td>
</tr>
</tbody>
</table>

### High water mark fields

The table in this section lists high water mark fields and their corresponding Statistics panels.

#### Table 8. High water mark fields

<table>
<thead>
<tr>
<th>Statistics panel</th>
<th>Field</th>
<th>Panel ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB2 Statistics Detail</td>
<td>Open data sets - High Water Mark</td>
<td>DGOMSPSM</td>
</tr>
<tr>
<td>Buffer Pool - Query Parallelism</td>
<td>Concurrent streams - high water mark</td>
<td>DGOMSWBU</td>
</tr>
<tr>
<td>Open/Close Management</td>
<td>Open data sets - HWM</td>
<td>DGOMSWOC</td>
</tr>
<tr>
<td></td>
<td>Data sets on Deferred Close queue - Maximum</td>
<td></td>
</tr>
<tr>
<td>RID List Processing</td>
<td>RID blocks allocated - Maximum</td>
<td>DGOMSWRP</td>
</tr>
<tr>
<td>Distributed Data</td>
<td>Inactive DBATs - HWM</td>
<td>DGOMSWDD</td>
</tr>
<tr>
<td></td>
<td>Active DBATs - HWM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total DBATs - HWM</td>
<td></td>
</tr>
</tbody>
</table>

### Statistics panel overview

The DB2 Statistics Detail panel shows a summary of key statistics values. From this panel, you can reach windows that provide statistics data in greater detail.
Moving between statistics panels does not cause the values shown to be updated. Data displayed in 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 of the DB2 performance.

To display the DB2 Statistics Detail panel, select option 2 (Display Statistics) from the Online Monitor Main Menu.

**Note:** The DB2 Statistics Detail panel displayed at your site might have been tailored by your installation and consequently might not necessarily match the panel example shown in this publication.
From this panel, you can display windows that show statistics about various aspects of the system. 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 status 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 in 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 that are shown in this panel:

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interval</td>
<td>12:43.051</td>
</tr>
<tr>
<td>EDM Pool</td>
<td></td>
</tr>
<tr>
<td>EDM Pool full</td>
<td>0</td>
</tr>
<tr>
<td>EDM Pool pages in use (%)</td>
<td>1.6</td>
</tr>
<tr>
<td>CT requests/CT not in EDM pool</td>
<td>7.4</td>
</tr>
<tr>
<td>PT requests/PT not in EDM pool</td>
<td>1.8</td>
</tr>
<tr>
<td>DBD requests/DBD not in EDM pool</td>
<td>27.4</td>
</tr>
<tr>
<td>Buffer Manager</td>
<td></td>
</tr>
<tr>
<td>Synchronous Reads</td>
<td>10.3</td>
</tr>
<tr>
<td>Deferred write threshold reached</td>
<td>0</td>
</tr>
<tr>
<td>DM critical threshold reached</td>
<td>0</td>
</tr>
<tr>
<td>Locking Activity</td>
<td></td>
</tr>
<tr>
<td>Suspensions - all</td>
<td>6089</td>
</tr>
<tr>
<td>Deadlocks</td>
<td>0</td>
</tr>
<tr>
<td>Timeouts</td>
<td>0</td>
</tr>
<tr>
<td>Lock escalations - all</td>
<td>0</td>
</tr>
<tr>
<td>Open/Close Management</td>
<td></td>
</tr>
<tr>
<td>Open data sets - High Water Mark</td>
<td>58</td>
</tr>
<tr>
<td>Bind Processing</td>
<td></td>
</tr>
<tr>
<td>Plan/Package Allocation, Authorization Management</td>
<td></td>
</tr>
<tr>
<td>Log Manager</td>
<td></td>
</tr>
<tr>
<td>Reads satisfied - Output Buffer</td>
<td>39</td>
</tr>
<tr>
<td>Reads satisfied - Active Log</td>
<td>397</td>
</tr>
<tr>
<td>Reads satisfied - Archive Log</td>
<td>0</td>
</tr>
<tr>
<td>Write-no-wait</td>
<td>1677</td>
</tr>
<tr>
<td>Unavailable output log buffers</td>
<td>0</td>
</tr>
<tr>
<td>Subsystem Service</td>
<td></td>
</tr>
<tr>
<td>Queued at create thread</td>
<td>0</td>
</tr>
<tr>
<td>System event checkpoints</td>
<td>2</td>
</tr>
<tr>
<td>SQL Activity</td>
<td></td>
</tr>
<tr>
<td>PREPARE Detail</td>
<td></td>
</tr>
<tr>
<td>Prepare</td>
<td>10</td>
</tr>
<tr>
<td>Query Parallelism Data</td>
<td></td>
</tr>
<tr>
<td>RID List Processing</td>
<td></td>
</tr>
<tr>
<td>Distributed Data</td>
<td></td>
</tr>
<tr>
<td>CPU Times and Other Data</td>
<td></td>
</tr>
<tr>
<td>Data Sharing Locking Activity</td>
<td></td>
</tr>
<tr>
<td>Group Buffer Pool Activity</td>
<td></td>
</tr>
<tr>
<td>Global Group Buffer Pool Statistics</td>
<td></td>
</tr>
<tr>
<td>Stored Procedures</td>
<td></td>
</tr>
</tbody>
</table>

Figure 80. DB2 Statistics Detail panel
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 in 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 KEEPDYNAMIC(YES), the count is not incremented.
DB2 Statistics windows

You can access the following windows from the DB2 Statistics Detail panel. To reach 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.

<table>
<thead>
<tr>
<th>DGMSSWEP</th>
<th>EDM Pool</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERVAL</td>
<td>3:32.419</td>
</tr>
<tr>
<td>More:</td>
<td></td>
</tr>
<tr>
<td>Requests for CT sections ..............:   89</td>
<td></td>
</tr>
<tr>
<td>CT section not found in EDM pool .......:  12</td>
<td></td>
</tr>
<tr>
<td>CT requests/CT not in EDM pool .........:  7.4</td>
<td></td>
</tr>
<tr>
<td>Requests for PT sections ..............:   16</td>
<td></td>
</tr>
<tr>
<td>PT section not found in EDM pool .......:   9</td>
<td></td>
</tr>
<tr>
<td>PT requests/PT not in EDM pool .........:  1.8</td>
<td></td>
</tr>
<tr>
<td>Requests for DBD sections ..............:  137</td>
<td></td>
</tr>
<tr>
<td>DBD section not found in EDM pool ......:  55</td>
<td></td>
</tr>
<tr>
<td>DBD requests/DBD not in EDM pool ......: 27.4</td>
<td></td>
</tr>
<tr>
<td>EDM Pool full ..........................:   0</td>
<td></td>
</tr>
<tr>
<td>EDM Pool pages in use (%) ..............:  1.6</td>
<td></td>
</tr>
<tr>
<td>Pages in EDM pool ......................:  1425</td>
<td></td>
</tr>
<tr>
<td>Free pages in free chain ................:  1402</td>
<td></td>
</tr>
<tr>
<td>Pages used for CT ......................:   1</td>
<td></td>
</tr>
<tr>
<td>Pages used for SKCT ....................:   9</td>
<td></td>
</tr>
<tr>
<td>Pages used for PT ......................:   0</td>
<td></td>
</tr>
<tr>
<td>Pages used for SKPT ....................:   4</td>
<td></td>
</tr>
<tr>
<td>Pages used for DBD .....................:   9</td>
<td></td>
</tr>
<tr>
<td>Inserts for dynamic cache ................: 91381</td>
<td></td>
</tr>
<tr>
<td>Requests for dynamic cache section ......: 117202</td>
<td></td>
</tr>
<tr>
<td>Pages used cache ......................: 1310</td>
<td></td>
</tr>
</tbody>
</table>

Figure 81. 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 that are shown in this panel:

**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.

EDM pool use varies during 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.

![Figure 82. Buffer Manager window](image)

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 to reduce physical I/Os. However, to minimize paging I/O, choose buffer pool sizes that can be backed by real or expanded storage.

Select any active buffer pool listed in the Buffer Manager window to display the Buffer Pool window, where you can view further details about 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 Management in DB2**

Use these buffer pool statistics in conjunction with the system parameters panels. The statistics panels show when various thresholds have been reached or exceeded, the system parameters panels show what the buffer pool settings currently are. You can alter buffer pool settings dynamically using the DB2 ALTER BUFFERPOOL command.

**Buffer Pool windows**

Use the Buffer Pool window to view important statistics about an active buffer pool.

To display the Buffer Pool window, select any active buffer pool listed in the Buffer Manager window.

On the Buffer Pool window, select the required type of information. A further window then displays the requested information. Use the scrolling keys F7 (Up) and F8 (Down) to view the portions of the window not displayed.

```plaintext
DGOMSWBY Buffer Pool BP1
Command ===> _______________________________________________________
For details, type any character next to heading, then press Enter.

- General
- Read Operations
- Write Operations
- Query Parallelism
- Sort/Merge Work File Operations

F1=Help F3=Exit F5=Auto F6=History F7=Up
F8=Down F10=Delta F11=Interval F12=Cancel F16=Look
F17=Collect
```

*Figure 83. Buffer Pool window*

Depending on your selection one of the following windows is displayed. Each window is followed by a description of some of the important fields shown in this window.
Buffer pool hit ratio (%)
The total number of Getpage operations, minus the number of pages read from a hard disk drive (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 might be too small if the number of active buffers is greater than the Deferred Write threshold (DWQT) of the buffer pool.

Figure 84. Buffer Pool – General window
<table>
<thead>
<tr>
<th></th>
<th>DGOMSWBS Buffer Pool BP1 Read Operations</th>
<th>Command ====&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Getpage requests</td>
<td></td>
<td>More: +</td>
</tr>
<tr>
<td>Total</td>
<td>103519</td>
<td></td>
</tr>
<tr>
<td>Sequential access only</td>
<td>10883</td>
<td></td>
</tr>
<tr>
<td>Synchronous reads</td>
<td>14720</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2900</td>
<td></td>
</tr>
<tr>
<td>Sequential prefetch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Requested</td>
<td>1104</td>
<td></td>
</tr>
<tr>
<td>Reads</td>
<td>1087</td>
<td></td>
</tr>
<tr>
<td>Pages read</td>
<td>10895</td>
<td></td>
</tr>
<tr>
<td>List prefetch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Requested</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Reads</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Pages read</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Dynamic prefetch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Requested</td>
<td>242</td>
<td></td>
</tr>
<tr>
<td>Reads</td>
<td>242</td>
<td></td>
</tr>
<tr>
<td>Pages read</td>
<td>1936</td>
<td></td>
</tr>
<tr>
<td>Prefetch disabled</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No buffer</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>No read engine</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Page-ins required for read I/O</td>
<td>185</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 85. Buffer Pool – Read Operations window**

**Getpage requests - Total**
The number of Getpage requests issued by sequential and random requests.

**Synchronous reads - Total**
The number of synchronous read I/O operations performed by sequential and random requests.

**Sequential prefetch - Reads**
The number of times Sequential Prefetch reads were performed.

**Sequential prefetch - Pages read**
Number of pages read because of Sequential Prefetch.

The ratio of Sequential prefetch - Pages read to Sequential prefetch - Reads is 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 because of List Prefetch.

The ratio of List prefetch - Pages read to List prefetch - Reads is between 0 and 32.

**Dynamic prefetch - Reads**
Number of times Dynamic Prefetch reads were performed.
**Dynamic prefetch - Pages read**
Number of pages read because of Dynamic Prefetch performed because of sequential detection.

The ratio of Dynamic prefetch - Pages read to Dynamic prefetch - Reads is between 0 and 32.

**Prefetch disabled - No buffer**
Number of times Sequential Prefetch was disabled because buffers were not available. 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.

---

**DGOMSWBT Buffer Pool BP1**
**Write Operations**

| Command => __________________________________________________________ |
| Buffer updates .....................: 4706 |
| Pages written ........................: 2077 |
| Synchronous writes .................: 5 |
| Asynchronous writes .................: 2025 |
| Write engine not available ..........: 0 |
| Thresholds reached ........................ |
| Deferred write .......................: 0 |
| Vertical deferred write .............: 1742 |
| Data Manager critical ................: 0 |
| Page-Ins required for write I/O ...........: 0 |

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 – Write Operations window

**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 a hard disk drive.

**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 fixed threshold is experienced if 95% of the pages in the buffer pool are unavailable. This has a significant effect on CPU usage.

---

**DGOMSWBU**

Buffer Pool BP1

Query Parallelism

Command ===> ________________________________________________________

Prefetch I/O streams
Concurrent streams - high water mark ..............: 2
Streams reduced - buffer shortage ..............: 0
Parallel query requests .....................: 44
Reduced parallel query requests ..............: 0
Prefetch quantity reduced to 1/2 ..........: 0
Prefetch quantity reduced to 1/4 ..........: 0

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 87. Buffer Pool – Query Parallelism window

**DGOMSWBV**

Buffer Pool BP1

Sort/Merge Work File Operations

Command ===> ________________________________________________________

Maximum concurrent work files ......................: 0
Requested for all merge passes ......................: 0
Not Created - no buffer ......................: 0
Prefetch not scheduled - zero quantity ..............: 0
Pages marked to destruct ......................: 0
Pages not written ......................: 0
Merge passes requested ......................: 0
Degraded - low buffers ......................: 0
Workfile requests rejected - low buffers ..............: 0

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 88. Buffer Pool – Sort/Merge Work File Operations window

Not created - no buffer
The number of times a workfile could not be created because of insufficient buffer resources during sort processing.

Prefetch not scheduled - zero quantity
The number of workfile Prefetches rejected because of a zero Prefetch quantity.
Degraded - low buffers
The number of times that a merge pass could not be efficiently performed because of 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.

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.

![DGOMSWLK Locking Activity](image)

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 in the DB2 System Parameters panel to determine whether to increase DSNZPARM fields NUMLKTS and NUMLKUS (LOCKS PER TABLE(SPACE) and LOCKS PER USER respectively in the INSTALL DB2 - IRLM PANEL 2 panel DSNTIPJ).
The following list describes some of the important fields that are shown in this panel:

**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 can contribute adversely to DB2 performance. The suspension can 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) can occur on either lock request or change request.

**Lock escalations - shared**
Count of lock escalations to shared mode. Number of times the LOCKS PER TABLE(SPACE) parameter in 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 in 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

See the *DB2 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.
The following list describes some of the important fields that are shown in this panel:

**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. See the *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.
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 and 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.

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 might be quite adequate. See the DB2 Administration Guide for more 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.
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 that are shown in this panel:

**Reads delayed - Tape volume contention**
Number of read accesses delayed because of tape volume contention (that is, a tape volume was already in use by another thread).

**Reads delayed - Unavailable resource**
Number of read accesses delayed because of an unavailable resource. This can be because of 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 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. If you use 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 might be a need to determine in which environments log performance is critical 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.
The following list describes some of the important fields that are shown in this panel:

**Identify**
The number of successful connections to DB2 from an allied address space (for example TSO, BATCH, CICS, IMS, CAF, RRSAF, 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 in "Thread Reuse" on page 137) 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.

**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 in the DSNTIPE installation panel. This parameter controls 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 that you specify for the 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.

**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 can result in too many idle threads for the level of the DB2 workload. Under CICS, protected threads are terminated after the purge cycle 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.**
If 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 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.

**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.
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.

**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 that contain 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 and information about kept dynamic statements and dynamic cached statements.

To display this window, select PREPARE Detail from the DB2 Statistics Detail panel.

<table>
<thead>
<tr>
<th>DGOMSWPD</th>
<th>PREPARE Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prepares satisfied ...............: 123</td>
<td></td>
</tr>
<tr>
<td>Prepares received ................: 4</td>
<td></td>
</tr>
<tr>
<td>Prepares implicit ................: 12</td>
<td></td>
</tr>
<tr>
<td>Prepares avoided ................: 12223</td>
<td></td>
</tr>
<tr>
<td>Kept dynamic statement discarded .......: 12</td>
<td></td>
</tr>
<tr>
<td>Dynamic cache statement purged ...........: 4</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 96. PREPARE Detail window (Statistics)**

The following list describes some of the important fields that are shown in this panel:

**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 KEEPDYNAMIC(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 KEEPDYNAMIC(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 about 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.

<table>
<thead>
<tr>
<th>DGOMSWQP</th>
<th>Query Parallelism Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERVAL</td>
<td>3:32.419</td>
</tr>
<tr>
<td>More:</td>
<td>- +</td>
</tr>
</tbody>
</table>

Maximum Degree of Parallelism ..............: 0
Parallel Groups executed ..............: 0
Number of Parallel Groups executed with Planned Parallel Degree ..............: 0
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 (%) ..............: 3

Command ===>
F1=Help  F2=Split  F3=Exit  F5=Auto
F6=History  F9=Swap  F10=Delta  F11=Interval
F12=Cancel

Figure 97. Query Parallelism Data window (Statistics)

The main objective of query parallelism is to improve query response times.

Query parallelism is suited to data-intensive and complex queries. A query is data-intensive if it has a high ratio of I/O compared to CPU. A query is complex if it requires a high use of CPU to resolve complex predicates and functions.

By examining the information displayed in 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 that are shown in this panel:

**Number of Parallel Groups executed with - One DB2 - COORDINATOR Parm = NO**
The total number of parallel groups scheduled for Sysplex query parallelism, but executed on a single DB2 because of 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.

**Number of Parallel Groups executed with - One DB2 - Isolation level**
The total number of parallel groups scheduled for Sysplex query parallelism, but executed on a single DB2 because of 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.

```
DGOMSWRP RID List Processing

INTERVAL 3:32.419
More: - +

RID blocks allocated
Maximum ................: 6
Current ................: 0

Terminated
No storage ..............: 0
RDS limit exceeded ..........: 0
DM limit exceeded...........: 0
Process limit exceeded . . . . : 0

Command ===> ______________________________________
F1=Help F2=Split F3=Exit F5=Auto
F6=History F9=Swap F10=Delta F11=Interval
F12=Cancel F16=Look F17=Collect
```

*Figure 98. 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 that are shown in this panel:
Terminated - No storage
Number of times RID list processing was terminated because of insufficient storage.
This failure occurs when the 2 GB limit is reached. You cannot increase virtual storage beyond 2 GB.

Terminated - 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.

Terminated - 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.

Terminated - Process limit exceeded
Number of times RID list processing was terminated because of 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.
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 controls the number of DBATs that can be concurrently active in the DB2 system.

