MainView for DB2
Getting Started Guide

Supporting

Version 11.2.00 Release of MainView for DB2
Version 11.2.00 Release of BMC System Performance for DB2

May 2015
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  - Product name
  - Product version (release number)
  - License number and password (trial or permanent)
- Operating system and environment information
  - Machine type
  - Operating system type, version, and service pack or other maintenance level such as PUT or PTF
  - System hardware configuration
  - Serial numbers
  - Related software (database, application, and communication) including type, version, and service pack or maintenance level
- Sequence of events leading to the problem
- Commands and options that you used
- Messages received (and the time and date that you received them)
  - Product error messages
  - Messages from the operating system
  - Messages from related software
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About this book

Like a tutorial, this book offers practice sessions to help you learn to navigate in MainView for DB2 views and displays and to use product features. New users should complete all of the practice sessions; experienced users can use the quick-reference table in this chapter to locate practice sessions of interest.

If you are new to MainView, you should get a copy of the MainView User Guide before starting. Use the following procedures to access MainView and set parameters.

This document covers the basic things you need to know to use any MainView product.

Note

As a tutorial, this book does not attempt to address every product area or display.

Like most BMC documentation, this book is available in printed and online formats. To request printed books or to view online books and notices (such as release notes and technical bulletins), see the support website at http://www.bmc.com/support.

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Quick reference table

The following table directs you to a section in the documentation to find information about a certain topic.
**Note**

If you are a new user, complete each of the practice sessions in the rest of this book before using the quick-reference table.

<table>
<thead>
<tr>
<th>To see</th>
<th>Start here</th>
</tr>
</thead>
<tbody>
<tr>
<td>MainView for DB2</td>
<td>“Accessing MainView in 3270 mode” on page 13</td>
</tr>
<tr>
<td>MainView Explorer</td>
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</tr>
<tr>
<td>Multiple DB2s</td>
<td>“Checking the status of all DB2 subsystems” on page 17</td>
</tr>
<tr>
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</tr>
<tr>
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<td>All windows mode views</td>
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<tr>
<td>DB2 status</td>
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</tr>
<tr>
<td>Current threads</td>
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<tr>
<td>Current locks</td>
<td>“Viewing current lock contention” on page 40</td>
</tr>
<tr>
<td>Lock contention analysis</td>
<td>“Analyzing lock contention” on page 39</td>
</tr>
<tr>
<td></td>
<td>“Analyzing timeouts and deadlocks” on page 43A</td>
</tr>
<tr>
<td>Data sharing analysis</td>
<td>“Checking current group activity” on page 70</td>
</tr>
<tr>
<td>DDF analysis</td>
<td>“Analyzing DDF connections and activity” on page 28</td>
</tr>
<tr>
<td>Page set and I/O analysis</td>
<td>“Analyzing page set usage and I/O” on page 47</td>
</tr>
<tr>
<td>Buffer pools</td>
<td>“Analyzing buffer pools” on page 36</td>
</tr>
<tr>
<td>Group buffer pools</td>
<td>“Tuning group buffer pools” on page 81</td>
</tr>
<tr>
<td>Monitors</td>
<td>“Using monitors to isolate problems” on page 52</td>
</tr>
<tr>
<td></td>
<td>“Viewing monitors in warning status” on page 59</td>
</tr>
<tr>
<td></td>
<td>“Reviewing workload objectives” on page 61</td>
</tr>
<tr>
<td>Exception messages</td>
<td>“Viewing a list of exceptions” on page 58</td>
</tr>
<tr>
<td>Workload objectives</td>
<td>“Reviewing workload objectives” on page 61</td>
</tr>
<tr>
<td>Workload history charts</td>
<td>“Analyzing workload history with MainView Explorer charts” on page 149</td>
</tr>
<tr>
<td>Current traces or to start a trace</td>
<td>“Starting an application trace” on page 97</td>
</tr>
<tr>
<td>History traces thread history/query recent workload history</td>
<td>“Analyzing thread history” on page 139</td>
</tr>
<tr>
<td>DB2 catalog information</td>
<td>“Using the Catalog Browse facility” on page 38</td>
</tr>
<tr>
<td>Explain information</td>
<td>“Accessing current thread activity information” on page 20</td>
</tr>
<tr>
<td></td>
<td>“Viewing SQL statement summary data” on page 116</td>
</tr>
<tr>
<td></td>
<td>“Testing traces” on page 106</td>
</tr>
</tbody>
</table>
Related publications

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- View Quick Course videos (short overviews of selected product concepts, tasks, or features), which are available from the following locations:
  - Documentation Center
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Tip
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Conventions

This document uses the following special conventions:

- All syntax, operating system terms, and literal examples are presented in this typeface.

- Variable text in path names, system messages, or syntax is displayed in italic text: testsys/instance/fileName
Menu sequences use a symbol to convey the sequence. For example, **Actions => Create Test** instructs you to choose the **Create Test** command from the **Actions** menu.
Isolating DB2 performance problems

These scenarios teach you how to navigate easily through the MainView for DB2 views and displays. They do not show you every area covered by the product or all of the displays.

In this practice session, you will:

1. Check the status and activity of all DB2s to detect potential problem areas
2. Analyze a single DB2 to study problem areas in more detail
3. Use monitors to isolate specific resource- or workload-related problems
4. Review critical problems, including those you have identified in this session

For a complete description of how to work in both windows mode and full-screen mode, see the MainView User Guide.