**Rule of thumb**: About 1% DBAT queuing is acceptable.

**Note**: The Distributed Data window is not accessible if there is no distributed activity.

**Notes® on MAX REMOTE ACTIVE**

The MAX REMOTE ACTIVE option in the Install panel DSNTIPE specifies the number of database access threads that can be active at the same time as opposed to MAX USERS in 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 in 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 might choose, by means of DDF THREADS in 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.

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 in the Distributed Data 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 that are shown in this panel:

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 that are queued by the Distributed Data Facility and are waiting for allocation.

If this number is high, 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.

If this number is high, 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.

![CPU Times and Other Data window](image)

**Figure 101. Statistics CPU Times and Other Data window**

The 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 1 fields show the number of calls made to the instrumentation facility interface (IFI) by various functions, and the number of IFI abnormal terminations.

From the CPU Times and Other Data window, you can reach windows that display information about 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.
### 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.
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 that are 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.

The IFC destinations in 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.

```
DGOMSWCD       Data Capture

                         INTERVAL 16:14.034
Log reads performed ...............: 1
Log records captured ...............: 15
Log records returned ...............: 11
Data records returned .............: 79
Data descriptions returned .........: 2
Describes performed ...............: 2
Tables returned ...................: 2

Command ===> _________________________________________

F1=Help                  F2=Split  F3=Exit  F5=Auto
F6=History               F9=Swap   F10=Delta F11=Interval
F12=Cancel               F16=Look  F17=Collect
```

*Figure 105. Data Capture window*

The following list describes some of the important fields that are shown in this panel:

**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 about 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.

<table>
<thead>
<tr>
<th>DGOMSWSL</th>
<th>Data Sharing Locking Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>More: +</td>
<td></td>
</tr>
<tr>
<td>Global contention rate (%)</td>
<td>0</td>
</tr>
<tr>
<td>P-locks</td>
<td></td>
</tr>
<tr>
<td>Lock requests</td>
<td>N/P</td>
</tr>
<tr>
<td>Unlock requests</td>
<td>N/P</td>
</tr>
<tr>
<td>Change requests</td>
<td>0</td>
</tr>
<tr>
<td>Synchronous XES</td>
<td></td>
</tr>
<tr>
<td>Lock requests</td>
<td>625</td>
</tr>
<tr>
<td>Unlock requests</td>
<td>554</td>
</tr>
<tr>
<td>Change requests</td>
<td>11.4</td>
</tr>
<tr>
<td>Asynchronous XES</td>
<td>Resources</td>
</tr>
<tr>
<td>Suspensions</td>
<td></td>
</tr>
<tr>
<td>IRLM global contention</td>
<td>17</td>
</tr>
<tr>
<td>XES global contention</td>
<td>12</td>
</tr>
<tr>
<td>False contention and conversion</td>
<td>0</td>
</tr>
<tr>
<td>False contention</td>
<td>0</td>
</tr>
<tr>
<td>Incompatible retained lock</td>
<td>39</td>
</tr>
<tr>
<td>Notify messages sent</td>
<td>0</td>
</tr>
<tr>
<td>Notify messages received</td>
<td>128</td>
</tr>
<tr>
<td>P-Lock/notify exists</td>
<td></td>
</tr>
<tr>
<td>Maximum engines</td>
<td>11</td>
</tr>
<tr>
<td>Engines unavailable</td>
<td>11.6</td>
</tr>
<tr>
<td>P-Lock negotiation</td>
<td></td>
</tr>
<tr>
<td>Pageset/partition</td>
<td>1127</td>
</tr>
<tr>
<td>Page</td>
<td>132</td>
</tr>
<tr>
<td>Other</td>
<td>8.5</td>
</tr>
<tr>
<td>Change</td>
<td>523</td>
</tr>
<tr>
<td>Command ===</td>
<td></td>
</tr>
<tr>
<td>F1=Help</td>
<td>F2=Split</td>
</tr>
<tr>
<td>F7=Up</td>
<td>F8=Down</td>
</tr>
<tr>
<td>F12=Cancel</td>
<td>F16=Look</td>
</tr>
</tbody>
</table>

Figure 106. 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 about locking in a data sharing environment, see DB2 Data Sharing: Planning and Administration.

The following list describes the fields shown in 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.

**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 because of IRLM global contention. IRLM lock states were in conflict.

Suspensions - XES global contention
The number of suspensions because of MVS XES global contention. MVS XES lock states were in conflict, but IRLM was not.

Suspensions - False contention and conversion
Summation of false contentions (see below) and sync-to-async heuristic conversions. Conversions are done when XES determines that it is more efficient to drive the request asynchronously to the CF.

False contention
The number of false contentions encountered on this z/OS image. A false contention occurs when different resource names hash to the same entry in the CF lock table. The CF detects contention within the hash entry, and XES uses inter-system messaging to determine that no actual resource contention exists. This counter is maintained on a per-LPAR basis. Therefore this counter over-reports false contentions in cases where multiple members from the same data sharing group run on the same z/OS image. The counter is not present (N/P) if data is unavailable because of errors from the IXLMG service.

Incompatible retained lock
The number of global lock or change requests rejected or suspended because of 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 page set or partition P-lock because of changing inter-DB2 interest levels on the page set or partition.

P-lock negotiation - Page
The number of times this DB2 was driven to negotiate a page P-lock because of inter-DB2 P-lock contention.

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.

You can select any group buffer pool ID listed in 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 group buffer pools used by the thread.
The following list describes some of the important fields that are shown in this panel:

**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 a hard disk drive.

**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 a hard disk drive.

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 a hard disk drive.

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 a hard disk drive, 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 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 DSNB798I) can be recorded and used for recovery purposes in case the group buffer pool
fails. Read directory information requests might have to be issued several times for each group buffer pool checkpoint 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 because of 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 because of 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 about the number of coupling facility read requests for the group buffer pools.

While the [Group Buffer Pools Activity window](#) and the [Group Buffer Pool Detail window](#) display statistics on the group buffer pool usage of the currently monitored subsystem, the Global Group Buffer Pool Statistics window below and the associated Global GBP Statistics Detail window provide information about the group buffer pool usage across the entire 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.
You can select any group buffer pool listed in this window to display the Global GBP Statistics Detail window, where you can view more information about 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.

The following list describes some of the important fields that are shown in this panel:
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 page set 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 because of a lack of coupling facility storage resources.

Stored Procedures window
Use the Stored Procedures window to view activity on calls made to stored procedures.

<table>
<thead>
<tr>
<th>Stored Procedures window</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interval 24.754</td>
</tr>
<tr>
<td>CALL statements executed : 0</td>
</tr>
<tr>
<td>Procedure abends : 0</td>
</tr>
<tr>
<td>CALL statement timeouts : 0</td>
</tr>
<tr>
<td>CALL statements rejected : 0</td>
</tr>
</tbody>
</table>

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 111. Stored Procedures window

The following list describes the fields shown in 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 because of the procedure being in the STOP ACTION (REJECT) state.
Statistics commands

You can type statistics 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 in 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:

```
AUTO <integer> [SECONDS | MINUTES]
```

*Figure 112. Syntax of the AUTO command*

**Parameters of the AUTO command**

The AUTO command accepts the following parameters:

- **integer**  Optional. Specifies the auto-display interval. The valid ranges are:
  - 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, integer should also be specified.

- **MINUTES**  Optional. Specifies the auto-display unit in minutes. If this parameter is specified, integer should also be specified.

If no parameters are specified, the values in the Auto Display window are used.

**Starting Auto Display mode**

To start Auto Display mode, type `AUTO`, followed by any parameters, on the command line and press Enter. 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.
Examples of the AUTO command

- 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 in 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:

```plaintext
DELTA
```

Figure 113. Syntax of the DELTA command

Selecting delta processing

To select delta processing mode, type `DELTA` on the command line and press Enter. `DELTA` can be truncated to a minimum of `DEL`.

Each time you press Enter, the displayed values are updated to reflect the system activity 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.

INTERVAL command

Use the INTERVAL command to view an accumulation of statistics data from a specified point in time.

The command syntax is:

```plaintext
INTERVAL
```

Figure 114. Syntax of the INTERVAL command

Selecting interval processing

To select interval processing mode, type `INTERVAL` on the command line and press Enter. `INTERVAL` can be truncated to a minimum of `INT`.

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.
**RESET command**

Use RESET to deactivate delta or interval processing mode and revert back to regular display mode.

The command syntax is:

```
>>>RESET
```

*Figure 115. 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` on the command line and press Enter. `RESET` can be truncated to 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 in the panels that support 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. See [Chapter 13, “OMEGAMON Collector purpose and function,” on page 211](#) for information about the data collector.

The command syntax is:

```
>>>HISTORY
- OFF
- BACK
- FORWARD
```

*Figure 116. Syntax of the HISTORY command*

**Parameters of the HISTORY command**

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 no more data is available, data from the current time is displayed and processing continues as if HISTORY is 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 default is the time of the earliest available history record for the specified date. The seconds do not need to be specified.

If no data is 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. The current system date and time are the defaults for the History window.

**Viewing past data**

To view past data, type `HISTORY` followed by any parameters on the command line and press Enter. `HISTORY` can be truncated to 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 that occurs 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 the oldest 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 the oldest to avoid the calculation of negative INTERVAL values.
Chapter 9. Monitoring the access path with Explain

Online Monitor Explain provides a real-time analysis of the access path methods that are chosen by DB2 for a given SQL statement. You can also modify the SQL statement text and reexplan it. This provides you with the ability to tune a DB2 subsystem while you are online.

This topic 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 do not need to know the values and columns of the PLAN_TABLE. In addition, Online Monitor Explain provides direct access to related catalog information (the catalog statistics of the tables and indexes that are used in the SQL statement).

Authorizations required to use Explain

To explain an SQL statement, you need DB2 EXECUTE privilege on the OMEGAMON XE for DB2 PE Explain plan defined at installation. The name of this plan is KO2EXPL.

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 privilege, a dynamic Explain of the statement is performed if you have UPDATE privilege on your own PLAN_TABLE.
- Explain an SQL statement entered in 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 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.
  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.

Performance considerations

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.
What to look for in Explain information

When an SQL statement is explained, it is 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 in terms of table size, available indexes, and other key values. You can 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.

The following Explain information can be useful in determining why an application does not perform as expected:

- **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 you only select a few column values, 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 select a maximum value, consider building a descending index on that column (or an ascending index, if you select a minimum value). In this way, you can even avoid the scanning of leaf pages in the index structure.

- **Clustering versus clustered**
  If a clustering index has been chosen by DB2, ensure that the actual index is clustered. In 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 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 in 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 approximately the same as active pages, especially if you are performing table space scans. The value shown in the 1 field in the Table Information window should be as close as possible to 100 percent.

- **Number of tables per table space**
  On the Table Space Information window, you should monitor the Tables field. This field shows the number of tables located in the table space. If the access path is Tablespace scan and the table space is not segmented, there should be only one table in the table space. In a nonsegmented table space, all tables are scanned, not only the selected table.

- **Host variable definitions versus column definitions**
  An inconsistent definition of host variables shown in the Host Variable Definition window, compared to the corresponding column definitions shown in the Key Column Selection window, can indicate an inefficient access path selection, resulting from a possible disqualification of index usage. If, for example, an index column is defined as 3 characters, and that column is being compared in a WHERE-clause with a host variable defined as 4 characters, then
DB2 does not base its access path selection on the mentioned index. You should verify that a column and a host variable being compared in a WHERE-clause have compatible definitions.

**Plan table considerations**

Whenever an SQL statement is explained, the result is written as an entry into a plan table. When the Explain function performs a dynamic Explain, the result is written to the PLAN_TABLE of the current SQLID. The current SQLID is either the same ID as the one used for your Online Monitor session or the ID that you specify in the Explain Menu. You can then examine the explained SQL statement residing in the plan table by using the DB2 Explain Output panel and its associated windows.

If you request a dynamic Explain of an SQL statement, and if you do not have an up-to-date plan table, one of these windows is displayed:

- If a plan table currently does not exist, the **Create Plan Table window** prompts you to create a plan table.
- If a plan table exists, but does not match your current version of DB2, the **Upgrade Plan Table window** prompts you to upgrade the plan table.

**Create Plan Table window**

If a plan table does not exist when a dynamic Explain is required, the Create Plan Table window is displayed.

Use the Create Plan Table window to specify the database name (optional), and table space name of the table to be created (optional). If neither are entered, a plan table is created in the default database DSNDB04. If this database does not exist or you do not have sufficient authority, an error message is displayed.

**Upgrade Plan Table window**

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.
Explain an SQL statement

You can explain an SQL statement by various actions.

- Entering the EXPLAIN command or pressing F18 (Explain) in any Thread Activity panel in either the SQL Statement and Package window or SQL Statement and DBRM window.
  The current SQL statement is then explained.
- Selecting option 9 (Explain) from the 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.
  See “ISPF Online Monitor Source Explain” on page 176 for more information.

The SQL statement is then explained and the result displayed in the DB2 Explain Output panel.

Figure 119 on page 162 shows the flow of the Explain process.
Selecting Explain from the Online Monitor Main Menu

You can access Explain by selecting option 9 (Explain) from the Online Monitor Main Menu. See Figure 2 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, see “ISPF Online Monitor Source Explain” on page 176.

If Explain executed successfully, the DB2 Explain Output panel is displayed. For more information about the DB2 Explain Output panel, see “Explain output (DB2 Explain Output panel)” on page 174.

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 9 (Explain) from the Online Monitor Main Menu.
Use the Current server 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. The default value is the local location.

Use the Current SQLID field to specify a different SQL authorization ID for qualifying the unqualified tables in the SQL statements to be explained. The Current SQLID field can also be used to qualify the plan table to be accessed. The default value is your user ID.

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:

- Select option 1 (Explain an existing entry in the plan table) 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.
- Select option 2 (Explain a package’s SQL statement) to display the Package SQL Statement window, where you can explain an SQL statement for a previously bound package.
- Select option 3 (Explain a DBRM’s SQL statement) to display the DBRM SQL Statement window, where you can explain an SQL statement for a previously bound plan.
- Select option 4 (Enter an SQL statement to be explained) to display the SQL Text Entry window, where you can explain a dynamic SQL statement. After you 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 in 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.

![Plan Table Entry window](image)

Figure 121. 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 **1** field is left blank, all entries are listed that match the plan name, program name, and version that you specified. Leaving any of these criteria fields blank is equivalent to specifying an asterisk (*), which matches all entries. The Plan Table Entry List panel is then displayed, which lists all matching entries in the plan table.

After selecting an entry in a plan table, the entry is processed and the result is shown in 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 many table entries are listed, you can use the scrolling keys F7 (Up) and F8 (Down) to browse the list.
After making a selection, the entry is processed and the result is shown in 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.

---

**Figure 122. Plan Table Entry List panel**

---

**Figure 123. 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. Empty fields are equivalent to asterisks (*), which is the default. The Package Version List panel is then displayed, where you can select a package from a list of all matching packages.

**Package Version List panel**

The Package Version List panel shows a list of packages that match the fields specified in the Package SQL Statement window. If many packages are listed, you can use the scrolling keys F7 (Up) and F8 (Down) to browse the list.
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 shows a list of SQL statements for the selected package. For each item listed, the statement number and the first 60 characters of the SQL statement text are shown. If many SQL statements are listed, you can use the scrolling keys F7 (Up) and F8 (Down) to browse the list. Use the key F21 (Expand) to browse the SQL statement.

From this window, you can select the SQL statement to be explained. The SQL statement is then processed and the result is shown in 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.

![Figure 126. DBRM SQL Statement window](image)

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. Empty fields are equivalent to asterisks (*), which is the default. The DBRM and Plan List panel is then displayed, where you can select a DBRM from a list of all matching DBRMs and plans.

**DBRM and Plan List panel**

The DBRM and Plan List panel shows a list of DBRMs and plans matching the fields specified in the DBRM SQL Statement window. If many items are listed, you can use the scrolling keys F7 (Up) and F8 (Down) to browse the list.

![Figure 127. DBRM and Plan List panel](image)

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 shows a list of SQL statements for the selected DBRM. This window shows the statement number and the first 60 characters of the SQL statement text for each item listed. If many SQL statements are listed, you can use the scrolling keys F7 (Up) and F8 (Down) to browse the list. Use the key F21 (Expand) to browse the SQL statement.
From this window, you can select an SQL statement to be explained. The SQL statement is then processed and the result is shown in 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.

**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 in the SQL Text Entry window, or by selecting the 1 field from the DB2 Explain Output panel.

```
ISREDDE2  XRX_PMD4.SPFTEMP1.CNTL  Columns 00001 00072
****** **************************** Top of Data *******************************
000001 SELECT COUNT ( * ) INTO :HV_LOC10_COUNT FROM DGO_SYS_PACKAGE WHERE
000002 LOCATION = :HV_LOC10_LOCATION AND ( COLLID LIKE :HV_LOC10_COLLID OR
000003 COLLID LIKE :HV_LOC10_COLLID2 ) AND ( NAME LIKE :HV_LOC10_NAME OR NAME
000004 LIKE :HV_LOC10_NAME2 ) AND VERSION LIKE :HV_LOC10_VERSION QUERYNO
000005 001011010
****** **************************** Bottom of Data *******************************
```

Figure 130. SQL Text Edit panel

From this panel, you can enter a new (or modify an existing) SQL statement to assess the effect on access path selection. The statement can be adjusted and then explained again to dynamically assess the effect.

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 confirmation message.

To ignore the changes and return to the previous panel, press F12 (Cancel).

**Explain output (DB2 Explain Output panel)**

Use the DB2 Explain Output panel and Catalog Table windows to investigate the access path methods of an explained SQL statement. Information regarding packages, DBRMs, table spaces, tables, indexes, and column attributes can also be viewed.

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.

The plan table is searched by using the bind time of the package. There might be multiple occurrences of the package with different bind times. For example, the DB2 system catalog might contain the latest package that
is created by the DB2 command BIND or REBIND. It might also contain a former package version that is activated by the DB2 command REBIND SWITCH.

**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.

---

**Figure 131. DB2 Explain Output panel (packages)**

The DB2 Explain Output panel is divided into three sections:

- The first section of the panel shows the plan name, and information about the package or DBRM that contains 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 about the SQL Text Edit panel, see “SQL Text Edit panel” on page 173. After the SQL text is modified, the SQL statement is reexplained, and the new result is shown in the DB2 Explain Output panel. From this section you can also reach windows that provide information about the host variable definitions.

• The third section of the panel, titled Access path summary, shows information about 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. This also provides online access to help information for PLAN_TABLE columns, similar to the information in DB2 SQL Reference for the EXPLAIN statement.

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.

### Online Monitor EXPLAIN command

Use the EXPLAIN command to explain the currently executing SQL statement in the 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, you can use the EXPLAIN command 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 132. Syntax of the EXPLAIN command*

**Note:** EXPLAIN can be truncated to a minimum of EXP.

For a description of the DB2 Explain Output panel, see “Explain output (DB2 Explain Output panel)” on page 174.

### ISPF Online Monitor Source Explain

Use 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 following languages are supported:

• Assembler
• C
• COBOL
• FORTRAN
• PL/1
• SPUFI
Note: Ensure that Source Explain is installed at your site. 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), specify the lines you want to have explained by using the ISPF/PDF editor line prefix command E, type EXPLAIN on the command line, and press Enter.

You can use the line prefix command E like this:

**E**  To explain a single line, type E in the prefix area of the line to be scanned for SQL statements.

**EE**  To explain a range of lines, type EE in the prefix area of the first line and the last line of the range of lines 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 be scanned, 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. The valid SQL statements are then listed on the SQL Statement Selection panel.

The following figure shows how to explain an SQL statement while editing COBOL source code.

To explain the SQL statements in the source code from line 3040 to 3160:

1. In the line prefix area of lines 3040 and 3160, type EE.
2. On the command line, type explain and press Enter.
If you previously selected the Always display this window field in the Source Explain Options window as shown in Source Explain Options window, the Source Explain Options window is displayed. If you did not select this field, the SQL Statement Selection panel is displayed.

**Source Explain Options window**

You can display the Source Explain Options window by specifying a command in the ISPF/PDF editor or on the SQL Statement Selection panel.

- In the command line of the ISPF/PDF editor, type `EXPLAIN OPTIONS` and press Enter.

  If you have previously selected the Always display this window field in the Source Explain Options window, you can type `EXPLAIN` in the command line of the ISPF/PDF editor and press Enter.

- In the command line of the SQL Statement Selection panel, type `OPTIONS` and press Enter.

You can use the Source Explain Options window to specify the Source Explain processing options, for example, the language of the source code you are editing, the subsystem ID of the explaining DB2, the SQLID to be used, or the degree of parallelism.
On the Source Explain Options window, you can specify the following options:

**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.

In this field, you can specify the DB2 test subsystem you want to connect to while you are executing the explain on the remote production system. If you do not specify a subsystem, the local DB2 subsystem is used.

**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 you do not specify an SQL authorization ID, your user ID is used.

**Query number**
A number that identifies the Explain statement.

If you do not specify a number, the value 999 735 912 is assigned to this field.

**Set current degree to ANY**
To specify whether the SQL statement is eligible for query parallelism.

By default, the current degree of parallelism is set to 1. To set the current degree of parallelism to ANY, type a slash (/) in this field.

**Always display this window**
To control the display of the Source Explain Options window.

By default, the Source Explain Options window is not displayed on each Source Explain request. To display the Source Explain Options window on each Source Explain request, type a slash (/) in this field.

**Define source language**
In this field, you must specify the language of the source that contains the SQL statements. This field cannot be left blank.
After you have specified the Source Explain options to be used, press Enter to proceed to the SQL Statement Selection panel.

**SQL Statement Selection panel**

Use the SQL Statement Selection panel 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.

---

You can select any SQL statement that is listed on the SQL Statement Selection panel for Explain processing by typing a slash (/) next to the line to be explained as shown in the figure above. The SQL statement is then processed even if the SQL statement text exceeds the specified range. Then the Online Monitor is accessed. With the Online Monitor, you can view the Explain output on the DB2 Explain Output panel. For more information, see “Explain output (DB2 Explain Output panel)” on page 174.

From the SQL Statement Selection panel, you can access the Source Explain Options window by using the OPTIONS command. In the Source Explain Options window, you can change the Source Explain processing options.

**Source EXPLAIN command**

Use the EXPLAIN command to explain an SQL statement from within an ISPF/PDF editor, or to specify Source EXPLAIN options.

The command syntax looks like this:

```
>>EXPLAIN OPTIONS
```

---

**Figure 136. Syntax of the Source EXPLAIN command**
Chapter 10. Viewing system parameters

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 in these panels is similar to that presented by the Batch System Parameters report set.

Note: This function is not supported for DB2 11.

All system parameter fields are supported. You can also use DB2 Visual Explain.

DB2 System Parameters panel

Use the DB2 System Parameters 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 information in the DB2 System Parameters panel.

To display the DB2 System Parameters panel, select option 3 (Display System Parameters) from the Online Monitor Main Menu.

The following figure shows the DB2 System Parameters panel.
Note: The DB2 System Parameters panel you see might have been tailored by your installation and consequently might not necessarily match the panel examples shown in this publication.

From the DB2 System Parameters panel, you can reach a set of windows that provide system parameters information in greater detail. To reach a window, type any character in the space provided beside the desired heading.

Several windows can be accessed simultaneously by selecting multiple fields in the DB2 System Parameters 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 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 in the panels that support 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. See Chapter 13, “OMEGAMON Collector purpose and function,” on page 211 for information about the data collector.

The command syntax is:

```
/SM590000/SM590000

HISTORY

-OFF
-BACK
-FORWARD

date hh:mm:ss
```

Figure 138. Syntax of the HISTORY command

**Parameters of the HISTORY command**

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 no more data is available, data from the current time is displayed and processing continues as if HISTORY is 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 default is the time of the earliest available history record for the specified date. The seconds do not need to be specified.

If no data is 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. The current system date and time are the defaults for the History window.

**Viewing past data**

To view past data, type HISTORY followed by any parameters on the command line and press Enter. HISTORY can be truncated to a minimum of HIS.
Chapter 11. Problem identification examples

This section provides 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, set the exception threshold for class 2 CPU time to a value applicable to your environment. To do this, select option 8 (Maintain parameter data sets) from the Online Monitor Main Menu. This displays the Data Set Maintenance Menu.

```
DGOPMENU      Data Set Maintenance Menu

Select one of the following.

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 139. Data Set Maintenance Menu

Ensure that you have specified an Exception Threshold data set name in the 1 field. Select option 1 (Maintain exception thresholds) to display the Exception Threshold Category Selection panel.

The Exception Threshold Category Selection panel is displayed.
Select the category that contains the desired exception field. For this example, select the Elapsed, CPU and Waiting Times per Plan Execution field.

The Exception Threshold Field Details panel is displayed.

This panel shows all available fields within the specified category. Select the ADDBCPUT field and press Enter.

The Exception Threshold Field Details panel is displayed.
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: Choose a threshold value that is applicable to your environment. For information about defining exception threshold values, see “How to define exception threshold values” on page 48.

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.
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 forward 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 about activating exception processing, see “How to start exception processing” on page 48.

When a periodic exception occurs, the Online Monitor notifies you by displaying the Exception Notification window. This window is overlaid on the current 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.

Figure 144. Exception Notification window (overlaid on Thread Detail panel)
From this window you can examine a list that contains 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 in 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.

Some fields can have values that are longer than the space available to show them in this panel. When this happens, the last character in the field is replaced with an asterisk (*) to indicate that the reported value is truncated.
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 you can use past data 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. See Chapter 5, "Viewing past data," on page 41 for more information about 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.
This window displays the SQL statement executing at the time the exception occurred. To obtain details about 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.
The access path summary in 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.

Figure 148. DB2 Explain Output panel (packages)
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 DSN8710.XEMP1. This displays the Index Information window.
From the Index Information window, you can select Key columns to display the Key Column Information window.

**Figure 150. Index Information window**

Use this window to examine the characteristics of the key column on which the index has been defined.

**Figure 151. Key Column Information window**
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.

![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

This 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 Online Monitor Main Menu.

![Thread Summary panel]

Figure 153. Thread Summary panel
**Note:** To view Class 3 times in 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 because of lock and latch suspensions are sorted to the top.

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 about the `SORT` command see "SORT command" on page 110.

Press F3 (Exit) to exit the DB2 Thread Sort Specification window and return to the 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. The word SORT is displayed in the header of the Thread Summary panel.

For example, 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 that you see might have been tailored by your installation and consequently might not necessarily match the panel examples shown in this publication.
The Thread Detail panel shows that the thread is in LOCK status. Select the field to display the Thread Times window, where you can examine the suspension time shown in the Locks and Latches field.

As you can see, most of the total class 3 suspension time is because of locks and latches.

Figure 156. Thread Detail panel

Figure 157. Thread Times window
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.

```
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.

<table>
<thead>
<tr>
<th>Database</th>
<th>Type</th>
<th>Status</th>
<th>Duration</th>
<th>Attribute</th>
</tr>
</thead>
<tbody>
<tr>
<td>MACBP2DB</td>
<td>PAGESET</td>
<td>N/A</td>
<td>COMMIT</td>
<td>L-LOCK</td>
</tr>
<tr>
<td>MACBP2TB</td>
<td>PAGESET</td>
<td>YES</td>
<td>LOCK</td>
<td></td>
</tr>
<tr>
<td>MACBP2DB</td>
<td>PAGESET</td>
<td>N/A</td>
<td>COMMIT</td>
<td>N/A</td>
</tr>
<tr>
<td>MACBP2TB</td>
<td>DATABASE</td>
<td>S</td>
<td>COMMIT</td>
<td>L-LOCK</td>
</tr>
<tr>
<td>N/A</td>
<td>SKPT</td>
<td>S</td>
<td>COMMIT</td>
<td>L-LOCK</td>
</tr>
<tr>
<td>N/A</td>
<td>SKCT</td>
<td>S</td>
<td>PLAN</td>
<td>L-LOCK</td>
</tr>
<tr>
<td>DSNESPCS</td>
<td>S</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

******************************************************************************

Figure 158. 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.

<table>
<thead>
<tr>
<th>Database</th>
<th>Object</th>
<th>Resource type</th>
<th>Status</th>
<th>Subsystem</th>
<th>Planname</th>
<th>Connection</th>
<th>Suspended</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>MACBP2DB</td>
<td>MACBP2TB</td>
<td>PAGESET</td>
<td>N/A</td>
<td>N/A</td>
<td>USERT001</td>
<td>TSO</td>
<td>NO</td>
<td>COMMIT</td>
</tr>
<tr>
<td>USERT003</td>
<td>USERT003</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>DSNESPRR</td>
<td>TSO</td>
<td>YES</td>
<td>COMMIT</td>
</tr>
</tbody>
</table>

******************************************************************************

Figure 159. 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 (DSNESPRR). You should decide whether it is necessary for USERT001 to use DSNESPRR, or if DSNESPCS can be used instead.
Using the ISPF Online Monitor in deadlock resolution

A deadlock is an error condition where processing cannot continue because of an unresolved contention for a particular resource. A deadlock is signaled when the deadlock detection cycle time has been reached. 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. See "How to start exception processing" on page 48.

Deadlock resolution

On detection of a deadlock, use LOOK to display the participants in the deadlock.

```
DGOMLED0  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.A74A89FEF91C
State ..............: EXCLUSIVE
Duration .............: COMMIT
Status ...............: WAIT
Waiter
Member/DBMS identifier ..........: MEMBER02
Plan name .............: DDLD3P15
Correlation identifier ..........: RUNPRG15
Connection identifier ..........: BATCH
LUW identifier ..........: USIBMSY.SY30BDB2.A74A89EE117F
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 160. Deadlock Data window

If the 1 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 (the Locked resource Type field is Index Page), 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 in the Thread Detail panel.
Part 4. Customizing the ISPF Online Monitor

You can customize the Online Monitor, for example, you might want to set exception thresholds or change the default layout of the panels.

For information about tailoring exception thresholds and exception profiling, see the Reporting User’s Guide.
Chapter 12. Customizing panels

You can customize the layout of headings, field labels, fields displayed, and the order in which the fields appear in the Thread Detail panel, the DB2 Statistics Detail panel, and the DB2 System Parameters panel.

The panels are defined by 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, you need to add or remove the corresponding field help panels. You might also have to modify the exception processing variables in the same panels.

Example of a customized Thread Detail panel

To view an example of the standard Thread Detail panel, see Standard Thread Detail panel.

The following figure shows an example of a customized Thread Detail panel. It demonstrates the flexibility of customizing panels.

![Figure 161. Customized Thread Detail panel]

The panel above is tailored to show LUW and CICS instances and more detailed buffer information. It is also tailored to show all desired fields in one panel, thereby removing the need to use the scrolling keys. Furthermore, the following general modifications were made to the panel above:

- Fields are added, removed, rearranged, and field labels are changed.
- The heading of the panel is 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 (Thread Detail), DGOMSPSM (DB2 Statistics Detail), and DGOMZPSM (DB2 System Parameters) panels displayed at your site might have been tailored by your installation and consequently might not necessarily match the panel examples shown in this publication.

How to customize panels

Before you modify any of the Online Monitor detail panels, become familiar with the way ISPF panels are defined. Consult your system programmer before making any change to your ISPF or TSO environment.

The Online Monitor panels are defined by 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 add or remove fields, you also need to add or remove the corresponding help panels for the appropriate fields. For a list of all available Online Monitor fields and their corresponding help panel names, see Chapter 14, “Online Monitor field table,” on page 215.

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 in 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(MTITABLE,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 that indicates the exception status of that field. The ISPF variable has the same name as the OMEGAMON XE for DB2 PE 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.

An exception ISPF variable can contain one of the following one-character values:

P
Indicates a problem level exception

W
Indicates a warning level exception

blank
Indicates that the corresponding field is not in exception status.

If you want your exception fields to be highlighted when they are in exception status, you need to test for an exception condition and highlight the field appropriately. For example, to test and highlight the Q3STABRT field in the Thread Detail panel, you would add the following lines to the panel logic:

```plaintext
if (&x3stabrt = 'P')
  .attr(q3stabrt) = 'color(red) hilite(reverse)'
if (&amp;x3stabrt = 'W')
  .attr(q3stabrt) = 'color(yellow) hilite(reverse)'
```

If you remove an exception field, also remove the corresponding code that tests and highlights the field.

Editing selection fields

The selection fields in the detail panels provide access to other Online Monitor panels. These fields are selected by typing any nonblank character in the desired field and pressing Enter.

You can remove or disable any of the selection fields in the Thread Detail panel, DB2 Statistics Detail panel, or DB2 System Parameters panel.

The following table shows the names of all selection fields and their corresponding subheadings in the Thread Detail panel:

<table>
<thead>
<tr>
<th>Selection field name</th>
<th>Subheading</th>
</tr>
</thead>
<tbody>
<tr>
<td>C01</td>
<td>Thread Identification</td>
</tr>
<tr>
<td>C02</td>
<td>Current Package/DBRM</td>
</tr>
<tr>
<td>C03</td>
<td>Times</td>
</tr>
<tr>
<td>C04</td>
<td>Locking Activity</td>
</tr>
<tr>
<td>C05</td>
<td>Locked Resources</td>
</tr>
<tr>
<td>C06</td>
<td>RID List Processing</td>
</tr>
<tr>
<td>C07</td>
<td>SQL Activity, Commits and Rollbacks</td>
</tr>
<tr>
<td>C08</td>
<td>Buffer Manager Activity</td>
</tr>
<tr>
<td>C09</td>
<td>SQL Statement and Package/DBRM</td>
</tr>
<tr>
<td>C10</td>
<td>Distributed Data</td>
</tr>
</tbody>
</table>
Table 9. Selection field names and corresponding subheadings in the Thread Detail panel (continued)

<table>
<thead>
<tr>
<th>Selection field name</th>
<th>Subheading</th>
</tr>
</thead>
<tbody>
<tr>
<td>C11</td>
<td>IFI (Class 5) and Data Capture</td>
</tr>
<tr>
<td>C12</td>
<td>Query Parallelism Data</td>
</tr>
<tr>
<td>C13</td>
<td>Data Sharing Locking Activity</td>
</tr>
<tr>
<td>C14</td>
<td>Group Buffer Pools Activity</td>
</tr>
<tr>
<td>C15</td>
<td>Stored Procedures</td>
</tr>
</tbody>
</table>

The following table shows the names of all selection fields and their corresponding subheadings in the DB2 Statistics Detail panel:

Table 10. Selection field names and corresponding subheadings in the DB2 Statistics Detail panel

<table>
<thead>
<tr>
<th>Selection field name</th>
<th>Subheading</th>
</tr>
</thead>
<tbody>
<tr>
<td>C01T01</td>
<td>EDM Pool</td>
</tr>
<tr>
<td>C01T02</td>
<td>Buffer Manager</td>
</tr>
<tr>
<td>C01T03</td>
<td>Locking Activity</td>
</tr>
<tr>
<td>C01T04</td>
<td>Open/Close Management</td>
</tr>
<tr>
<td>C01T05</td>
<td>Bind Processing</td>
</tr>
<tr>
<td>C01T06</td>
<td>Plan/Package Allocation, Authorization Management</td>
</tr>
<tr>
<td>C01T07</td>
<td>Log Manager</td>
</tr>
<tr>
<td>C01T08</td>
<td>Subsystem Services</td>
</tr>
<tr>
<td>C01T09</td>
<td>SQL Activity</td>
</tr>
<tr>
<td>C01T10</td>
<td>Query Parallelism Data</td>
</tr>
<tr>
<td>C01T11</td>
<td>RID List Processing</td>
</tr>
<tr>
<td>C01T12</td>
<td>Distributed Data</td>
</tr>
<tr>
<td>C01T13</td>
<td>CPU Times and Other Data</td>
</tr>
<tr>
<td>C01T14</td>
<td>Data Sharing Locking Activity</td>
</tr>
<tr>
<td>C01T15</td>
<td>Group Buffer Pool Activity</td>
</tr>
<tr>
<td>C01T16</td>
<td>Global Group Buffer Pool Statistics</td>
</tr>
<tr>
<td>C01T17</td>
<td>Stored Procedures</td>
</tr>
</tbody>
</table>

The following table shows the names of all selection fields and their corresponding subheadings in the DB2 System Parameters panel:

Table 11. Selection field names and corresponding subheadings in the DB2 System Parameters panel

<table>
<thead>
<tr>
<th>Selection field name</th>
<th>Subheading</th>
</tr>
</thead>
<tbody>
<tr>
<td>C01T1</td>
<td>Virtual and Hiperpool Buffer Sizes</td>
</tr>
<tr>
<td>C01T2</td>
<td>Storages Sizes and Connections</td>
</tr>
<tr>
<td>C01T3</td>
<td>Operator and DDF Functions</td>
</tr>
<tr>
<td>C01T4</td>
<td>Tracing, Data Installation and Pseudo-Close</td>
</tr>
<tr>
<td>C01T5</td>
<td>Locking (IRLM)</td>
</tr>
</tbody>
</table>
Table 11. Selection field names and corresponding subheadings in the DB2 System Parameters panel (continued)

<table>
<thead>
<tr>
<th>Selection field name</th>
<th>Subheading</th>
</tr>
</thead>
<tbody>
<tr>
<td>C01T6</td>
<td>Active Log</td>
</tr>
<tr>
<td>C01T7</td>
<td>Archive Log</td>
</tr>
<tr>
<td>C01T8</td>
<td>Protection and Data Definition</td>
</tr>
<tr>
<td>C01T9</td>
<td>Stored Procedures</td>
</tr>
<tr>
<td>C01T10</td>
<td>Group Buffer Pools</td>
</tr>
<tr>
<td>C01TA</td>
<td>Data Sharing Parameters</td>
</tr>
<tr>
<td>C01TB</td>
<td>Application Programming Defaults</td>
</tr>
<tr>
<td>C01T11</td>
<td>Other Parameters</td>
</tr>
</tbody>
</table>
Chapter 13. OMEGAMON Collector purpose and function

The OMEGAMON Collector executes as a started task address space. The purpose of the OMEGAMON Collector is to support functions that are not suited to a TSO address space.

The following functions are available if the OMEGAMON 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

There is one OMEGAMON Collector for all DB2 subsystems.

**Viewing past data**

Before you can view past data, the OMEGAMON Collector needs to be active so that instrumentation data can be gathered.

This data is gathered by the OMEGAMON 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 OMEGAMON 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 OMEGAMON Collector to reduce unnecessary system overhead and to limit the quantity of data stored using the OMEGAMON Collector parameters.

For more information, see the *DB2 Installation Guide*.

**Periodic exceptions**

With the OMEGAMON 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 OMEGAMON Collector and are written to the periodic exceptions list, where they can be examined by using the LOOK command. You are notified of any periodic exceptions when you log on to your TSO system the next time.

**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 OMEGAMON Collector and are written to the exception event list, where they can be examined by using the LOOK command. You are notified of any exception events when you log on to your TSO system the next time.
You can specify the exception event traces to start during OMEGAMON Collector startup using the OMEGAMON Collector parameters. For more information, see the DB2 Installation Guide.

**Collection of parallelism data**

The data that the Online Monitor shows for threads that exploit 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 OMEGAMON Collector if it has been set up to do so. See parameter COLLECTCPUPARALLEL or CCP in the DB2 Installation Guide.

If your DB2 system exploits query CP parallelism, set CCP to YES to enable the OMEGAMON 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.
Part 5. Additional Information

These topics provide additional information that can be helpful when you work with OMEGAMON XE for DB2 PE or OMEGAMON XE for DB2 PE.
Chapter 14. Online Monitor field table

The tables in this section 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 display exception processing and for periodic exception processing, or to look up a field help panel name when customizing Online Monitor panels, as described in Chapter 12, “Customizing panels,” on page 205.

The following is a description of the table columns:

**Field name**

The name of the field.

**Field description**

The field title, as the field is shown in the panel. 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.

### Table 12. Accounting - Buffer Pool Activity

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
<th>Exception</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABCLSPR</td>
<td>Prefetch Reads</td>
<td>DGO0231</td>
<td>●</td>
</tr>
<tr>
<td>ABCRWIO</td>
<td>Synchronous I/O</td>
<td>DGO0232</td>
<td></td>
</tr>
<tr>
<td>ADRGPRIO</td>
<td>Getpage/Synchronous Reads</td>
<td>DGO0233</td>
<td>●</td>
</tr>
<tr>
<td>QBACDPF</td>
<td>Dynamic Prefetch Requests</td>
<td>DGO0222</td>
<td></td>
</tr>
<tr>
<td>QBACGET</td>
<td>Getpage Requests</td>
<td>DGO0217</td>
<td>●</td>
</tr>
<tr>
<td>QBACIMW</td>
<td>Synchronous Writes</td>
<td>DGO0226</td>
<td>●</td>
</tr>
<tr>
<td>QBACLPF</td>
<td>List Prefetch Requests</td>
<td>DGO0221</td>
<td></td>
</tr>
<tr>
<td>QBACPID</td>
<td>Buffer Pool ID</td>
<td>DGO0215</td>
<td></td>
</tr>
<tr>
<td>QBACRIO</td>
<td>Synchronous Read I/O</td>
<td>DGO0219</td>
<td>●</td>
</tr>
<tr>
<td>QBACSEQ</td>
<td>Sequential Prefetch Requests</td>
<td>DGO0220</td>
<td></td>
</tr>
<tr>
<td>QBACSIO</td>
<td>Asynchronous Pages Read</td>
<td>DGO0229</td>
<td></td>
</tr>
<tr>
<td>QBACSWS</td>
<td>Buffer Updates</td>
<td>DGO0225</td>
<td>●</td>
</tr>
</tbody>
</table>

### Table 13. Accounting - Data Capture Activity and Class 5 Times

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
<th>Exception</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADIFICAL</td>
<td>IFI Calls</td>
<td>DGO0775</td>
<td>●</td>
</tr>
<tr>
<td>QIFAAIET</td>
<td>Class 5 Elapsed Time</td>
<td>DGO0202</td>
<td>●</td>
</tr>
<tr>
<td>QIFAAITT</td>
<td>Class 5 TCB Time</td>
<td>DGO0203</td>
<td>●</td>
</tr>
<tr>
<td>QIFAAAMBT</td>
<td>Describe Time</td>
<td>DGO0204</td>
<td></td>
</tr>
</tbody>
</table>
### Table 13. Accounting - Data Capture Activity and Class 5 Times (continued)

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
<th>Exception</th>
</tr>
</thead>
<tbody>
<tr>
<td>QIFAAMLT</td>
<td>Log Extraction Time</td>
<td>DGO0205</td>
<td></td>
</tr>
<tr>
<td>QIFAANDD</td>
<td>Data Descriptions Returned</td>
<td>DGO0211</td>
<td></td>
</tr>
<tr>
<td>QIFAANDR</td>
<td>Data Rows Returned</td>
<td>DGO0210</td>
<td></td>
</tr>
<tr>
<td>QIFAANLR</td>
<td>Log Reads Performed</td>
<td>DGO0207</td>
<td></td>
</tr>
<tr>
<td>QIFAANMB</td>
<td>Describes Performed</td>
<td>DGO0212</td>
<td></td>
</tr>
<tr>
<td>QIFAANRC</td>
<td>Log Records Captured</td>
<td>DGO0208</td>
<td></td>
</tr>
<tr>
<td>QIFAANRR</td>
<td>Log Records Returned</td>
<td>DGO0209</td>
<td></td>
</tr>
<tr>
<td>QIFAANTB</td>
<td>Tables Returned</td>
<td>DGO0213</td>
<td></td>
</tr>
</tbody>
</table>

### Table 14. Accounting - Data Sharing Locking Activity

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
<th>Exception</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABUFFRAT</td>
<td>Buffer Pool Hit Ratio (%)</td>
<td>DGO1769</td>
<td></td>
</tr>
<tr>
<td>AGLOBRAT</td>
<td>Global Contention Rate (%)</td>
<td>DGO1767</td>
<td></td>
</tr>
<tr>
<td>QTGACPLK</td>
<td>Change Requests</td>
<td>DGO1399</td>
<td></td>
</tr>
<tr>
<td>QTGACSLM</td>
<td>Change Requests - XES</td>
<td>DGO1402</td>
<td></td>
</tr>
<tr>
<td>QTGADRTA</td>
<td>Incompatible Retained Lock</td>
<td>DGO1408</td>
<td>●</td>
</tr>
<tr>
<td>QTGAFLSE</td>
<td>Suspensions - False Contention</td>
<td>DGO1407</td>
<td></td>
</tr>
<tr>
<td>QTGAIGL0</td>
<td>Suspensions - IRLM Global Contention</td>
<td>DGO1403</td>
<td></td>
</tr>
<tr>
<td>QTGALPLK</td>
<td>Lock Requests</td>
<td>DGO1397</td>
<td></td>
</tr>
<tr>
<td>QTGALSLM</td>
<td>Lock Requests - XES</td>
<td>DGO1400</td>
<td></td>
</tr>
<tr>
<td>QTGANTFY</td>
<td>Notify Messages Sent</td>
<td>DGO1409</td>
<td></td>
</tr>
<tr>
<td>QTGASGLO</td>
<td>Suspensions - XES Global Contention</td>
<td>DGO1406</td>
<td></td>
</tr>
<tr>
<td>QTGAUPLK</td>
<td>Unlock Requests</td>
<td>DGO1398</td>
<td></td>
</tr>
<tr>
<td>QTGAUSLM</td>
<td>Unlock Requests - XES</td>
<td>DGO1401</td>
<td></td>
</tr>
</tbody>
</table>

### Table 15. Accounting - Distributed Data Facility Activity

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
<th>Exception</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADDSCNV</td>
<td>Current DDF Conversions</td>
<td>DGO0270</td>
<td></td>
</tr>
<tr>
<td>ADDSELRS</td>
<td>Remote Elapsed</td>
<td>DGO0263</td>
<td>●</td>
</tr>
<tr>
<td>ADDSSRSL</td>
<td>Remote CPU</td>
<td>DGO0264</td>
<td>●</td>
</tr>
<tr>
<td>ADPROTOC</td>
<td>Method</td>
<td>DGO0235</td>
<td></td>
</tr>
<tr>
<td>QLACLLOCN</td>
<td>Remote Location</td>
<td>DGO0234</td>
<td></td>
</tr>
<tr>
<td>QW0148CT</td>
<td>Type</td>
<td>DGO0833</td>
<td></td>
</tr>
<tr>
<td>QW0148EL</td>
<td>Requester Elapsed</td>
<td>DGO1195</td>
<td>●</td>
</tr>
<tr>
<td>QW0148MR</td>
<td>Messages Received</td>
<td>DGO0272</td>
<td></td>
</tr>
<tr>
<td>QW0148MS</td>
<td>Messages Sent</td>
<td>DGO0271</td>
<td></td>
</tr>
<tr>
<td>QW0148PT</td>
<td>Product ID</td>
<td>DGO0804</td>
<td></td>
</tr>
<tr>
<td>QW0148PV</td>
<td>Product Version</td>
<td>DGO1556</td>
<td></td>
</tr>
</tbody>
</table>
Table 15. Accounting - Distributed Data Facility Activity (continued)

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
<th>Exception</th>
</tr>
</thead>
<tbody>
<tr>
<td>QW01488A</td>
<td>Conversation Active Flag</td>
<td>DGO0266</td>
<td></td>
</tr>
<tr>
<td>QW01488C</td>
<td>Conversation ID</td>
<td>DGO0269</td>
<td></td>
</tr>
<tr>
<td>QW01488L</td>
<td>Remote Location</td>
<td>DGO0836</td>
<td></td>
</tr>
<tr>
<td>QW01488N</td>
<td>Network Connection Type</td>
<td>DGO1722</td>
<td></td>
</tr>
<tr>
<td>QW01488S</td>
<td>Connection ID</td>
<td>DGO0268</td>
<td></td>
</tr>
<tr>
<td>QW01488T</td>
<td>Time of Last Message</td>
<td>DGO0267</td>
<td></td>
</tr>
<tr>
<td>QW01488U</td>
<td>State</td>
<td>DGO0265</td>
<td></td>
</tr>
</tbody>
</table>

Table 16. Accounting - Group Buffer Pools Activity

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
<th>Exception</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABGAMR</td>
<td>Read (Not Found)-No Data Returned</td>
<td>DGO1832</td>
<td></td>
</tr>
<tr>
<td>ABGAXR</td>
<td>Read (Cross Inval.)-No Data Returned</td>
<td>DGO1833</td>
<td></td>
</tr>
<tr>
<td>QBGADG</td>
<td>Unregister Page</td>
<td>DGO1721</td>
<td></td>
</tr>
<tr>
<td>QBGAGN</td>
<td>Group Buffer Pool ID</td>
<td>DGO1579</td>
<td></td>
</tr>
<tr>
<td>QBGAMD</td>
<td>Read (Not Found) - Data Returned</td>
<td>DGO1413</td>
<td></td>
</tr>
<tr>
<td>QBGAMN</td>
<td>Read Prefetch</td>
<td>DGO1415</td>
<td></td>
</tr>
<tr>
<td>QBGASW</td>
<td>Changed Pages Written</td>
<td>DGO1418</td>
<td></td>
</tr>
<tr>
<td>QBGAWC</td>
<td>Clean Pages Written</td>
<td>DGO1417</td>
<td></td>
</tr>
<tr>
<td>QBGAXD</td>
<td>Read (Cross Invalidation) - Data Returned</td>
<td>DGO1410</td>
<td></td>
</tr>
</tbody>
</table>

Table 17. Accounting - Locking Activity

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
<th>Exception</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALCLKET</td>
<td>Lock Escalations</td>
<td>DGO0190</td>
<td></td>
</tr>
<tr>
<td>ALRSUSLL</td>
<td>Number of Lock and Latch Suspensions</td>
<td>DGO0179</td>
<td></td>
</tr>
<tr>
<td>ALRSUSP</td>
<td>Total Suspensions</td>
<td>DGO0178</td>
<td></td>
</tr>
<tr>
<td>QTXACHG</td>
<td>Change Requests</td>
<td>DGO0186</td>
<td></td>
</tr>
<tr>
<td>QTXACLNO</td>
<td>Claim Requests</td>
<td>DGO0192</td>
<td></td>
</tr>
<tr>
<td>QTXACLUN</td>
<td>Unsuccessful Claim Requests</td>
<td>DGO0193</td>
<td></td>
</tr>
<tr>
<td>QTXADEA</td>
<td>Deadlocks</td>
<td>DGO0176</td>
<td></td>
</tr>
<tr>
<td>QTXADRNO</td>
<td>Drain Requests</td>
<td>DGO0194</td>
<td></td>
</tr>
<tr>
<td>QTXADRUN</td>
<td>Unsuccessful Drain Requests</td>
<td>DGO0195</td>
<td></td>
</tr>
<tr>
<td>QTXAIRLM</td>
<td>Other IRLM Requests</td>
<td>DGO0187</td>
<td></td>
</tr>
<tr>
<td>QTXALES</td>
<td>Lock Escalations - shared</td>
<td>DGO0188</td>
<td></td>
</tr>
<tr>
<td>QTXALEX</td>
<td>Lock Escalations - Exclusive</td>
<td>DGO0189</td>
<td></td>
</tr>
<tr>
<td>QTXALOCK</td>
<td>Lock Requests</td>
<td>DGO0183</td>
<td></td>
</tr>
<tr>
<td>QTXANPL</td>
<td>Maximum Page or Row Locks Held</td>
<td>DGO0191</td>
<td></td>
</tr>
<tr>
<td>QTXAQRY</td>
<td>Query Requests</td>
<td>DGO0185</td>
<td></td>
</tr>
<tr>
<td>QTXASLAT</td>
<td>Suspensions - Latch</td>
<td>DGO0181</td>
<td></td>
</tr>
</tbody>
</table>
### Table 17. Accounting - Locking Activity (continued)

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
<th>Exception</th>
</tr>
</thead>
<tbody>
<tr>
<td>QTXASLOC</td>
<td>Suspensions - Lock</td>
<td>DGO0180</td>
<td>●</td>
</tr>
<tr>
<td>QTXASOTH</td>
<td>Suspensions - Other</td>
<td>DGO0182</td>
<td></td>
</tr>
<tr>
<td>QTXATIM</td>
<td>Timeouts</td>
<td>DGO0175</td>
<td>●</td>
</tr>
<tr>
<td>QTXAUNLK</td>
<td>Unlock Requests</td>
<td>DGO0184</td>
<td></td>
</tr>
<tr>
<td>T3ANCHOR</td>
<td>Anchor</td>
<td>DGO1840</td>
<td></td>
</tr>
<tr>
<td>T3BPID</td>
<td>Buffer pool Id</td>
<td>DGO1845</td>
<td></td>
</tr>
<tr>
<td>T3COLL</td>
<td>Collection ID</td>
<td>DGO0842</td>
<td></td>
</tr>
<tr>
<td>T3CONST</td>
<td>Consistency Token</td>
<td>DGO0843</td>
<td></td>
</tr>
<tr>
<td>T3DBNAME</td>
<td>Database</td>
<td>DGO0844</td>
<td></td>
</tr>
<tr>
<td>T3DURAT</td>
<td>Duration</td>
<td>DGO0845</td>
<td></td>
</tr>
<tr>
<td>T3FUNCT</td>
<td>Function</td>
<td>DGO0846</td>
<td></td>
</tr>
<tr>
<td>T3HASH</td>
<td>Hash Class</td>
<td>DGO1843</td>
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</tr>
<tr>
<td>T3LOCKS</td>
<td>Count</td>
<td>DGO0847</td>
<td></td>
</tr>
<tr>
<td>T3OBNAME</td>
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### Table 19. Accounting - Query Parallelism

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### Table 21. Accounting - SQL Activity (DML, DCL, DDL)

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Table 21. Accounting - SQL Activity (DML, DCL, DDL) (continued)

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Table 21. Accounting - SQL Activity (DML, DCL, DDL) (continued)

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Table 22. Accounting - SQL Nested Activity

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Table 23. Accounting - Termination Conditions, Commit/Rollback, Incremental Binds

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Table 23. Accounting - Termination Conditions, Commit/Rollback, Incremental Binds (continued)

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Table 24. Accounting - Timing Data (Elapsed, TCB. Suspensions, and so on) (continued)

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Table 25. Statistics - Authorization Management

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Table 26. Statistics - Buffer Pool Activity

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Table 26. Statistics - Buffer Pool Activity (continued)

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<td>DGO0336</td>
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<tr>
<td>QBSTNGT</td>
<td>Unsuccessful Page Requests</td>
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<td>QBSTPID</td>
<td>Buffer Pool ID</td>
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<tr>
<td>QBSTPIO</td>
<td>Sequential Prefetch Reads</td>
<td>DGO0351</td>
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<tr>
<td>QBSTPL1</td>
<td>Prefetch Quantity Reduced To 1/2</td>
<td>DGO0387</td>
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<tr>
<td>QBSTPL2</td>
<td>Prefetch Quantity Reduced To 1/4</td>