Note
This practice session takes approximately one hour to complete.

Accessing MainView in 3270 mode

Use the following procedure to access MainView for DB2 views and displays in 3270 mode.

Note
For more information about accessing MainView for DB2 views from your web browser, with added graphic capabilities, see “Using MainView Explorer and the DB2 Health Navigator” on page 85.
For more information, view the Quick Course "MainView for DB2 - Getting Started."

To access MainView for DB2

1. Launch MainView by using one of the following methods:
   - Execute the MainView CLIST.
   - Select an ISPF panel option.
   - Log on to an IBM VTAM session.

2. To specify your CASID, go to Option 0;1, and then 1.

3. Return to the MainView Selection Menu, (Figure 1 on page 14).

Figure 1: MainView Selection Menu

From this menu and its related set of submenus, you can access any installed MainView product. Products that work together to provide similar solutions are grouped together in submenus. You also have access to a full set of MainView functions that work with all of your MainView products to help you solve performance problems. For more information, see the MainView User Guide.
4 To access the DB2 Solutions submenu, (Figure 2 on page 15), select Option D from the MainView Selection Menu.

**Figure 2: DB2 Solutions submenu**

<table>
<thead>
<tr>
<th>OPTION</th>
<th>DB2 Solutions</th>
<th>DATE</th>
<th>TIME</th>
<th>USERID</th>
<th>MODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance</td>
<td></td>
<td>2011/03/11</td>
<td>16:33:29</td>
<td>BCVJXF2</td>
<td>ISPF 6.1</td>
</tr>
<tr>
<td>1 MVDB2</td>
<td>MAINVIEW for DB2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 SPD</td>
<td>System Performance for DB2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Application Management and Operations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T MVTA</td>
<td>MAINVIEW Transaction Analyzer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V MVVP</td>
<td>MAINVIEW VistaPoint</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A AUTOMATION</td>
<td>MAINVIEW AutoOPERATOR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E ALERTS</td>
<td>Alert Management</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M MESSAGES</td>
<td>Messages and Codes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J JOURNAL</td>
<td>Journal Log</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P PARMS</td>
<td>Parameters and Options</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note**

If you have the full System Performance for DB2 solution installed, you can access its capabilities through Option 2.

5 To access MainView for DB2, select Option 1 from the DB2 Solutions submenu.

The Parameter Confirmation panel is displayed, (Figure 3 on page 15).

**Figure 3: MainView for DB2 Parameter Confirmation panel**

BMC Software ------------ Parameter Confirmation ----------- MAINVIEW for DB2

<table>
<thead>
<tr>
<th>Command</th>
<th>Parameter Confirmation</th>
<th>MAINVIEW for DB2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confirm parameters for this session of MainView for DB2:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Context</td>
<td>=&gt; ALL</td>
<td>Default context</td>
</tr>
<tr>
<td>Screen</td>
<td>=&gt; MVDB2</td>
<td>Initial screen</td>
</tr>
<tr>
<td>Mode</td>
<td>=&gt; WINDOW</td>
<td>Window/Full/FullScreen (Initial Mode)</td>
</tr>
<tr>
<td>Confirm</td>
<td>=&gt; YES</td>
<td>Yes/No (Show this panel at next session startup)</td>
</tr>
</tbody>
</table>

Press Enter to continue or press HELP for additional information.

This panel prompts you to confirm the parameters for your MainView for DB2 session. The first time you sign on, the default parameters are:

- A context of all active DB2 subsystems
- An initial screen of MainView for DB2, which displays the EZDSSI easy menu
- A primary display mode of MainView windows mode

You can change the parameters for a session by changing the values on this confirmation panel.
Tip
You can also change the default parameters for future sessions of MainView for DB2 by selecting Option 0.1.D, Parameters-Windows Mode, on the MainView Selection Menu (Figure 1 on page 14).

6 Press Enter.

The DB2 SSI Easy Menu (EZDSSI) is displayed.

Figure 4: DB2 SSI easy menu (EZDSSI)

You can access both SSI and single DB2 target options from the easy menu EZDBA. To change the default screen to EZDBA, in the Parameter Confirmation screen type MVDB2DBA in the Initial screen field.

Windows mode provides trace and monitor administration dialogs, enhanced functionality, and more extensive DB2 data for both single DB2 and SSI (multiple DB2) analysis.

The fourth line from the top is the window information line, which shows the:

- Window number (W1)
  This number can be helpful when you have several windows open at once.
- Name of this view (EZDSSI)
- Current target context (ALL)
- Date
- Time
- Product (MVDB2)
This view is an example of an easy menu that provides hyperlinks to various other views.

**Note**
Options prefixed with a period take you directly to data. Options prefixed with an angle bracket (>) take you to another menu.

This EZDSSI easy menu is designed to be used in Single System Image (SSI) mode to look at multiple target DB2s at one time.

You can use several hyperlinks to other easy menus to check out DB2 status. You can check the following examples (but do not move beyond them) before continuing to the next procedure:

- **Stats Menu** provides options to select the many views that show complete DB2 statistics (EZDSTAT). EZDSTAT hyperlinks generally go to tabular views that show one row per DB2, with detail views accessible from there.

- **Buffer Pool Menu** provides options to show status and statistics for individual buffer pools (and group buffer pools).

- **EZDBA Menu / Tgt & SSI** provides options to analyze one DB2 or multiple DB2s in SSI mode.