<td>DGO0388</td>
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<tr>
<td>QBSTPQF</td>
<td>Reduced Parallel Query Requests</td>
<td>DGO0386</td>
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<td>QBSTPQO</td>
<td>Parallel Query Requests</td>
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<tr>
<td>QBSTPWS</td>
<td>Pages Written</td>
<td>DGO0368</td>
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<tr>
<td>QBSTREE</td>
<td>Prefetch Disabled No Read Engine</td>
<td>DGO0363</td>
<td>●</td>
</tr>
<tr>
<td>QBSTPIO</td>
<td>Synchronous Reads Total</td>
<td>DGO0346</td>
<td>●</td>
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<tr>
<td>QBSTRPI</td>
<td>Page-ins Required for Read I/O</td>
<td>DGO0815</td>
<td>●</td>
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<td>QBSTRTO</td>
<td>DFHSM Recall Timeouts</td>
<td>DGO0337</td>
<td>●</td>
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<td>QBSTSEQ</td>
<td>Sequential Prefetch Requested</td>
<td>DGO0350</td>
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<td>QBSTSGT</td>
<td>Getpage Request Sequential Access Only</td>
<td>DGO0344</td>
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<td>QBSTSIO</td>
<td>Synchronous Reads Sequential Access Only</td>
<td>DGO0347</td>
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<td>QBSTSPD</td>
<td>Prefetch Disabled No Buffer</td>
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<td>QBSTSPP</td>
<td>Sequential Prefetch Pages Read</td>
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<td>QBSTSWS</td>
<td>Buffer Updates</td>
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<tr>
<td>QBSTVPA</td>
<td>Alter Buffer Pool Expansions and Contractions</td>
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<tr>
<td>QBSTVPL</td>
<td>Buffers Allocated for Virtual Buffer Pool</td>
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<tr>
<td>QBSTWBVQ</td>
<td>Pages Not Written</td>
<td>DGO0398</td>
<td>●</td>
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<tr>
<td>QBSTWDRP</td>
<td>Pages Marked To Destruct</td>
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<td>●</td>
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<td>QBSTWEE</td>
<td>Write Engine Not Available</td>
<td>DGO0375</td>
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<tr>
<td>QBSTWFD</td>
<td>Workfile Request Rejected - Low Buffers</td>
<td>DGO0392</td>
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<tr>
<td>QBSTWFF</td>
<td>Degraded - Low Buffers</td>
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<td>QBSTWFM</td>
<td>Maximum Concurrent Work Files</td>
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<td>QBSTWFR</td>
<td>Merge Passes Requested</td>
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<td>QBSTWFT</td>
<td>Requested for All Merge Pass</td>
<td>DGO0393</td>
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### Table 26. Statistics - Buffer Pool Activity (continued)

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<tr>
<td>QBSTWIO</td>
<td>Asynchronous Writes</td>
<td>DGO0371</td>
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<tr>
<td>QBSTWKPD</td>
<td>Prefetch Not Scheduled - Zero Quantity</td>
<td>DGO0396</td>
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<tr>
<td>QBSTWPI</td>
<td>Page-ins Required for Write I/O</td>
<td>DGO0816</td>
<td>●</td>
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<tr>
<td>QBSTXFL</td>
<td>Buffer Pool Full</td>
<td>DGO0333</td>
<td>●</td>
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<tr>
<td>QBSTXFV</td>
<td>Virtual Storage Unavailable</td>
<td>DGO0334</td>
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<tr>
<td>QBSTXIS</td>
<td>Prefetch I/O Streams, Concurrent Str. - HWM</td>
<td>DGO0383</td>
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<tr>
<td>SBRBUPW</td>
<td>Buffer Updates / Pages Written</td>
<td>DGO0369</td>
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<td>SBRBUTP</td>
<td>Virtual Buffer Pool Pages in Use (%)</td>
<td>DGO0805</td>
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<td>SBRGPRIO</td>
<td>Getpage per Synchronous Read Random</td>
<td>DGO0349</td>
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<tr>
<td>SBRPPRIO</td>
<td>Seq. Prefetch Pages Read / Seq. Prefetch Read</td>
<td>DGO0353</td>
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<tr>
<td>SBRPWIO</td>
<td>Pages Written per Write I/O</td>
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<tr>
<td>SDPPPIO</td>
<td>Dynamic Prefetch Pages Read / Dyn. Pref. Read</td>
<td>DGO0361</td>
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<td>SDGETRAN</td>
<td>Getpage Request - Random</td>
<td>DGO0345</td>
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<tr>
<td>SDLPPPIO</td>
<td>List Prefetch Pages Read / List Prefetch Read</td>
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<td>SDTRAN</td>
<td>Synchronous Reads - Random</td>
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### Table 27. Statistics - Data Capture Activity

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<tr>
<td>QWSDCDDD</td>
<td>Data Descriptions Returned</td>
<td>DGO0634</td>
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<tr>
<td>QWSDCDLR</td>
<td>Data Rows Returned</td>
<td>DGO0632</td>
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<td>QWSDCDLC</td>
<td>Log Records Captured</td>
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<tr>
<td>QWSDCDLR</td>
<td>Log Reads Performed</td>
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<tr>
<td>QWSDCDMB</td>
<td>Describes Performed</td>
<td>DGO0633</td>
<td></td>
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<tr>
<td>QWSDCDRR</td>
<td>Log Records Returned</td>
<td>DGO0631</td>
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<td>QWSDCDTB</td>
<td>Tables Returned</td>
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### Table 28. Statistics - Data Sharing Locking Activity

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<tr>
<td>QTGSCSNP</td>
<td>P-lock Negotiation - Change</td>
<td>DGO1335</td>
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<tr>
<td>QTGSCPLK</td>
<td>P-locks - Change Requests</td>
<td>DGO1319</td>
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<tr>
<td>QTGSCSLM</td>
<td>Synchronous XES - Change Requests</td>
<td>DGO1321</td>
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<tr>
<td>QTGSDRTA</td>
<td>Incompatible Retained Lock</td>
<td>DGO1327</td>
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<tr>
<td>QTGSFUSE</td>
<td>Suspensions - False Contention</td>
<td>DGO1326</td>
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<tr>
<td>QTGSGLO</td>
<td>Suspensions - IRLM Global Contention</td>
<td>DGO1324</td>
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<td>QTGSKIDS</td>
<td>Asynchronous XES - Resources</td>
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Table 28. Statistics - Data Sharing Locking Activity (continued)

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<td>QTGSLPLK</td>
<td>P-locks - Lock Requests</td>
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<td>QTGSLSLM</td>
<td>Synchronous XES - Lock Requests</td>
<td>DGO1320</td>
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<tr>
<td>QTGSNTFR</td>
<td>Notify Messages Received</td>
<td>DGO1329</td>
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<td>QTGSNTFY</td>
<td>Notify Messages Sent</td>
<td>DGO1328</td>
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<td>QTGSOJPIE</td>
<td>P-lock Negotiation - Other</td>
<td>DGO1320</td>
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<tr>
<td>QTGSPEMX</td>
<td>P-Lock/Notify Exists - Maximum Engines</td>
<td>DGO1330</td>
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<tr>
<td>QTGSPGPE</td>
<td>P-lock Negotiation - Page</td>
<td>DGO1331</td>
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<tr>
<td>QTGSPPPPE</td>
<td>P-lock Negotiation - Pageset/Partition</td>
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<tr>
<td>QTGSSGLO</td>
<td>Suspensions - Global Contention</td>
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<td>QTGSUSLM</td>
<td>Synchronous XES - Unlock Requests</td>
<td>DGO1322</td>
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<tr>
<td>SBUFFRAT</td>
<td>Buffer Pool Hit Ratio (%)</td>
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<td>SGLOBRAT</td>
<td>Global Contention Rate (%)</td>
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Table 29. Statistics - DB2 Application Programming Interface

<table>
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<th>Field name</th>
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<tr>
<td>QWSDSCA</td>
<td>Abends</td>
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<td>QWSDSCCO</td>
<td>Command Requests</td>
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<td>QWSDSCRA</td>
<td>READA Requests</td>
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<td>QWSDSCRS</td>
<td>READS Requests</td>
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<td>QWSDSCU</td>
<td>Unrecognized</td>
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<td>QWSDSCWR</td>
<td>WRITE Requests</td>
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<tr>
<td>SDIFITOT</td>
<td>Total number of calls made to IFI</td>
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Table 30. Statistics - DB2 Commands

<table>
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<th>Field name</th>
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<th>Help panel name</th>
<th>Exception</th>
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<tr>
<td>Q9STCTRA</td>
<td>Stop DB2</td>
<td>DGO0552</td>
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<tr>
<td>Q9STCTRB</td>
<td>Term Utility</td>
<td>DGO0557</td>
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<tr>
<td>Q9STCTRC</td>
<td>Display Trace</td>
<td>DGO0539</td>
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<tr>
<td>Q9STCTRD</td>
<td>RESET GENERICCLU</td>
<td>DGO1545</td>
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<tr>
<td>Q9STCTRE</td>
<td>Start RLIMIT</td>
<td>DGO0548</td>
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<tr>
<td>Q9STCTRF</td>
<td>Stop RLIMIT</td>
<td>DGO0553</td>
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<tr>
<td>Q9STCTRG</td>
<td>DISPLAY RLIMIT</td>
<td>DGO0540</td>
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<tr>
<td>Q9STCTRH</td>
<td>Modify Trace</td>
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<tr>
<td>Q9STCTRI</td>
<td>Start DDF</td>
<td>DGO0549</td>
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<td>Q9STCTRJ</td>
<td>Stop DDF</td>
<td>DGO0554</td>
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<tr>
<td>Q9STCTRK</td>
<td>Cancel DDF Thread</td>
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Table 30. Statistics - DB2 Commands (continued)

<table>
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<td>Q9STCTRL</td>
<td>Display Location</td>
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<td>Q9STCTRM</td>
<td>Archive Log</td>
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<td>Q9STCTRN</td>
<td>Alter Bufferpool</td>
<td>DGO0544</td>
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<tr>
<td>Q9STCTRO</td>
<td>Display Bufferpool</td>
<td>DGO0543</td>
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<td>Q9STCTRP</td>
<td>Set Archive</td>
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<td>Q9STCTRQ</td>
<td>Display Archive</td>
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<td>Q9STCTRR</td>
<td>Reset Indoubt</td>
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<td>Q9STCTRS</td>
<td>ALTER GROUPBUFFERPOOL</td>
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<td>Q9STCTRT</td>
<td>DISPLAY GROUPBUFFERPOOL</td>
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<td>Q9STCTRU</td>
<td>DISPLAY PROCEDURE</td>
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<td>Q9STCTRV</td>
<td>START PROCEDURE</td>
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<td>Q9STCTRW</td>
<td>STOP PROCEDURE</td>
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<td>Q9STCTRX</td>
<td>DISPLAY GROUP</td>
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<td>Q9STCTR0</td>
<td>Display Database</td>
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<td>Q9STCTR1</td>
<td>Display Thread</td>
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<td>Q9STCTR2</td>
<td>Display Utility</td>
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<td>Q9STCTR3</td>
<td>Recover BSDS</td>
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<td>Q9STCTR4</td>
<td>Recover Indoubt</td>
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<td>Q9STCTR5</td>
<td>Start Database</td>
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<td>Q9STCTR6</td>
<td>Start Trace</td>
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<td>Q9STCTR7</td>
<td>Start DB2</td>
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<td>Q9STCTR8</td>
<td>Stop Database</td>
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<td>Stop Trace</td>
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<td>Q9STEROR</td>
<td>Unrecognized Commands</td>
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<td>SDSTTOTL</td>
<td>Total number of DB2 commands issued</td>
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Table 31. Statistics - DB2 Destination Data

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<td>GTF Not Written</td>
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<td>SDIGTFRA</td>
<td>GTF Not Accepted</td>
<td>DGO0597</td>
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<td>SDIGTFWF</td>
<td>GTF Write Failure</td>
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<td>SDIGTFWR</td>
<td>GTF Written</td>
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<td>OP1 Not Written</td>
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<td>OP1 Not Accepted</td>
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<td>OP1 Written</td>
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<td>SDIOP2NW</td>
<td>OP2 Not Written</td>
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<td>SDIOP2RA</td>
<td>OP2 Not Accepted</td>
<td>DGO0604</td>
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<td>SDIOP2WR</td>
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<td>SDIOP3NW</td>
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### Table 31. Statistics - DB2 Destination Data (continued)

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<td>SDIOP4NW</td>
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<td>SDIOP4WR</td>
<td>OP4 Written</td>
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<td>SDIOP5NW</td>
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<td>SDIOP5RA</td>
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<td>SDIOP5WR</td>
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<td>SDIRTTWR</td>
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<td>SDISMFBF</td>
<td>SMF Buffer Overrun</td>
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<td>SDISMFWF</td>
<td>SMF Write Failure</td>
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<td>SDTOTNA</td>
<td>Total number of IFC records not accepted</td>
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<td>Total number of IFC records succ. written</td>
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<td>SDTOTWF</td>
<td>Total number of IFC write failures</td>
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### Table 32. Statistics - DB2 Instrumentation

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<td>System Parameters - Buffer Pools</td>
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<td>System Parameters - Buffer Pools</td>
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<td>Audit (not written)</td>
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<td>Database Related (written)</td>
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Table 32. Statistics - DB2 Instrumentation (continued)

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<td>SDISTPN</td>
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<td>Dsnzparm (written)</td>
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<td>SDTSCRNW</td>
<td>Total count of all DB2 records not written</td>
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<td>SDTSCRWSW</td>
<td>Total count of all DB2 records written</td>
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Table 33. Statistics - Distributed Data Facility - per Location

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<td>QLSTBKRC</td>
<td>Two Phase Backout Requests Received</td>
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<td>QLSTBKSE</td>
<td>Two Phase Backout Requests</td>
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<td>QLSTBRBF</td>
<td>Blocks Received</td>
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<td>QLSTBROW</td>
<td>Message Buffer Rows</td>
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<td>QLSTBTBF</td>
<td>Blocks Sent</td>
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<td>QLSTBYTR</td>
<td>Bytes Received</td>
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<td>Bytes Sent</td>
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<td>QLSTCBLB</td>
<td>Limited Block Fetch</td>
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<td>QLSTCNVQ</td>
<td>Conversations Queued</td>
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<td>QLSTCNVR</td>
<td>Conversations Received</td>
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<td>Commits Received</td>
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<td>Commits Sent</td>
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<td>Commits Performed</td>
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<td>QLSTCRRRC</td>
<td>Two Phase Commit Requests Received</td>
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<td>QLSTCRRSE</td>
<td>Two Phase Commit Requests Sent</td>
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<td>QLSTINDT</td>
<td>Thread Went Indoubt</td>
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<td>QLSTLARC</td>
<td>Last Agent Requests Received</td>
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<td>QLSTLASE</td>
<td>Last Agent Requests Sent</td>
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<td>QLSTLOCN</td>
<td>Remote Location</td>
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<td>QLSTMSGR</td>
<td>Messages Received</td>
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<td>Messages Sent</td>
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<td>Prepare Requests Received</td>
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<td>Prepare Requests Sent</td>