7 To return to the DB2 Solutions Menu, press F3.

### Checking DB2 status and activity

Begin by investigating the capabilities of the windows mode views, which provide an overview of multiple DB2 subsystems at one time. You can also drill down to details about a single DB2.

Point-and-shoot *hyperlinks* take you from one view to additional displays with related information; these displays might be windows mode views or full-screen displays that are normally accessed through menu options.

### Checking the status of all DB2 subsystems

Use the following procedures to access windows mode and get acquainted with the views that are available for monitoring multiple DB2s.
To check the status of all DB2s

1. On EZDSSI, hyperlink on **SSI Status - List DB2s**.

   This link takes you to the STDB2 view, (Figure 5 on page 18), maintaining the default context of ALL, which includes all defined DB2s.

**Figure 5: DB2 activity overview (STDB2)**

<table>
<thead>
<tr>
<th>Target</th>
<th>Thrd</th>
<th>Rate</th>
<th>Rate</th>
<th>Rate</th>
<th>Rate</th>
<th>Warn Message</th>
<th>Dataset In-Use</th>
<th>Open</th>
</tr>
</thead>
<tbody>
<tr>
<td>DECE</td>
<td>17</td>
<td>1.4</td>
<td>1602.2</td>
<td>0.0</td>
<td>0.0</td>
<td>Conn Fail</td>
<td>45</td>
<td>175</td>
</tr>
<tr>
<td>DEDM</td>
<td>14</td>
<td>1.4</td>
<td>1545.2</td>
<td>0.0</td>
<td>0.0</td>
<td>RunawayQuery</td>
<td>46</td>
<td>87</td>
</tr>
<tr>
<td>DEEO</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>Conn Fail</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>DHH1</td>
<td>5</td>
<td>0.5</td>
<td>760.3</td>
<td>0.0</td>
<td>0.0</td>
<td>Conn Fail</td>
<td>20</td>
<td>31</td>
</tr>
<tr>
<td>DHH2</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>Conn Fail</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>DW1</td>
<td>5</td>
<td>0.7</td>
<td>941.3</td>
<td>0.0</td>
<td>0.0</td>
<td>Conn Fail</td>
<td>48</td>
<td>78</td>
</tr>
<tr>
<td>DIB2</td>
<td>4</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td>0</td>
<td>19</td>
</tr>
</tbody>
</table>

You can quickly gauge how well each of your DB2 subsystems are performing by reviewing and comparing the number of active threads, key activity rates, a total exception count, and the most critical warning condition that exists right now (if any). The angle bracket (>) preceding W1 in the window information line indicates that you can scroll right for more data.

You can move view fields around and set thresholds to customize the view to meet your monitoring needs (or even create different views for different conditions). For more information, see the **MainView User Guide**.

A hidden header beneath the window information line provides direct navigation to related views and identifies the row hyperlinks in the view.

2. Display and review the header options:

   a. Place the cursor on the **Show Header** field and press **Enter**.

      The top of the header provides hyperlinks to all related statistics views. The bottom of the header describes the row hyperlinks within the STDB2 view.

      Several of the column headers are highlighted, indicating that you can choose a row in that column. From each row, you can hyperlink to a view with more detail (related to that column) for the selected DB2.

      If you see a warning message for one DB2, place the cursor on that message and press **Enter** to list the warning conditions that are tracked per DB2. If multiple conditions exist at the same time, only the most important is shown in STDB2, and the others are set to YES in this view. Press **F3** to return to STDB2.
Note
You can use this hyperlink to see the list even if the warning message field is blank (in which case the conditions will be set to NO). The view also shows the versions of the DB2 subsystem and MainView for DB2.

b Select **Hide Header** and press **Enter** when you are finished.

3 Hyperlink on the **DB2 Target** field for an active DB2 to see a detail status view.

4 Press **F3** to return to STDB2.

You will return to a detail status view later.

5 Hyperlink on the **Comm Rate** field for an active DB2 to see counts and rates of activity in that DB2, both for the current interval (1 to 15 minutes) and for the total session data since DB2 startup.

**Figure 6: Activity rates (STRATE)**

<table>
<thead>
<tr>
<th>Interval</th>
<th>Qty</th>
<th>Session Qty</th>
<th>Rate</th>
<th>Session Rate</th>
<th>Interval</th>
<th>Session</th>
<th>Qty</th>
<th>Rate</th>
<th>Session Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commits...</td>
<td>16</td>
<td>52</td>
<td>0.0</td>
<td>0.0</td>
<td>2.0</td>
<td>1.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thd Creates.</td>
<td>8</td>
<td>46</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Getpages...</td>
<td>18431</td>
<td>30434</td>
<td>38.8</td>
<td>1.2</td>
<td>2303.9</td>
<td>661.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Page Updates</td>
<td>209</td>
<td>211</td>
<td>0.4</td>
<td>0.0</td>
<td>26.1</td>
<td>4.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sync I/O...</td>
<td>259</td>
<td>560</td>
<td>0.5</td>
<td>0.0</td>
<td>32.4</td>
<td>12.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prefetch I/O</td>
<td>2153</td>
<td>3502</td>
<td>4.5</td>
<td>0.1</td>
<td>269.1</td>
<td>76.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Write I/O...</td>
<td>4</td>
<td>5</td>
<td>0.0</td>
<td>0.0</td>
<td>0.5</td>
<td>0.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DatasetOpens</td>
<td>16</td>
<td>45</td>
<td>0.0</td>
<td>0.0</td>
<td>2.0</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lockouts...</td>
<td>2</td>
<td>2</td>
<td>0.0</td>
<td>0.0</td>
<td>0.2</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LockSuspends</td>
<td>2</td>
<td>2</td>
<td>0.0</td>
<td>0.0</td>
<td>2.6</td>
<td>1.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GBLLockCont.</td>
<td>56</td>
<td>924</td>
<td>0.1</td>
<td>0.0</td>
<td>4.5</td>
<td>20.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clm/Drn Fls.</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DML SQL.....</td>
<td>1196</td>
<td>1700</td>
<td>2.5</td>
<td>0.1</td>
<td>149.5</td>
<td>37.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>StProcCalls.</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>StProcFails.</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RID Fails...</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDM Loads...</td>
<td>5</td>
<td>10</td>
<td>0.0</td>
<td>0.0</td>
<td>0.6</td>
<td>0.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDM Fails...</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Checkpoints.</td>
<td>0</td>
<td>1</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pr1 Groups.</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pr1Fallback</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Some of these fields are highlighted, indicating that hyperlinks will take you to more detail.