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<td>QLSTRBND</td>
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### Table 33. Statistics - Distributed Data Facility - per Location (continued)

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<td>QLSTROWS</td>
<td>Rows Sent</td>
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<td>QLSTRRRC</td>
<td>Forget Responses Received</td>
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<td>QLSTRRSE</td>
<td>Forget Responses Sent</td>
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<td>QLSTSQLR</td>
<td>SQL Statements Received</td>
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<td>QLSTSQLS</td>
<td>SQL Statements Sent</td>
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<td>QLSTTRNS</td>
<td>Transactions Sent</td>
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<td>QLSTVNRC</td>
<td>Backout Responses Received</td>
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<td>QLSTVYRC</td>
<td>Commit Responses Received</td>
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### Table 34. Statistics - Distributed Data Facility - Global

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<td>QDSTCNAT</td>
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<td>QDSTCSTR</td>
<td>Cold Start Connections</td>
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<td>QDSTHWAT</td>
<td>Active DBATs - high water mark</td>
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<td>QDSTHWDT</td>
<td>Total DBATs - high water mark</td>
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<td>QDSTQCIT</td>
<td>Inactive DBATs - Currently</td>
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<td>QDSTQCRT</td>
<td>Conversions Deallocated-Maximum Connected</td>
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<td>QDSTQDBT</td>
<td>DBAT Queued-Maximum Active</td>
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<td>QDSTQMIT</td>
<td>Inactive DBATs - HWM</td>
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<td>QDSTRSAT</td>
<td>Resynchronization Attempted</td>
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<td>QDSTRSSU</td>
<td>Resynchronization Succeeded</td>
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<td>QDSTWSTR</td>
<td>Warm Start Connections</td>
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### Table 35. Statistics - EDM Pool Activity

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<td>QISECTG</td>
<td>Requests for CT Sections</td>
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<td>QISECTL</td>
<td>CT Section Not Found In EDM Pool</td>
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<td>QISEDBD</td>
<td>Pages Used for DBD</td>
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<td>QISEDBDG</td>
<td>Requests for DBD Sections</td>
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<td>QISEDBDL</td>
<td>DBD Section Not Found In EDM Pool</td>
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<td>QISEDYNI</td>
<td>Inserts for Dynamic Cache</td>
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Table 35. Statistics - EDM Pool Activity (continued)

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<td>QISEFAIL</td>
<td>EDM Pool Full</td>
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<td>QISEFREE</td>
<td>Free Pages In Free Chain</td>
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<td>Pages Used for PT</td>
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<td>QISEKTG</td>
<td>Requests for PT Sections</td>
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<td>Pages Used for Skpt</td>
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<td>QXSTDEXP</td>
<td>Kept Dynamic Statement Discarded</td>
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<td>QXSTDINV</td>
<td>Dynamic Cache Statement Purged</td>
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<td>Prepares Satisfied</td>
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<td>Prepares Implicit</td>
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<td>Prepares Avoided</td>
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<td>SERBUTP</td>
<td>EDM Pool Pages In Use (%)</td>
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<td>SERCTRLR</td>
<td>CT Requests / CT Not In EDM Pool</td>
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<td>SERDBLR</td>
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Table 36. Statistics - Global Group Buffer Pool Statistics

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<td>Checkpoint Interval (Minutes)</td>
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<td>QBGBGCT</td>
<td>Class Castout Threshold (%)</td>
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<td>QBGBGDR</td>
<td>Actual Directory Entries</td>
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<td>QBGBGDT</td>
<td>Actual Data Entries</td>
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<td>QBGBGGT</td>
<td>Buffer Pool Castout Threshold (%)</td>
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<td>QBGBGR1</td>
<td>Current Directory to Data Ratio</td>
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<td>QBGBGR2</td>
<td>Pending Directory to Data Ratio</td>
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<td>Allocated Buffer Pool Size (4k)</td>
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<td>Castout</td>
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<td>Directory Entry</td>
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<td>Directory Entry Reclaim</td>
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<td>Group Buffer Pool Name</td>
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<td>Read Miss Cache Full</td>
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<td>Read Hit</td>
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<td>Read Miss Name Assignment</td>
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Table 36. Statistics - Global Group Buffer Pool Statistics (continued)

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<td>QW0254TE</td>
<td>Data Entry</td>
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<tr>
<td>QW0254TR</td>
<td>Data Entry Reclaim</td>
<td>DGO1570</td>
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<tr>
<td>QW0254WC</td>
<td>Clean Page Write Hit</td>
<td>DGO1569</td>
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<tr>
<td>QW0254WF</td>
<td>Write Miss Cache Full</td>
<td>DGO1572</td>
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<tr>
<td>QW0254WH</td>
<td>Changed Page Write Hit</td>
<td>DGO1568</td>
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<tr>
<td>QW0254XR</td>
<td>XI Directory Entry Reclaim</td>
<td>DGO1573</td>
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Table 37. Statistics - Group Buffer Pools Activity

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
<th>Exception</th>
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<tbody>
<tr>
<td>QBGLAC</td>
<td>Clean Pages Written Asynchronously</td>
<td>DGO1356</td>
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<tr>
<td>QBGLAD</td>
<td>Asynchronous Reads - Data Returned</td>
<td>DGO1342</td>
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<tr>
<td>QBGLAN</td>
<td>Asynchronous reads - No read/write interest</td>
<td>DGO1344</td>
<td></td>
</tr>
<tr>
<td>QBGLAW</td>
<td>Changed Pages Written Asynchronously</td>
<td>DGO1346</td>
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<tr>
<td>QBGLAX</td>
<td>Register page list request</td>
<td>DGO1656</td>
<td></td>
</tr>
<tr>
<td>QBGLAY</td>
<td>Changed pages - Read after register page list</td>
<td>DGO1657</td>
<td></td>
</tr>
<tr>
<td>QBGLAZ</td>
<td>Clean pages - Read after register page list</td>
<td>DGO1658</td>
<td></td>
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<tr>
<td>QBGLCC</td>
<td>Read Castout Class</td>
<td>DGO1731</td>
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<tr>
<td>QBGLCK</td>
<td>GBP Checkpoints Triggered</td>
<td>DGO1733</td>
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<tr>
<td>QBGLCN</td>
<td>Castout Engine Unavailable</td>
<td>DGO1350</td>
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<tr>
<td>QBGLCS</td>
<td>Read Castout Statistics</td>
<td>DGO1732</td>
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<td>QBGLCT</td>
<td>Castout Class Threshold</td>
<td>DGO1348</td>
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<td>QBGLDG</td>
<td>Unregister Page</td>
<td>DGO1729</td>
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<td>QBGLDN</td>
<td>Delete Name</td>
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<td>QBGLGN</td>
<td>Group Bufferpool ID</td>
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<td>QBGLGT</td>
<td>Group Bufferpool Castout Threshold</td>
<td>DGO1349</td>
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<td>QBGLMD</td>
<td>Synchronous Reads Not Found - Data Returned</td>
<td>DGO1339</td>
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<tr>
<td>QBGLMN</td>
<td>Synchr. Reads Not Found - No R/W Interest</td>
<td>DGO1341</td>
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<tr>
<td>QBGLMR</td>
<td>Sync. Read (Not Found) - No Data Returned</td>
<td>DGO1340</td>
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<tr>
<td>QBGLOS</td>
<td>Read Storage Statistics</td>
<td>DGO1760</td>
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<td>QBGLRB</td>
<td>Participation in GBP Rebuild</td>
<td>DGO1734</td>
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<tr>
<td>QBGLRC</td>
<td>Pages Castout</td>
<td>DGO1347</td>
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<tr>
<td>QBGLRD</td>
<td>Read Directory Info</td>
<td>DGO1727</td>
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<tr>
<td>QBGLRF</td>
<td>Read Failed - No Storage</td>
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## Table 37. Statistics - Group Buffer Pools Activity (continued)

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<td>QBGLRG</td>
<td>Register Page</td>
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<td>QBGLSU</td>
<td>Write Engine Unavailable</td>
<td>DGO1351</td>
<td>●</td>
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<tr>
<td>QBGLSW</td>
<td>Changed Pages Written Synchronously</td>
<td>DGO1345</td>
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<td>QBGLUN</td>
<td>Unlock Castout</td>
<td>DGO1730</td>
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<tr>
<td>QBGLWC</td>
<td>Clean Pages Written Synchronously</td>
<td>DGO1355</td>
<td>●</td>
</tr>
<tr>
<td>QBGLWF</td>
<td>Write Failed - No Storage</td>
<td>DGO1353</td>
<td>●</td>
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<tr>
<td>QBGLXD</td>
<td>Synchr. Reads Cross Valid. - Data Returned</td>
<td>DGO1336</td>
<td>●</td>
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<tr>
<td>QBGLXN</td>
<td>Synchr. Reads Cross Valid. - No R/W Interest</td>
<td>DGO1338</td>
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<td>QBGLXR</td>
<td>Synchronous Read (XI) - No Data Returned</td>
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## Table 38. Statistics - Locking Activity

<table>
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<th>Exception</th>
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<tr>
<td>QTXACHG</td>
<td>Change Requests</td>
<td>DGO0480</td>
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<tr>
<td>QTXACLNO</td>
<td>Claim Requests</td>
<td>DGO0486</td>
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<tr>
<td>QTXACLUN</td>
<td>Unsuccessful Claim Requests</td>
<td>DGO0487</td>
<td>●</td>
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<tr>
<td>QTXADEA</td>
<td>Deadlocks</td>
<td>DGO0476</td>
<td>●</td>
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<tr>
<td>QTXADRNO</td>
<td>Drain Requests</td>
<td>DGO0484</td>
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<tr>
<td>QTXADRUN</td>
<td>Unsuccessful Drain Requests</td>
<td>DGO0485</td>
<td>●</td>
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<tr>
<td>QTXAIRLM</td>
<td>Other Requests</td>
<td>DGO0481</td>
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<tr>
<td>QTXALES</td>
<td>Lock Escalation (shared)</td>
<td>DGO0482</td>
<td>●</td>
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<tr>
<td>QTXALEX</td>
<td>Lock Escalation (exclusive)</td>
<td>DGO0483</td>
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<tr>
<td>QTXALOCK</td>
<td>Lock Requests</td>
<td>DGO0477</td>
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<tr>
<td>QTXAQRY</td>
<td>Query Requests</td>
<td>DGO0479</td>
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<tr>
<td>QTXASLAT</td>
<td>Suspensions (latch only)</td>
<td>DGO0473</td>
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<tr>
<td>QTXASLOC</td>
<td>Suspensions (lock only)</td>
<td>DGO0472</td>
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<tr>
<td>QTXASOTH</td>
<td>Suspensions (other)</td>
<td>DGO0474</td>
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<tr>
<td>QTXATIM</td>
<td>Timeouts</td>
<td>DGO0475</td>
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<tr>
<td>QTXAUNLK</td>
<td>Unlock Requests</td>
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<tr>
<td>SLCLKET</td>
<td>Lock Escalations</td>
<td>DGO0768</td>
<td>●</td>
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<td>SLRLCRLS</td>
<td>Lock and Change Requests per Lock Suspension</td>
<td>DGO0808</td>
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<td>SLRSUSP</td>
<td>Suspensions (all)</td>
<td>DGO0471</td>
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## Table 39. Statistics - Log Activity

<table>
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<tr>
<th>Field name</th>
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<th>Exception</th>
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<tbody>
<tr>
<td>QISTALR</td>
<td>Archive Log Read Allocations</td>
<td>DGO0519</td>
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<tr>
<td>QISTALW</td>
<td>Archive Log - Write Allocations</td>
<td>DGO0520</td>
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<tr>
<td>QISTBFFL</td>
<td>Control Intervals Created</td>
<td>DGO0518</td>
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### Table 39. Statistics - Log Activity (continued)

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
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<th>Exception</th>
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<tbody>
<tr>
<td>QJSTBFWR</td>
<td>Write Output Log Buffers</td>
<td>DGO0515</td>
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<tr>
<td>QJSTBSDS</td>
<td>Total BSDS Access Request</td>
<td>DGO0516</td>
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<tr>
<td>QJSTCIOF</td>
<td>Archive Log - Control Intervals Offloaded</td>
<td>DGO0807</td>
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<tr>
<td>QJSTLAMA</td>
<td>Look Ahead Mounts Attempted</td>
<td>DGO0512</td>
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<tr>
<td>QJSTLAMS</td>
<td>Look Ahead Mount Successful</td>
<td>DGO0513</td>
<td></td>
</tr>
<tr>
<td>QJSTRACT</td>
<td>Reads Satisfied - Active Log</td>
<td>DGO0505</td>
<td>●</td>
</tr>
<tr>
<td>QJSTRARH</td>
<td>Reads Satisfied - Archive Log</td>
<td>DGO0507</td>
<td>●</td>
</tr>
<tr>
<td>QJSTBUF</td>
<td>Reads Satisfied - Output Buffer</td>
<td>DGO0503</td>
<td>●</td>
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<tr>
<td>QJSTTVC</td>
<td>Reads Delayed - Tape Volume Contention</td>
<td>DGO0510</td>
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<tr>
<td>QJSTWNRW</td>
<td>Write-no-wait</td>
<td>DGO0514</td>
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<tr>
<td>QJSTWTB</td>
<td>Unavailable Output Log Buffers</td>
<td>DGO0517</td>
<td>●</td>
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<tr>
<td>QJSTWUR</td>
<td>Reads Delayed - Unavailable Resource</td>
<td>DGO0511</td>
<td>●</td>
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<tr>
<td>SARLRACT</td>
<td>Reads Satisfied - Active Log(%)</td>
<td>DGO0506</td>
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<tr>
<td>SARLRARC</td>
<td>Reads Satisfied - Archive Log(%)</td>
<td>DGO0508</td>
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<tr>
<td>SARLRBUF</td>
<td>Reads Satisfied - Output Buffer(%)</td>
<td>DGO0504</td>
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<tr>
<td>SARWBAC</td>
<td>Out Log Buf Writes / Act. Log Cntl I'val</td>
<td>DGO0806</td>
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### Table 40. Statistics - Miscellaneous

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<th>Field name</th>
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<tr>
<td>QISTCOLS</td>
<td>Columns Bypassed</td>
<td>DGO0770</td>
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<tr>
<td>QWSDLR</td>
<td>Log RBA</td>
<td>DGO0636</td>
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<td>QWSDRINV</td>
<td>Reason Invoke</td>
<td>DGO0637</td>
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### Table 41. Statistics - Open/Close Activity

<table>
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<th>Field name</th>
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<th>Exception</th>
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<tr>
<td>QTDSDRN</td>
<td>Data Sets Closed Threshold Reached</td>
<td>DGO0426</td>
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<tr>
<td>QTDSOPN</td>
<td>Open Data Sets - Current</td>
<td>DGO0418</td>
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<tr>
<td>QTMAXDS</td>
<td>Open Data Sets - HWM</td>
<td>DGO0417</td>
<td>●</td>
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<tr>
<td>QTMAXPB</td>
<td>Open Data Sets - Not In Use, Not Closed (HWM)</td>
<td>DGO0422</td>
<td>●</td>
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<tr>
<td>QTPCCT</td>
<td>Data Sets Converted R/W To R/O</td>
<td>DGO0755</td>
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<tr>
<td>QTREOPN</td>
<td>Successful Logical Reopens</td>
<td>DGO0429</td>
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<tr>
<td>QTSILWDD</td>
<td>Open DSs - Not In Use, Not Closed (current)</td>
<td>DGO0420</td>
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<tr>
<td>SDINUSEC</td>
<td>Open Data Sets In Use</td>
<td>DGO0757</td>
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Table 42. Statistics - Plan/Package Processing

<table>
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<tr>
<td>QTABIND</td>
<td>Autobind Plan Successful</td>
<td>DGO0442</td>
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<tr>
<td>QTABINDA</td>
<td>Autobind Plan Attempts</td>
<td>DGO0441</td>
<td>●</td>
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<tr>
<td>QTALLOC</td>
<td>Plan Allocation Successful</td>