6 Press **F3** until you return to EZDSSI.

7 Hyperlink on the **DB2 Dashboard** field to see critical, current interval measurements for all of the DB2 subsystems in the current SSI context, (Figure 7 on page 20).
This view can help you quickly gauge the status of all the DB2 subsystems.

Figure 7: DB2 dashboard (STDASHB)

<table>
<thead>
<tr>
<th>Target</th>
<th>DB2</th>
<th>Status</th>
<th>Message</th>
<th>Available Except</th>
<th>Except</th>
<th>Lock/Lt Actv</th>
<th>Suspnds</th>
<th>DDF</th>
</tr>
</thead>
<tbody>
<tr>
<td>DECE</td>
<td>ACTIVE</td>
<td></td>
<td></td>
<td>1400</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>ACTV</td>
</tr>
<tr>
<td>DEDM</td>
<td>INACTIVE</td>
<td>RunawayQuery</td>
<td>1372</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>ACTV</td>
<td></td>
</tr>
<tr>
<td>DEEO</td>
<td>INACTIVE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DHH1</td>
<td>INACTIVE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DHH2</td>
<td>ACTIVE</td>
<td></td>
<td></td>
<td>1401</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>INAC</td>
</tr>
<tr>
<td>DHW1</td>
<td>INACTIVE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DHW2</td>
<td>ACTIVE</td>
<td></td>
<td></td>
<td>1398</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>ACTV</td>
</tr>
<tr>
<td>DIB2</td>
<td>ACTIVE</td>
<td></td>
<td></td>
<td>1393</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>ACTV</td>
</tr>
</tbody>
</table>

The first 10 columns in the view are highlighted in reverse video. Green highlighting indicates acceptable values. Red highlighting indicates values that should be analyzed for potential problems.

8 Scroll right to see several other key indicators of system health, such as hit ratios and failure counts.

9 Press F3 to return to EZDSSI.

Accessing current thread activity information

From the DB2 status overview (STDB2), you can access current thread information.

For more information, view the Quick Course "Displaying Active Threads."

To access current thread information

1 On EZDSSI, hyperlink on SSI Status - List DB2s.

2 On STDB2, hyperlink on Act Thrd to view a list of all active threads in the selected DB2, (Figure 8 on page 21).
If you have the proper DB2 authorization, you can use the C line command to issue the DB2 CANCEL THREAD command.

**Figure 8: All active threads for one DB2 (THDACTV)**

A hidden header beneath the window information line provides direct navigation to related views and identifies the row hyperlinks in the view.

3 To display and review the header options:

a. Place the cursor on the **Show Header** field and press **Enter**.

b. Select **Hide Header** and press **Enter** when you are finished.
Hyperlink on one thread by placing your cursor in the Correlation ID column to see a detail display for that thread, Figure 9 on page 22.

**Figure 9: Detail user status view (DUSER)—base section**

The DUSER view is a hybrid free-form view. The data in the scrollable section of the view is provided by the full-screen service DUSER. You cannot customize or sort the view.

You can scroll down to see more data, or put the cursor on a field in the **Section Locates** area and press Enter to display that section at the top of the view. To display Help for a section, put the cursor on a field in the **Section Locates** area and press F1.

The view shows all available accounting detail information about that thread. A summary of the most critical data, including the key indicators of failures or potential problems is shown in the base section.

Notice that the SQL Statement Analysis section contains:

- The full text of the current SQL statement that is being executed
The current package/DBRM name
- The amount of time this SQL statement has been active
- The last page accessed

If the SQL is dynamic, the decimal value of the current SQL Cache Token is also shown. If the statement has been executing for a long time, you might want to use the decimal value to issue an EXPLAIN STMTCACHE :stmt-token to see information about the access path in use for the cached SQL statement. In contrast, the EXPLAIN hyperlink in the DUSER header (and the Explain function described in Step 7 on page 23) performs a dynamic Explain based on the SQL text. If the text has been used multiple times from the cache, the access paths might be different.

5. To view a breakdown of all SQL executed by this thread, place the cursor on the SQLCNTS field in the Section Locates area and press Enter.

This view contains many other sections of detail data with which you will become acquainted over time. For example, if you are concerned about locking, you can use the # Locks hyperlink in DUSER header to see all of the locks that this thread is holding or waiting on, and any threads that are in contention with it. Alternatively, you could use the LOCKS field in the Section Locates area to see the counts of all lock activity for this thread.

6. Press F3 as needed to return to THDACTV.

This view contains several other hyperlinks that can be useful in analyzing a thread. Scroll right and hyperlink on User Status to see a subset of the DUSER information in THDDETL. Staying in windows mode might be valuable if you need to "freeze" the threads to look at several at the same point in time.

7. Hyperlink on Current Activity if it shows a currently active SQL statement.

Figure 10: Explain application

You can also access the Explain application from the MVDB2/DC Admin/Archive hyperlink on the EZDB2 easy menu (shown in “Analyzing a specific DB2” on page 30) to Explain a plan or package, or view existing Plan_Table Explain data. For more information about the Explain application, see the MainView for DB2 User Guide.
8 Press F3 until you return to EZDSSI.

Exceptions overview

You can also check for exception conditions by accessing the STEXC view. To access STEXC, select Exceptions from EZDSSI.

Figure 11: Exception conditions (STEXC)

For more information about this view, see “Viewing a list of exceptions” on page 58.

Viewing thread activity for multiple DB2 instances

From EZDSSI, you can select hyperlinks to view thread activity across multiple DB2s.

To view thread activity across multiple DB2 instances

1 Hyperlink on Current Threads (Elap) to see all active threads, identified by the DB2 in which they are running.

2 Press F3 to return to EZDSSI.

3 Hyperlink on Summary by DB2 to see a summary of threads for each DB2; then, hyperlink on one row to view a list of threads for that DB2 only.

4 Press F3 to return to EZDSSI.

Viewing DB2 DBM1 storage usage

You can access views to see the various components of virtual storage (both above and below the 2-GB bar) in the Database Services address space (DBM1). You can use this information for troubleshooting DB2 virtual storage constraints or storage usage analysis.
To view DB2 DBM1 storage usage

1 From EZDSSI, hyperlink on **DB2 Storage Use** to see the DB2 Storage Entries view (DB2STOR), *(Figure 12 on page 25).*

**Figure 12: DB2 storage entries (DB2STOR)**

From this view, you can set an alarm to give you a warning if the amount of available storage below the 2-GB bar falls below the specified threshold. A sample alarm is provided. You can change the defined thresholds and assigned colors by customizing the view. For further instructions, see the *MainView User Guide*.

You might want to set this alarm either for one critical DB2 or for several production DB2s.

2 Hyperlink on a **DB2 Target** to access the DB2 Storage Details view (DB2STORD).

This view provides a complete picture of storage usage for the selected DB2. You can see information about storage usage below the 2-GB bar *(Figure 13 on page 26)*, and above the bar *(Figure 15 on page 27)*. For DB2 10, this view shows storage information for the DBM1 and DIST address spaces.

**Note**
You can also access this view for a single DB2 from the EZDB2 or EZDBA easy menus.

You will learn more about analyzing a single DB2 in the next section “Analyzing a specific DB2” on page 30.
The first section of this view provides a summary of storage usage below the 2-GB bar, with pointers to subsequent sections that provide further details, (Figure 13 on page 26).

Figure 13: DB2 storage details (DB2STORD)–below the bar (part 1 of 2)
### Figure 14: DB2 storage details (DB2STORD)—below the bar (part 2 of 2)

<table>
<thead>
<tr>
<th>Description</th>
<th>Column 1</th>
<th>Column 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Cushion</td>
<td>227.82</td>
<td>227.89</td>
</tr>
<tr>
<td>Contract Warning Cushion</td>
<td>113.80</td>
<td>113.80</td>
</tr>
<tr>
<td>Reserved For Must Complete</td>
<td>113.80</td>
<td>113.80</td>
</tr>
<tr>
<td>Reserved For MVS Usage</td>
<td>0.22</td>
<td>0.29</td>
</tr>
<tr>
<td>Total MVS Storage Below 2GB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 bit Low Private</td>
<td>0.22</td>
<td>0.24</td>
</tr>
<tr>
<td>24 bit High Private</td>
<td>0.68</td>
<td>0.27</td>
</tr>
<tr>
<td>31 bit Extended Low Private</td>
<td>75.11</td>
<td>13.50</td>
</tr>
<tr>
<td>31 bit Extended High Private</td>
<td>31.38</td>
<td>12.36</td>
</tr>
<tr>
<td>Extended Region Size (MAX)</td>
<td>1138.00</td>
<td>1138.00</td>
</tr>
<tr>
<td>Extended CSA Size</td>
<td>750.32</td>
<td></td>
</tr>
</tbody>
</table>

Information about storage usage above the 2-GB bar is displayed at the bottom portion of this view, (Figure 15 on page 27).