<td>DGO0431</td>
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</tr>
<tr>
<td>QTALLOCA</td>
<td>Plan Allocation Attempts</td>
<td>DGO0430</td>
<td></td>
</tr>
<tr>
<td>QTAUTOBA</td>
<td>Auto Bind Package Attempts</td>
<td>DGO0444</td>
<td>●</td>
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<tr>
<td>QTBINDA</td>
<td>Bind Plan Add Subcommands</td>
<td>DGO0435</td>
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<tr>
<td>QTBINDPA</td>
<td>Bind Package Add Subcommand</td>
<td>DGO0439</td>
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<tr>
<td>QTBINDPR</td>
<td>Bind Package Replace Subcommand</td>
<td>DGO0440</td>
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<tr>
<td>QTINVRID</td>
<td>Autobind Plan Invalid Resource ID</td>
<td>DGO0443</td>
<td>●</td>
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<tr>
<td>QTPKABND</td>
<td>Auto Bind Packages Successful</td>
<td>DGO0445</td>
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<td>QTPKALL</td>
<td>Package Allocation Successful</td>
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<td>QTPKALLA</td>
<td>Package Allocation Attempts</td>
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<td>QTPKGBD</td>
<td>Packages Bound</td>
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<td>QTPKGFRD</td>
<td>Free Package Successful</td>
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<td>QTPKGFRD</td>
<td>Rebind Package Successful</td>
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<td>QTPKLND</td>
<td>Plans Bound</td>
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<td>QTPLNFRD</td>
<td>Free Plan Successful</td>
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<td>QTPLNFB</td>
<td>Rebind Plan Successful</td>
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<td>QTRBINDA</td>
<td>Rebind Plan Attempts</td>
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<td>QTRBINDP</td>
<td>Rebind Package Subcommands</td>
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<td>QTRBINDPA</td>
<td>Rebind Package Attempts</td>
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<td>QTREBIND</td>
<td>Rebind Plan Subcommands</td>
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<td>QTTESTB</td>
<td>Test Binds No Plan-ID</td>
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Table 43. Statistics - Query Parallelism

<table>
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<th>Field description</th>
<th>Help panel name</th>
<th>Exception</th>
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<tbody>
<tr>
<td>QXCOORNO</td>
<td>One DB2 - COORDINATOR Parm = NO</td>
<td>DGO1672</td>
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<tr>
<td>QXDEGBUF</td>
<td>Fall To Sequential Mode (no buffer)</td>
<td>DGO0327</td>
<td>●</td>
</tr>
<tr>
<td>QXDEGCUR</td>
<td>Fall To Sequential Mode Cursor</td>
<td>DGO0748</td>
<td>●</td>
</tr>
<tr>
<td>QXDEGENC</td>
<td>MVS/ESA Enclave Services</td>
<td>DGO1359</td>
<td>●</td>
</tr>
<tr>
<td>QXDEGESA</td>
<td>Fall To Sequential Mode No ESA</td>
<td>DGO0747</td>
<td>●</td>
</tr>
<tr>
<td>QXISORR</td>
<td>One DB2 - Isolation Level</td>
<td>DGO1673</td>
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<tr>
<td>QXMAXDEG</td>
<td>Maximum Degree of Parallelism</td>
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<tr>
<td>QXNORGRP</td>
<td>Planned Parallel Degree</td>
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Table 43. Statistics - Query Parallelism (continued)

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<tr>
<td>QXREDGRP</td>
<td>Reduced Parallel Degree</td>
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<td>QXTOTGRP</td>
<td>Parallel Groups Executed</td>
<td>DGO0749</td>
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<tr>
<td>SDTOTPFL</td>
<td>Parallel Fall To Sequential</td>
<td>DGO0746</td>
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<td>SXXCRAT</td>
<td>Member Skipped (%)</td>
<td>DGO1798</td>
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Table 44. Statistics - RID List Processing

<table>
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<th>Exception</th>
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<tbody>
<tr>
<td>QISTRCUR</td>
<td>RID Blocks Allocated - Current</td>
<td>DGO0466</td>
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</tr>
<tr>
<td>QISTRHIG</td>
<td>RID Blocks Allocated - Maximum</td>
<td>DGO0465</td>
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</tr>
<tr>
<td>QISTRLLM</td>
<td>Terminated - RDS Limit Exceeded</td>
<td>DGO0468</td>
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<td>QISTRMAX</td>
<td>Terminated - Process Limit Exceeded</td>
<td>DGO0470</td>
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</tr>
<tr>
<td>QISTRPLM</td>
<td>Terminated - DM Limit Exceeded</td>
<td>DGO0469</td>
<td></td>
</tr>
<tr>
<td>QISTRSTG</td>
<td>Terminated - No Storage</td>
<td>DGO0467</td>
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<tr>
<td>SRTTERM</td>
<td>Number of Times RID List Processing Not Used</td>
<td>DGO0767</td>
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Table 45. Statistics - SQL Activity (DCL)

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
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<th>Exception</th>
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<tbody>
<tr>
<td>QXALOCC</td>
<td>Allocate Cursor</td>
<td>DGO1740</td>
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<td>QXALOCL</td>
<td>Associate Locators</td>
<td>DGO1739</td>
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<tr>
<td>QXCON1</td>
<td>Connect Type 1</td>
<td>DGO0296</td>
<td></td>
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<tr>
<td>QXCON2</td>
<td>Connect Type 2</td>
<td>DGO0297</td>
<td></td>
</tr>
<tr>
<td>QXGRANT</td>
<td>Grant</td>
<td>DGO0292</td>
<td></td>
</tr>
<tr>
<td>QXLOCK</td>
<td>Lock Table</td>
<td>DGO0291</td>
<td></td>
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<tr>
<td>QXREL</td>
<td>Release</td>
<td>DGO0298</td>
<td></td>
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<tr>
<td>QXREVOKE</td>
<td>Revoke</td>
<td>DGO0293</td>
<td></td>
</tr>
<tr>
<td>QXSETCDG</td>
<td>Set Current Degree</td>
<td>DGO0742</td>
<td></td>
</tr>
<tr>
<td>QXSETCON</td>
<td>Set Connection</td>
<td>DGO0299</td>
<td></td>
</tr>
<tr>
<td>QXSETCRL</td>
<td>Set Current Rules</td>
<td>DGO1357</td>
<td></td>
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<tr>
<td>QXSETHV</td>
<td>Set Host Variable</td>
<td>DGO0295</td>
<td></td>
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<tr>
<td>QXSETSQL</td>
<td>Set Current SQLID</td>
<td>DGO0294</td>
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<tr>
<td>SSCDCL</td>
<td>Total DCL</td>
<td>DGO0300</td>
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Table 46. Statistics - SQL Activity (DDL)

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<thead>
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<tr>
<td>QXALDAB</td>
<td>Alter Database</td>
<td>DGO0312</td>
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<tr>
<td>QXALTIX</td>
<td>Alter Index</td>
<td>DGO0310</td>
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<td>QXALTST</td>
<td>Alter Stogroup</td>
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### Table 46. Statistics - SQL Activity (DDL) (continued)

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<tr>
<td>QXALTTA</td>
<td>Alter Table</td>
<td>DGO0309</td>
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<tr>
<td>QXALTTS</td>
<td>Alter Tablespace</td>
<td>DGO0311</td>
<td></td>
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<tr>
<td>QXCMTON</td>
<td>Comment On</td>
<td>DGO0323</td>
<td></td>
</tr>
<tr>
<td>QXCRALS</td>
<td>Create Alias</td>
<td>DGO0308</td>
<td></td>
</tr>
<tr>
<td>QXCRDAB</td>
<td>Create Database</td>
<td>DGO0306</td>
<td></td>
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<tr>
<td>QXCRGTT</td>
<td>Temp. Table</td>
<td>DGO1671</td>
<td></td>
</tr>
<tr>
<td>QXCRINX</td>
<td>Create Index</td>
<td>DGO0302</td>
<td></td>
</tr>
<tr>
<td>QXCRSTG</td>
<td>Create Stogroup</td>
<td>DGO0307</td>
<td></td>
</tr>
<tr>
<td>QXCRSYN</td>
<td>Create Synonym</td>
<td>DGO0304</td>
<td></td>
</tr>
<tr>
<td>QXCRTAB</td>
<td>Create Table</td>
<td>DGO0301</td>
<td></td>
</tr>
<tr>
<td>QXCTABS</td>
<td>Create Tablespace</td>
<td>DGO0305</td>
<td></td>
</tr>
<tr>
<td>QXDEFVU</td>
<td>Create View</td>
<td>DGO0303</td>
<td></td>
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<tr>
<td>QXDRPAL</td>
<td>Drop Alias</td>
<td>DGO0321</td>
<td></td>
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<tr>
<td>QXDRPDB</td>
<td>Drop Database</td>
<td>DGO0319</td>
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<tr>
<td>QXDRPIX</td>
<td>Drop Index</td>
<td>DGO0315</td>
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<tr>
<td>QXDRPPKG</td>
<td>Drop Package</td>
<td>DGO0322</td>
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<tr>
<td>QXDRPST</td>
<td>Drop Stogroup</td>
<td>DGO0320</td>
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<td>QXDRPSY</td>
<td>Drop Synonym</td>
<td>DGO0317</td>
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<tr>
<td>QXDRPTA</td>
<td>Drop Table</td>
<td>DGO0314</td>
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<td>QXDRPTS</td>
<td>Drop Tablespace</td>
<td>DGO0318</td>
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<td>Drop View</td>
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<td>QXLABON</td>
<td>Label On</td>
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<td>QXRNTAB</td>
<td>Rename Table</td>
<td>DGO1828</td>
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<tr>
<td>SDTOTALT</td>
<td>Alters</td>
<td>DGO0743</td>
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<td>SDTOTCRT</td>
<td>Creates</td>
<td>DGO0745</td>
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<td>SDTOTDRP</td>
<td>Drops</td>
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<td>SSCDDL</td>
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### Table 47. Statistics - SQL Activity (DML)

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<th>Exception</th>
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<tbody>
<tr>
<td>QXCLOSE</td>
<td>Close Cursor</td>
<td>DGO0288</td>
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</tr>
<tr>
<td>QXDELETE</td>
<td>Delete</td>
<td>DGO0283</td>
<td></td>
</tr>
<tr>
<td>QXDESC</td>
<td>Describe</td>
<td>DGO0285</td>
<td></td>
</tr>
<tr>
<td>QXDSCRTB</td>
<td>Describe Table</td>
<td>DGO0286</td>
<td></td>
</tr>
<tr>
<td>QXFETCH</td>
<td>Fetch</td>
<td>DGO0289</td>
<td></td>
</tr>
<tr>
<td>QXINSRT</td>
<td>Insert</td>
<td>DGO0281</td>
<td></td>
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<tr>
<td>QXOPEN</td>
<td>Open Cursor</td>
<td>DGO0287</td>
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<tr>
<td>QXPREP</td>
<td>Prepare</td>
<td>DGO0284</td>
<td></td>
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<tr>
<td>QXSELECT</td>
<td>Select</td>
<td>DGO0280</td>
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### Table 47. Statistics - SQL Activity (DML) (continued)

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<th>Exception</th>
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<tbody>
<tr>
<td>QXUPDTE</td>
<td>Update</td>
<td>DGO0282</td>
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<tr>
<td>SSCDML</td>
<td>Total DML</td>
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### Table 48. Statistics - SQL Nested Activity

<table>
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<th>Exception</th>
</tr>
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<tbody>
<tr>
<td>QXCALL</td>
<td>Call Statements Executed</td>
<td>DGO1358</td>
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<tr>
<td>QXCALLAB</td>
<td>Procedure Abends</td>
<td>DGO1363</td>
<td>●</td>
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<tr>
<td>QXCALLRJ</td>
<td>Call Statement Rejected</td>
<td>DGO1365</td>
<td>●</td>
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<tr>
<td>QXCALLTO</td>
<td>CALL Statement Timeouts</td>
<td>DGO1364</td>
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### Table 49. Statistics - Subsystem Services

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
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<th>Exception</th>
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<tbody>
<tr>
<td>QWSDCKPT</td>
<td>System Event Checkpoint</td>
<td>DGO0535</td>
<td>●</td>
</tr>
<tr>
<td>Q3STABRT</td>
<td>Rollback</td>
<td>DGO0525</td>
<td>●</td>
</tr>
<tr>
<td>Q3STCOMM</td>
<td>Commits Phase 2</td>
<td>DGO0527</td>
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<tr>
<td>Q3STCTHD</td>
<td>Create Thread</td>
<td>DGO0522</td>
<td>●</td>
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<tr>
<td>Q3STCTHW</td>
<td>Queued At Create Thread</td>
<td>DGO0532</td>
<td>●</td>
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<tr>
<td>Q3STIDEN</td>
<td>Identify</td>
<td>DGO0521</td>
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<tr>
<td>Q3STINDT</td>
<td>Units of Recovery Gone Indoubt</td>
<td>DGO0529</td>
<td>●</td>
</tr>
<tr>
<td>Q3STMEOM</td>
<td>Subsystem Allied Memory End of Memory</td>
<td>DGO0534</td>
<td>●</td>
</tr>
<tr>
<td>Q3STMEOT</td>
<td>Subsystem Allied Memory End of Task</td>
<td>DGO0533</td>
<td>●</td>
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<tr>
<td>Q3STPREP</td>
<td>Commits Phase 1</td>
<td>DGO0526</td>
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<tr>
<td>Q3STRDON</td>
<td>Commits Read Only</td>
<td>DGO0528</td>
<td></td>
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<tr>
<td>Q3STRIUR</td>
<td>Units of Recovery Indoubt Resolved</td>
<td>DGO0530</td>
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<td>Q3STSIGN</td>
<td>Signon</td>
<td>DGO0523</td>
<td>●</td>
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<tr>
<td>Q3STSYNC</td>
<td>Synchs (single phase commit)</td>
<td>DGO0531</td>
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<td>Q3STTERM</td>
<td>Terminate</td>
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### Table 50. Statistics - Times

<table>
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<th>Field name</th>
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<th>Exception</th>
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<tbody>
<tr>
<td>SDFFSRBT</td>
<td>DDF Address Space SRB Time</td>
<td>DGO0498</td>
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<tr>
<td>SDDFTCBT</td>
<td>DDF Address Space TCB Time</td>
<td>DGO0497</td>
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<tr>
<td>SDDFTOTT</td>
<td>DDF Address Space Total Time</td>
<td>DGO0499</td>
<td>●</td>
</tr>
<tr>
<td>SDISRBT</td>
<td>IRLM SRB Time</td>
<td>DGO0495</td>
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</tr>
<tr>
<td>SDITCBT</td>
<td>IRLM TCB Time</td>
<td>DGO0494</td>
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<td>SDITOTT</td>
<td>IRLM Total Time</td>
<td>DGO0496</td>
<td>●</td>
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<tr>
<td>SDSRBT</td>
<td>Database Services SRB Time</td>
<td>DGO0492</td>
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### Table 50. Statistics - Times (continued)

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<td>SDTCBT</td>
<td>Database Services TCB Time</td>
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<td>SDTLSRBT</td>
<td>Total</td>
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<td>SDTLTCTBT</td>
<td>Total</td>
<td>DGO0500</td>
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<tr>
<td>SDTLTOTT</td>
<td>Total</td>
<td>DGO0502</td>
<td></td>
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<td>SDTOTT</td>
<td>Database Services Total Time</td>
<td>DGO0493</td>
<td>●</td>
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<td>SSSRBT</td>
<td>System Services SRB Time</td>
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<tr>
<td>SSTCBT</td>
<td>System Services TCB Time</td>
<td>DGO0488</td>
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<td>SSTOTT</td>
<td>System Services Total Time</td>
<td>DGO0490</td>
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### Table 51. System Parameters - Application Programming Defaults

<table>
<thead>
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<tr>
<td>QWPBAGID</td>
<td>ASCII GBCS CCSID</td>
<td>DGO1741</td>
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<tr>
<td>QWPBAMID</td>
<td>ASCII MBCS CCSID</td>
<td>DGO1742</td>
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<tr>
<td>QWPBAR</td>
<td>Default Decimal Arithmetic</td>
<td>DGO1748</td>
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<tr>
<td>QWPBASID</td>
<td>ASCII SBCS CCSID</td>
<td>DGO1743</td>
</tr>
<tr>
<td>QWPBCHAR</td>
<td>Default Character Set</td>
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<tr>
<td>QWPBDATE</td>
<td>Date Format</td>
<td>DGO1755</td>
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<tr>
<td>QWPBDE</td>
<td>Decimal Point Option</td>
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<td>QWPBDSL</td>
<td>Default Delimiter</td>
<td>DGO1749</td>
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<td>QWPBDLEN</td>
<td>Local Date Length</td>
<td>DGO1757</td>
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<tr>
<td>QWPBDSID</td>
<td>Distributed SQL String Delimiter</td>
<td>DGO1754</td>
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<tr>
<td>QWPBENS</td>
<td>Default Encoding Scheme</td>
<td>DGO1750</td>
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<tr>
<td>QWPBGID</td>
<td>EBCDIC GBCS CCSID</td>
<td>DGO1744</td>
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<tr>
<td>QWPBGRA</td>
<td>Default Mixed Graphic</td>
<td>DGO1752</td>
</tr>
<tr>
<td>QWPBLANG</td>
<td>Default Host Language</td>
<td>DGO1751</td>
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<td>QWPBMID</td>
<td>EBCDIC MBCS CCSID</td>
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<td>QWPBSDL</td>
<td>Default SQL Delimiter</td>
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<td>QWPBSID</td>
<td>EBCDIC SBCS CCSID</td>
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<td>QWPBSQL</td>
<td>SQL Language Support Level</td>
<td>DGO1759</td>
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<tr>
<td>QWPBTIME</td>
<td>Time Format</td>
<td>DGO1756</td>
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<tr>
<td>QWPBTLEN</td>
<td>Local Time Length</td>
<td>DGO1758</td>
</tr>
<tr>
<td>QWP4CDEG</td>
<td>Current Degree (CDSSRDEF)</td>
<td>DGO1659</td>
</tr>
<tr>
<td>QWP4CDYN</td>
<td>Cache Dynamic SQL Statements</td>
<td>DGO1809</td>
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<tr>
<td>QWP4RCHL</td>