### Figure 15: DB2 storage details (DB2STORD)—above the bar

<table>
<thead>
<tr>
<th>Description</th>
<th>Column 1</th>
<th>Column 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Storage Above the Bar</td>
<td>6.13</td>
<td>0.09</td>
</tr>
<tr>
<td>Fixed Storage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Getmained Storage</td>
<td>240.51</td>
<td>0.00</td>
</tr>
<tr>
<td>Variable Storage</td>
<td>25.25</td>
<td>0.02</td>
</tr>
<tr>
<td>Total Shared Storage Above the Bar</td>
<td>3.33</td>
<td>1.34</td>
</tr>
<tr>
<td>Fixed Shared Storage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Getmained Shared Storage</td>
<td>4.93</td>
<td></td>
</tr>
<tr>
<td>Variable Shared Storage</td>
<td>8.20</td>
<td></td>
</tr>
<tr>
<td>Agent Local Storage</td>
<td>7.19</td>
<td></td>
</tr>
<tr>
<td>System Agent Storage</td>
<td>4.99</td>
<td></td>
</tr>
<tr>
<td>Storage Manager Structures</td>
<td>1.34</td>
<td>1.34</td>
</tr>
<tr>
<td>Allocated for Thread Copies</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>HWM Allocated for Thread Copies</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Total Stmt Cache Block Storage</td>
<td>0.09</td>
<td></td>
</tr>
<tr>
<td>DBD Pool</td>
<td>22.85</td>
<td></td>
</tr>
<tr>
<td>Statement Cache Pool</td>
<td>110.73</td>
<td></td>
</tr>
<tr>
<td>Virtual Buffer Pools</td>
<td>39.06</td>
<td></td>
</tr>
<tr>
<td>Virtual Pool Control Blocks</td>
<td>0.58</td>
<td></td>
</tr>
<tr>
<td>Castout Buffers</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Compression Dictionary</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Total xPROC Storage for Static SQL</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>Total array variable storage</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Real Storage Usage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number Of Real Frames(4K)</td>
<td>88855</td>
<td>4252</td>
</tr>
<tr>
<td>Number Of Auxillary Slots(4K)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Log Manager storage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Write buffers Real Frames</td>
<td>256</td>
<td></td>
</tr>
<tr>
<td>Write buffers Aux Frames</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Control Structures Real Frames</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Control Structures Aux Frames</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

#### Note

These views support only current (recent) data online. To see history data, use the BSTATSTM—Virtual Storage Status batch report, described in the MainView for DB2 Performance Reporter User Guide.

3 Press F3 until you return to EZDSSI.
Analyzing DDF connections and activity

You can analyze active and inactive Distributed Data Facility (DDF) connections, threads, and conversations by using the DDF views.

To analyze DDF connections and activity

1. From EZDSSI, hyperlink on **DDF Menu** to display the EZDDF easy menu.

   **Figure 16: DDF easy menu (EZDDF)**

   EZDDF provides access to information about DDF connections, DBAT threads, statistics, exception monitors, ZPARM installation parameters, and (if MainView for z/OS is installed) IBM System z Integrated Information Processor (zIIP) usage for active DBAT threads.

2. Hyperlink on **All Locations** to display a summary of the DDF connections by DB2 subsystem and remote location.

   **Figure 17: Connection location summary (DDFLocz)**

The PING and TRACERT commands are available on this view and several other DDF views to check the state of a TCP/IP connection and to trace the route to a destination. Network security might limit your ability to execute these commands.

3. In the C line command field, enter **P** next to a connection to issue an ICMP echo request to a remote IP host.

   If an echo reply is received within ten seconds, the host is considered accessible and the elapsed response time is shown:
BBMXV335I Message(s) received from targets on BMCE ---

BBPF1015I Ping: 'mwitkows-BMC-04.bprod.bmc.com' is alive; time = 43ms

BBMXV336I --- End of message(s) from targets on BMCE ---

Otherwise, the PING command times out and a message is issued.

4 Press F3 until you return to EZDDF.

5 Hyperlink on Client Products - SSI to display DDF connections summarized by client product ID.

In SSI mode, the DDFPRODZ view summarizes connections for all monitored DB2 subsystems.

**Figure 18: Client product summary (DDFPRODZ)**

<table>
<thead>
<tr>
<th>Client Network</th>
<th>Last Idle Time</th>
<th>Network I/O Time</th>
<th>Activ Conns</th>
<th>Inact Conns</th>
<th>Total Conns</th>
<th>Activ Conversations</th>
<th>Inact Conversations</th>
<th>Total Conversations</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSN</td>
<td>00:44:27.90</td>
<td>2008.184</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>SQL</td>
<td>00:43:23.36</td>
<td>2008.184</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

The network idle time and last network I/O time stamp are valuable indicators of potential problems with remote clients and connections.

If the Client Product field displays SQL, it hyperlinks to DB2 Connect activity. If it displays JCC, it hyperlinks to JDBC Universal Driver activity.

Both the DDFPRODZ and DDFLOCZ views hyperlink to views that display connections and conversations for the remote product or remote location.

6 Press F3 as needed to return to EZDDF.

7 Hyperlink on Connections Menu to display the EZDDF2 easy menu.
Use this menu to check the status of threads, connections, and conversations by server or requester.

Figure 19: DB2 DDF Connection Menu (EZDDDF2)

Table: DDF Connection Menu

<table>
<thead>
<tr>
<th>Threads</th>
<th>Conversations</th>
</tr>
</thead>
<tbody>
<tr>
<td>. All Threads</td>
<td>. All Conversations</td>
</tr>
<tr>
<td>. Server</td>
<td>. Server</td>
</tr>
<tr>
<td>. Requester</td>
<td>. Requester</td>
</tr>
<tr>
<td>. Active Threads</td>
<td>. Active Conversations</td>
</tr>
<tr>
<td>. Server</td>
<td>. Server</td>
</tr>
<tr>
<td>. Requester</td>
<td>. Requester</td>
</tr>
<tr>
<td>. Inactive Connections</td>
<td>. Inactive Conversations</td>
</tr>
<tr>
<td>. Server</td>
<td>. Server</td>
</tr>
<tr>
<td>. Requester</td>
<td>. Requester</td>
</tr>
<tr>
<td>. All Locations</td>
<td>. Server</td>
</tr>
<tr>
<td>. Locations</td>
<td>. Requester</td>
</tr>
<tr>
<td>. Analytics Accelerator</td>
<td>. Analytics Accelerator</td>
</tr>
</tbody>
</table>

[In the All Threads section, hyperlink on Server to display the DDFTHDZ view.]

Figure 20: Thread summary (DDFTHDZ)

8 In the All Threads section, hyperlink on Server to display the DDFTHDZ view.

On this view and other DDF views, the Thread Token and AuthID fields hyperlink to the THDDETL view and DUSER display for additional information about active DBATs or distributed threads.

9 Press F3 until you return to EZDSSI.

Analyzing a specific DB2

Use the following procedures to analyze detailed data about a specific DB2.

To view detailed data about a specific DB2

1 From EZDSSI, select the easy menu EZDB2.

The EZDB2 easy menu is designed to analyze one DB2 at a time. This method selects one DB2 from the context of ALL. (If you select the SSI Status - List DB2s hyperlink, the STDB2 view provides a drill down on the target to STDB2D, and from there to EZDB2.)
Tip
Alternatively, you could access the detailed data by selecting any view from the DB2 SSI easy menu (EZDSSI). From the list of available DB2 targets, you can hyperlink to another view with more information about the selected DB2.

Figure 21: DB2 easy menu (EZDB2)

<table>
<thead>
<tr>
<th>DB2 Status</th>
<th>Thread Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>. DB2 Status Summary</td>
<td>. Current Threads (Elap)</td>
</tr>
<tr>
<td>. DB2 Health Dashboard</td>
<td>&gt; Active Thread Menu</td>
</tr>
<tr>
<td>. Current Exceptions</td>
<td>&gt; DB2 Event Traces</td>
</tr>
<tr>
<td>. Activity Rates</td>
<td>. DB2 IFCID Traces</td>
</tr>
<tr>
<td>&gt; Stats Menu</td>
<td>. MVB2/DC Admin/Archive</td>
</tr>
<tr>
<td>&gt; System Resources</td>
<td>. CATALOG MANAGER Local</td>
</tr>
<tr>
<td>&gt; Locking Menu</td>
<td>. CATALOG MANAGER-Remote</td>
</tr>
<tr>
<td>. Buffer Pools</td>
<td>* Pool Advisor</td>
</tr>
<tr>
<td>. EDM Pool</td>
<td>Tools And Menus</td>
</tr>
<tr>
<td>. Dynamic SQL Cache</td>
<td>. Set Target Context</td>
</tr>
<tr>
<td>. Static SQL Cache</td>
<td>&gt; DBA Easy Menu</td>
</tr>
<tr>
<td>. RID Pool</td>
<td>&gt; MAIN Menu</td>
</tr>
<tr>
<td>. Logging</td>
<td>&gt; BBI-SS PAS Info</td>
</tr>
<tr>
<td>&gt; DDF Menu</td>
<td>&gt; BBI-SS Parm Info</td>
</tr>
<tr>
<td>. Page Set Status</td>
<td>. Return...</td>
</tr>
<tr>
<td>. Volume 1/0 Summary</td>
<td>&gt; What’s New</td>
</tr>
<tr>
<td>&gt; Page Set Menu</td>
<td></td>
</tr>
<tr>
<td>&gt; Tuning Wizards</td>
<td></td>
</tr>
</tbody>
</table>

To select the target DB2 that you want to analyze

1 Use one of the following methods:

- Hyperlink on Set Target Context to see a list of targets; then, place your cursor in the Target column and press Enter to hyperlink to a different target.

- Type CON target on the COMMAND line, where CON target is the name of the DB2 target that you want.

Notice that the Tools And Menus section provides hyperlinks to several other easy menus.

Checking DB2 status

Use the following procedure to check the status of the target DB2.

To check the status of the target DB2

1 From EZDB2, hyperlink on DB2 Status Summary.

This link takes you to the STDB2 view, (“Checking the status of all DB2 subsystems” on page 17), but only one DB2 is displayed.
2 To review recent history, on the COMMAND line type `TIME * * 2H` to see the last 2 hours by 15-minute intervals.

3 Type `INCLUDE TIME` to see the times (the **Intvl Time** column is added to the view), (Figure 22 on page 32).

**Figure 22: DB2 activity overview (STDB2)**

```
1OMAR2011 16:57:55 --------MainView WINDOW INTERFACE (V6.0.00) ----------
COMMAND ===>                                                  SCROLL ===> CSR
CURR WIN ===> 1        ALT WIN ===>                        >W1=STDB2============DB2HC====*========10MAR2011==16:57:54====MVDB2====D====1
+ DB2 Status / Statistics                                    + Show Header
DB2       Intvl  Act   Comm  Getpg  Lockout Total                Dataset  Data
Target     Time  Thrd  Rate   Rate     Rate Excpt Warning Msg     In-Use     O
DB2HC         5   0.0    4.7      0.0     0 GBL cont >2%         4       63
```

**Tip**
If you needed to analyze a time period further, you could hyperlink on that period (although doing so is not recommended for this practice session).

4 Reset to current time by typing `TIME * * 1I` and then `EXCLUDE TIME`.

5 Hyperlink on **DB2 Target** to see a detail status view, (Figure 23 on page 33).
You can also access the STDB2D view by selecting one DB2 from STDB2 in SSI mode.