<td>Release Cursor Hold Locks</td>
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### Table 52. System Parameters - Archive Log Installation Parameters

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
</tr>
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<tbody>
<tr>
<td>QWP2ADL</td>
<td>Number of Copies</td>
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<tr>
<td>QWP2ARCL</td>
<td>Maximum Data Sets Recorded In BSDS</td>
<td>DGO1242</td>
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Table 52. System Parameters - Archive Log Installation Parameters (continued)

<table>
<thead>
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<th>Field name</th>
<th>Field description</th>
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<tbody>
<tr>
<td>QWP2MRTU</td>
<td>Maximum Read Tape Units</td>
<td>DGO1248</td>
</tr>
<tr>
<td>QWP3BKSZ</td>
<td>Archive Log Block Size</td>
<td>DGO1251</td>
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<tr>
<td>QWP3COMP</td>
<td>Compact Data</td>
<td>DGO1252</td>
</tr>
<tr>
<td>QWP3CTLG</td>
<td>Catalog Archive Data Sets</td>
<td>DGO1253</td>
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<tr>
<td>QWP3CYL</td>
<td>Space Allocation Method</td>
<td>DGO1420</td>
</tr>
<tr>
<td>QWP3DTIM</td>
<td>Timestamp Archive Log Data Sets</td>
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<td>QWP3MQP</td>
<td>Quiesce Period (seconds)</td>
<td>DGO1255</td>
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<tr>
<td>QWP3MSV1</td>
<td>Archive Copy 1 Mass Storage Group Name</td>
<td>DGO1256</td>
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<tr>
<td>QWP3MSV2</td>
<td>Archive Copy 2 Mass Storage Group Name</td>
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</tr>
<tr>
<td>QWP3RETN</td>
<td>Days To Retain Archive Log Data Sets</td>
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<tr>
<td>QWP3RE1N</td>
<td>Copy 1 Prefix</td>
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<tr>
<td>QWP3RE2N</td>
<td>Copy 2 Prefix</td>
<td>DGO1260</td>
</tr>
<tr>
<td>QWP3RISP</td>
<td>Primary Space</td>
<td>DGO1261</td>
</tr>
<tr>
<td>QWP3SECS</td>
<td>Secondary Space</td>
<td>DGO1263</td>
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<tr>
<td>QWP3UNT1</td>
<td>Copy 1 Archive Log Device Type</td>
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</tr>
<tr>
<td>QWP3UNT2</td>
<td>Copy 2 Archive Log Device Type</td>
<td>DGO1419</td>
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<tr>
<td>QWP3WTOR</td>
<td>Issue WTOR Before Mount for Archive Volume</td>
<td>DGO1265</td>
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<tr>
<td>ZWP2TIME</td>
<td>Tape Unit Deallocation Period</td>
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Table 53. System Parameters - Buffer Pool Information Page

<table>
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<td>Castout Attribute</td>
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<td>QDBPDWQT</td>
<td>Deferred Write Threshold</td>
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<td>QDBPNM</td>
<td>Buffer Pool Name</td>
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<td>QDBPPSQT</td>
<td>Parallel Sequential Threshold</td>
<td>DGO1215</td>
</tr>
<tr>
<td>QDBPVCDQT</td>
<td>Vertical Deferred Write Threshold</td>
<td>DGO1216</td>
</tr>
<tr>
<td>QDBPVPSH</td>
<td>Virtual Sequential Threshold</td>
<td>DGO1217</td>
</tr>
<tr>
<td>QDBPVPSZ</td>
<td>Virtual Pool Size</td>
<td>DGO1218</td>
</tr>
<tr>
<td>QDBPXLSQT</td>
<td>Assisting Parallel Sequential Threshold</td>
<td>DGO1660</td>
</tr>
</tbody>
</table>

Table 54. System Parameters - Data Definition Control Support

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
</tr>
</thead>
<tbody>
<tr>
<td>QWP4ESC</td>
<td>Escape Character</td>
<td>DGO1273</td>
</tr>
<tr>
<td>QWP4REGA</td>
<td>Application Registration Table</td>
<td>DGO1286</td>
</tr>
<tr>
<td>QWP4REGC</td>
<td>Register Table Owner</td>
<td>DGO1287</td>
</tr>
<tr>
<td>QWP4REGD</td>
<td>Control All Applications</td>
<td>DGO1288</td>
</tr>
<tr>
<td>QWP4REGI</td>
<td>Install DD Control</td>
<td>DGO1289</td>
</tr>
<tr>
<td>QWP4REGN</td>
<td>DDL Registration Database Name</td>
<td>DGO1290</td>
</tr>
<tr>
<td>QWP4REGO</td>
<td>Object Registration Table</td>
<td>DGO1291</td>
</tr>
<tr>
<td>QWP4REGQ</td>
<td>Require Full Names</td>
<td>DGO1292</td>
</tr>
</tbody>
</table>
Table 54. System Parameters - Data Definition Control Support (continued)

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
</tr>
</thead>
<tbody>
<tr>
<td>QWP4REGU</td>
<td>Unregistered DDL Default</td>
<td>DGO1293</td>
</tr>
</tbody>
</table>

Table 55. System Parameters - Data Installation Parameters

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
</tr>
</thead>
<tbody>
<tr>
<td>QWP6CATN</td>
<td>Icf Catalog Qualifier</td>
<td>DGO1303</td>
</tr>
</tbody>
</table>

Table 56. System Parameters - Data-Sharing Parameters

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
</tr>
</thead>
<tbody>
<tr>
<td>QWPAASST</td>
<td>Parallellism Assistant</td>
<td>DGO1780</td>
</tr>
<tr>
<td>QWPACOOR</td>
<td>Query coordinator</td>
<td>DGO1675</td>
</tr>
<tr>
<td>QWPAGRPN</td>
<td>Group name</td>
<td>DGO1455</td>
</tr>
<tr>
<td>QWPAMAXM</td>
<td>Maximum number of members</td>
<td>DGO1549</td>
</tr>
<tr>
<td>QWPAMBRN</td>
<td>Member name</td>
<td>DGO1547</td>
</tr>
<tr>
<td>QWPASUCV</td>
<td>SU conversion factor</td>
<td>DGO1676</td>
</tr>
</tbody>
</table>

Table 57. System Parameters - Distributed Data Facility Parameters

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
</tr>
</thead>
<tbody>
<tr>
<td>QWP1SCER</td>
<td>Extended Security</td>
<td>DGO1674</td>
</tr>
<tr>
<td>QWP4HOP</td>
<td>Hop Site Authorization</td>
<td>DGO1274</td>
</tr>
<tr>
<td>QWP9CMST</td>
<td>DBAT Status</td>
<td>DGO1304</td>
</tr>
<tr>
<td>QWP9RLFN</td>
<td>Resource Limit Spec. Table Error Action (DDF)</td>
<td>DGO1305</td>
</tr>
<tr>
<td>QWP9RYC</td>
<td>Resynchronization Interval (minutes)</td>
<td>DGO1306</td>
</tr>
<tr>
<td>QWP9STRT</td>
<td>DB2 Startup Option</td>
<td>DGO1307</td>
</tr>
<tr>
<td>QWP9TTO</td>
<td>Idle Thread Timeout Interval</td>
<td>DGO1435</td>
</tr>
</tbody>
</table>

Table 58. System Parameters - Group Buffer Pools Parameters Page

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
</tr>
</thead>
<tbody>
<tr>
<td>QBGBGAS</td>
<td>AUTOREC (automatic recovery)</td>
<td>DGO1725</td>
</tr>
<tr>
<td>QBGBGDR</td>
<td>Actual Directory Entry</td>
<td>DGO1559</td>
</tr>
<tr>
<td>QBGBGDT</td>
<td>Actual Data Entry</td>
<td>DGO1560</td>
</tr>
<tr>
<td>QBGBGR2</td>
<td>Pending Directory to Data Ratio</td>
<td>DGO1561</td>
</tr>
<tr>
<td>QBGBGSZ</td>
<td>Allocated Buffer Pool Size (4K)</td>
<td>DGO1558</td>
</tr>
</tbody>
</table>

Table 59. System Parameters - IRLM Installation Parameters

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
</tr>
</thead>
<tbody>
<tr>
<td>QWP4AUT</td>
<td>Automatic Start</td>
<td>DGO1405</td>
</tr>
<tr>
<td>QWP4IPRC</td>
<td>Start Procedure Name</td>
<td>DGO1276</td>
</tr>
<tr>
<td>QWP4ISID</td>
<td>Subsystem Name</td>
<td>DGO1277</td>
</tr>
<tr>
<td>QWP4ISWT</td>
<td>Time DB2 Will Wait for Start (seconds)</td>
<td>DGO1278</td>
</tr>
<tr>
<td>QWP4TOUT</td>
<td>Resource Timeout (seconds)</td>
<td>DGO1299</td>
</tr>
</tbody>
</table>
### Table 59. System Parameters - IRLM Installation Parameters (continued)

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
</tr>
</thead>
<tbody>
<tr>
<td>QWP4UTO</td>
<td>Utility Timeout Factor</td>
<td>DGO1300</td>
</tr>
</tbody>
</table>

### Table 60. System Parameters - Lock Escalation Parameters

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
</tr>
</thead>
<tbody>
<tr>
<td>QWP4LKTS</td>
<td>Maximum Locks per Table Space</td>
<td>DGO1279</td>
</tr>
<tr>
<td>QWP4LKUS</td>
<td>Maximum Locks per User</td>
<td>DGO1280</td>
</tr>
<tr>
<td>QWP4WAIT</td>
<td>Wait For Retained Locks</td>
<td>DGO1738</td>
</tr>
</tbody>
</table>

### Table 61. System Parameters - Log Installation Parameters

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
</tr>
</thead>
<tbody>
<tr>
<td>QWP2DUAL</td>
<td>Number of Copies</td>
<td>DGO1431</td>
</tr>
<tr>
<td>QWP2IBPS</td>
<td>Input Buffer Size (KB)</td>
<td>DGO1246</td>
</tr>
<tr>
<td>QWP2OBPS</td>
<td>Output Buffer Size (KB)</td>
<td>DGO1249</td>
</tr>
<tr>
<td>QWP2WRTH</td>
<td>Write Threshold On Filled Buffers</td>
<td>DGO1250</td>
</tr>
</tbody>
</table>

### Table 62. System Parameters - Operator Functions Installation Parameters

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
</tr>
</thead>
<tbody>
<tr>
<td>QWP1RLF</td>
<td>Resource Limit Facility Automatic Start</td>
<td>DGO1228</td>
</tr>
<tr>
<td>QWP1RLFN</td>
<td>Resource Limit Spec. Table Error Action</td>
<td>DGO1230</td>
</tr>
<tr>
<td>QWP1RLFT</td>
<td>Resource Limit Specification Table Suffix</td>
<td>DGO1231</td>
</tr>
<tr>
<td>QWP1SMRC</td>
<td>WTO Route Codes</td>
<td>DGO1236</td>
</tr>
<tr>
<td>QWP4ABN</td>
<td>Allow Autobind Operations</td>
<td>DGO1266</td>
</tr>
<tr>
<td>QWP4ABX</td>
<td>Allow Explain At Autobind</td>
<td>DGO1267</td>
</tr>
<tr>
<td>QWP4ENF</td>
<td>DPROP Support</td>
<td>DGO1404</td>
</tr>
<tr>
<td>QWP4SIT</td>
<td>Site Type</td>
<td>DGO1296</td>
</tr>
<tr>
<td>QWP9TCPA</td>
<td>TCP/IP Already Verified</td>
<td>DGO1761</td>
</tr>
</tbody>
</table>

### Table 63. System Parameters - Other System Parameters

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
</tr>
</thead>
<tbody>
<tr>
<td>MZDBSTRT</td>
<td>Databases and Table Spaces</td>
<td>DGO1208</td>
</tr>
<tr>
<td>QWP1DFRQ</td>
<td>Checkpoints Level ID Updates</td>
<td>DGO1434</td>
</tr>
<tr>
<td>QWP2DBSD</td>
<td>Dual BSDS Mode</td>
<td>DGO1243</td>
</tr>
<tr>
<td>QWP4DSMX</td>
<td>Maximum Open Data Sets (DSMAX)</td>
<td>DGO1271</td>
</tr>
<tr>
<td>QWP4DSSST</td>
<td>Static describe (DESCSTAT)</td>
<td>DGO1701</td>
</tr>
<tr>
<td>QWP4ISWI</td>
<td>IRLM Initial Inquiry by DB2</td>
<td>DGO1433</td>
</tr>
<tr>
<td>QWP4MDDN</td>
<td>Asynchronous Drain Stop (%DSMAX)</td>
<td>DGO1281</td>
</tr>
<tr>
<td>QWP4TDDN</td>
<td>Asynchronous Drain Start (%DSMAX)</td>
<td>DGO1298</td>
</tr>
<tr>
<td>QWP4WBMP</td>
<td>IMS/BMP time-out factor (BMPTOUT)</td>
<td>DGO1669</td>
</tr>
<tr>
<td>QWP4WDLI</td>
<td>IMS/DLI time-out factor (DLITOUT)</td>
<td>DGO1670</td>
</tr>
<tr>
<td>XWP4CDEG</td>
<td>Current Degree (CDSSRDEF)</td>
<td>DGO1859</td>
</tr>
</tbody>
</table>
Table 64. System Parameters - Protection Installation Parameters

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
</tr>
</thead>
<tbody>
<tr>
<td>QWP1RLFA</td>
<td>Resource Limit Table Creator Authid</td>
<td>DGO1229</td>
</tr>
<tr>
<td>QWP3RTCT</td>
<td>RACF® Protect Archive Log</td>
<td>DGO1262</td>
</tr>
<tr>
<td>QWP4ADM2</td>
<td>System Administrator 2 Authid</td>
<td>DGO1268</td>
</tr>
<tr>
<td>QWP4AUCA</td>
<td>Plan Authorization Cache Size</td>
<td>DGO1428</td>
</tr>
<tr>
<td>QWP4AUTH</td>
<td>DB2 Authorization Enabled</td>
<td>DGO1269</td>
</tr>
<tr>
<td>QWP4BNVA</td>
<td>Bind New Version</td>
<td>DGO1430</td>
</tr>
<tr>
<td>QWP4DFID</td>
<td>Default (unknown) User Authid</td>
<td>DGO1270</td>
</tr>
<tr>
<td>QWP4OPR1</td>
<td>System Operator 1 Authid</td>
<td>DGO1283</td>
</tr>
<tr>
<td>QWP4OPR2</td>
<td>System Operator 2 Authid</td>
<td>DGO1284</td>
</tr>
<tr>
<td>QWP4PAC</td>
<td>Package Authorization Cache Size</td>
<td>DGO1779</td>
</tr>
<tr>
<td>QWP4SADM</td>
<td>System Administrator 1 Authid</td>
<td>DGO1294</td>
</tr>
</tbody>
</table>

Table 65. System Parameters - Storage Sizes Installation Parameters

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
</tr>
</thead>
<tbody>
<tr>
<td>QWP1CDB</td>
<td>Maximum Remote</td>
<td>DGO1220</td>
</tr>
<tr>
<td>QWP1CT</td>
<td>Maximum Concurrent Threads</td>
<td>DGO1221</td>
</tr>
<tr>
<td>QWP1IDB</td>
<td>Maximum Batch</td>
<td>DGO1223</td>
</tr>
<tr>
<td>QWP1IDF</td>
<td>Maximum TSO</td>
<td>DGO1224</td>
</tr>
<tr>
<td>QWP1RMT</td>
<td>Maximum Remote Active</td>
<td>DGO1232</td>
</tr>
<tr>
<td>QWP4EDPL</td>
<td>Maximum Size of EDM Pool</td>
<td>DGO1272</td>
</tr>
<tr>
<td>QWP4IXTP</td>
<td>Default Index Type</td>
<td>DGO1546</td>
</tr>
<tr>
<td>QWP4MXKD</td>
<td>Maximum Kept Dynamic Statements</td>
<td>DGO1810</td>
</tr>
<tr>
<td>QWP4PST</td>
<td>Utility Cache Option</td>
<td>DGO1766</td>
</tr>
<tr>
<td>QWP4RMAX</td>
<td>Maximum Size of RID Pool</td>
<td>DGO1396</td>
</tr>
<tr>
<td>QWP4SCAC</td>
<td>3990 Cache</td>
<td>DGO1295</td>
</tr>
<tr>
<td>QWP4SPOL</td>
<td>Maximum Size of Sort Pool</td>
<td>DGO1297</td>
</tr>
</tbody>
</table>

Table 66. System Parameters - Stored Procedures Parameters

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
</tr>
</thead>
<tbody>
<tr>
<td>QWP1SPAB</td>
<td>Abends Allowed</td>
<td>DGO1437</td>
</tr>
<tr>
<td>QWP1SPPN</td>
<td>MVS Procedure Name</td>
<td>DGO1436</td>
</tr>
<tr>
<td>QWP1SPTO</td>
<td>Timeout Value</td>
<td>DGO1438</td>
</tr>
</tbody>
</table>

Table 67. System Parameters - Tracing, Checkpoint and Pseudo-Close Parameters

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
</tr>
</thead>
<tbody>
<tr>
<td>QWP1AUDT</td>
<td>Start Audit Trace</td>
<td>DGO1219</td>
</tr>
<tr>
<td>QWP1FREQ</td>
<td>Pseudo-Close Frequency</td>
<td>DGO1222</td>
</tr>
<tr>
<td>QWP1LOGL</td>
<td>Checkpoint Frequency</td>
<td>DGO1225</td>
</tr>
<tr>
<td>QWP1MON</td>
<td>Start Monitor Trace</td>
<td>DGO1226</td>
</tr>
<tr>
<td>QWP1MONS</td>
<td>Monitor Buffer Size (bytes)</td>
<td>DGO1227</td>
</tr>
</tbody>
</table>
Table 67. System Parameters - Tracing, Checkpoint and Pseudo-Close Parameters (continued)

<table>
<thead>
<tr>
<th>Field name</th>
<th>Field description</th>
<th>Help panel name</th>
</tr>
</thead>
<tbody>
<tr>
<td>QWP1SMFA</td>
<td>Start SMF Accounting</td>
<td>DGO1234</td>
</tr>
<tr>
<td>QWP1SMFS</td>
<td>Start SMF Statistics Trace</td>
<td>DGO1235</td>
</tr>
<tr>
<td>QWP1STIM</td>
<td>Statistics Interval (minutes)</td>
<td>DGO1237</td>
</tr>
<tr>
<td>QWP1TMR</td>
<td>Pseudo-Close Timer</td>
<td>DGO1238</td>
</tr>
<tr>
<td>QWP1TRST</td>
<td>Start Global Trace</td>
<td>DGO1239</td>
</tr>
<tr>
<td>QWP1TRSZ</td>
<td>Trace Table Size (4 KB multiple)</td>
<td>DGO1240</td>
</tr>
<tr>
<td>QWP1URCK</td>
<td>UR Check Frequency</td>
<td>DGO1712</td>
</tr>
</tbody>
</table>
Chapter 15. Layout of the Exception Log File output record

The table in this section 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

<table>
<thead>
<tr>
<th>Offset (decimal)</th>
<th>Length (bytes)</th>
<th>DB2 Data Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>2</td>
<td>SMALLINT</td>
<td>Length of record (LL)</td>
</tr>
<tr>
<td>N/A</td>
<td>2</td>
<td>SMALLINT</td>
<td>Binary zeros</td>
</tr>
</tbody>
</table>
| 0                | 1              | CHAR          | Log record type:  
  - F = Field-level exception record  
  - M = Exception message (Online Monitor only) |
| 1                | 1              | CHAR          | Processing origin ID:  
  - 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:  
  - 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 |
| 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 |
Table 68. Layout of the Exception Log File output record (continued)

<table>
<thead>
<tr>
<th>Offset (decimal)</th>
<th>Length (bytes)</th>
<th>DB2 Data Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>92</td>
<td>8</td>
<td>CHAR</td>
<td>Network ID</td>
</tr>
<tr>
<td>100</td>
<td>8</td>
<td>CHAR</td>
<td>VTAM LU name</td>
</tr>
<tr>
<td>108</td>
<td>12</td>
<td>CHAR</td>
<td>Instance number</td>
</tr>
<tr>
<td>120</td>
<td>2</td>
<td>SMALLINT</td>
<td>LUW sequence number</td>
</tr>
<tr>
<td>122</td>
<td>18</td>
<td>CHAR</td>
<td>Main package (MAINPACK)</td>
</tr>
<tr>
<td>140</td>
<td>16</td>
<td>CHAR</td>
<td>Requesting location</td>
</tr>
<tr>
<td>156</td>
<td>2</td>
<td>CHAR</td>
<td>Reserved</td>
</tr>
<tr>
<td>158</td>
<td>4</td>
<td>CHAR</td>
<td>DB2 subsystem ID</td>
</tr>
<tr>
<td>162</td>
<td>6</td>
<td>CHAR</td>
<td>OMEGAMON XE for DB2 PE VnRnMn</td>
</tr>
<tr>
<td>168</td>
<td>6</td>
<td>CHAR</td>
<td>DB2 VnRnMn</td>
</tr>
<tr>
<td>174</td>
<td>1</td>
<td>SMALLINT</td>
<td>DB2 release code</td>
</tr>
<tr>
<td>175</td>
<td>8</td>
<td>CHAR</td>
<td>Store clock timestamp</td>
</tr>
<tr>
<td>183</td>
<td>26</td>
<td>TIMESTAMP</td>
<td>DB2 timestamp</td>
</tr>
<tr>
<td>209</td>
<td>8</td>
<td>CHAR</td>
<td>Field name</td>
</tr>
<tr>
<td>217</td>
<td>1</td>
<td>CHAR</td>
<td>Field type:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Blank = Normal field</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• B = Buffer pool field</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• D = DDF field</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• G = Group buffer pool field</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• C = Global group buffer pool statistics field</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• P = Package</td>
</tr>
<tr>
<td>218</td>
<td>54</td>
<td>CHAR</td>
<td>Field name qualifier used in the Exception Threshold data set</td>
</tr>
<tr>
<td>272</td>
<td>2</td>
<td>CHAR</td>
<td>Reserved</td>
</tr>
<tr>
<td>274</td>
<td>54</td>
<td>CHAR</td>
<td>Actual field name qualifier:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Buffer pool ID for buffer pool records</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Remote location for DDF records</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Package location, connection ID, and program name for package records</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Blank for all other records</td>
</tr>
<tr>
<td>328</td>
<td>2</td>
<td>CHAR</td>
<td>Reserved</td>
</tr>
<tr>
<td>330</td>
<td>1</td>
<td>CHAR</td>
<td>Reserved</td>
</tr>
<tr>
<td>331</td>
<td>1</td>
<td>CHAR</td>
<td>Field description (without qualifier)</td>
</tr>
<tr>
<td>371</td>
<td>40</td>
<td>CHAR</td>
<td>Compare basis:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• V = Total value</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• M = By minute</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• S = By second</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• C = By commit</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• T = By thread</td>
</tr>
<tr>
<td>372</td>
<td>1</td>
<td>CHAR</td>
<td>Operator (≥ or ≤)</td>
</tr>
<tr>
<td>373</td>
<td>12</td>
<td>CHAR</td>
<td>Exception value (character)</td>
</tr>
<tr>
<td>385</td>
<td>12</td>
<td>CHAR</td>
<td>Threshold value (character)</td>
</tr>
</tbody>
</table>
Table 68. Layout of the Exception Log File output record (continued)

<table>
<thead>
<tr>
<th>Offset (decimal)</th>
<th>Length (bytes)</th>
<th>DB2 Data Type</th>
<th>Description</th>
</tr>
</thead>
</table>
| 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.
Part 6. Appendixes
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