**Figure 23: DB2 status detail–interval (STDB2D)**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>INFORMATION DISPLAY</th>
<th>COMMAND</th>
<th>SCROLL</th>
<th>CSR</th>
<th>CURR WIN</th>
<th>ALT WIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>10MAR2011</td>
<td>16:58:31</td>
<td></td>
<td>--------</td>
<td>--------</td>
<td>-----</td>
<td>----------</td>
<td>---------</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DATABASE</th>
<th>Connect</th>
<th>Active</th>
<th>In DB2</th>
<th>Queued</th>
<th>Suspended</th>
<th>CPU%</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSO</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Batch</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>--BATCH</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>--CAF</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>--Utility</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>IMS</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>CICS</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>DBAT</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>RRSAF</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>SYS THRODS</td>
<td>213</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td><em>Total</em></td>
<td>217</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EDM Pool</th>
<th>EDM Fail</th>
<th>BP Thresh</th>
<th>INACTIVE</th>
<th>ACTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.50.100</td>
<td>0.50.100</td>
<td>0.50.100</td>
<td>0.50.100</td>
<td>0.50.100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DBM1 Stor:</th>
<th>Available</th>
<th>In Use</th>
<th>Total MVS</th>
<th>128.89</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP Rates:</td>
<td>Getpage</td>
<td>0.1</td>
<td>Reads</td>
<td>0</td>
</tr>
<tr>
<td>Locking:</td>
<td>Suspend</td>
<td>0</td>
<td>Deadlocks</td>
<td>0</td>
</tr>
<tr>
<td>Exceptions:</td>
<td>Monitor</td>
<td>0</td>
<td>System</td>
<td>0</td>
</tr>
<tr>
<td>Data Sets:</td>
<td>Open</td>
<td>124</td>
<td>Open HWM</td>
<td>124</td>
</tr>
<tr>
<td>Parallel:</td>
<td>Maximum</td>
<td>0</td>
<td>Groups</td>
<td>0</td>
</tr>
<tr>
<td>Routine:</td>
<td>Calls</td>
<td>0</td>
<td>Abends</td>
<td>0</td>
</tr>
<tr>
<td>GBP Rates:</td>
<td>Reads</td>
<td>0.0</td>
<td>Writes</td>
<td>0.0</td>
</tr>
<tr>
<td>Paging:</td>
<td>DB2</td>
<td>0.0</td>
<td>System</td>
<td>0.0</td>
</tr>
<tr>
<td>DB2 Start:</td>
<td>Date</td>
<td>24JUN200</td>
<td>Time</td>
<td>07:09:30</td>
</tr>
<tr>
<td>Traces</td>
<td>Ifibuff</td>
<td>262144</td>
<td>Monsize</td>
<td>262144</td>
</tr>
</tbody>
</table>

This view shows an overview of current thread activity per attach type, and key indicators of recent performance:

- The top of the view includes several hyperlinks.
- The middle includes hyperlinks to threads of different connect types.
- The bottom includes hyperlinks in the key indicators.

There are several hyperlinks at the top of the view, in addition to hyperlinks to threads of different connect types in the middle of the view, and others in the key indicators shown at the bottom of the view.

6 Use the **STDB2DS** hyperlink at the top of the view to see totals since DB2 startup instead of current interval values in the key indicator fields.

7 Use the **EZDSTATD** option at the top of STDB2D to see the DB2 Stats Detail easy menu.
This easy menu resembles the DB2 Status easy menu, EZDSTAT, that you saw earlier, but the hyperlinks here take you directly to detailed statistics views for this DB2.

8 From EZDSTATD, hyperlink on **SQL Counts** to see STSQLD as an example of these detailed statistics views, ([Figure 24 on page 34](#)).

**Figure 24: SQL counts detail (STSQLD)**

8MAR2011  17:01:51 ------------ INFORMATION DISPLAY -------------------------
COMMAND  ===>                                                 SCROLL ===> CSR
CURR WIN ===> 1        ALT WIN ===>
W1 =EZDSTATD==STSQLD===DB2HC====*========10MAR2011==16:57:54====MVDB2====D====1
SQL Counts Detail..........

<table>
<thead>
<tr>
<th>Interval</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>SELECT...</td>
<td>0</td>
</tr>
<tr>
<td>INSERT...</td>
<td>0</td>
</tr>
<tr>
<td>UPDATE...</td>
<td>2</td>
</tr>
<tr>
<td>DELETE...</td>
<td>0</td>
</tr>
<tr>
<td>DESCRIBE...</td>
<td>0</td>
</tr>
<tr>
<td>PREPARE...</td>
<td>12</td>
</tr>
<tr>
<td>OPEN......</td>
<td>10</td>
</tr>
<tr>
<td>FETCH.....</td>
<td>150</td>
</tr>
<tr>
<td>CLOSE.....</td>
<td>9</td>
</tr>
</tbody>
</table>

9 Press **F3** to return to EZDSTATD.

10 Press **F3** to return to STDB2D.

11 Hyperlink on **TSO** to see a tabular view of current TSO users.

You have stepped through several status views now. However, some information is not available in windows mode. Examples are information about IBM CICS connections, IBM DB2 logging, DSNZPARM values, and so on.

12 Press **F3** to return to EZDB2.

13 Hyperlink on **Exception Menu**.

In addition to access to the exception displays that you have seen before, the Exception Menu also has a hyperlink to the MainView ALERTS view. This view consolidates monitor exceptions and those produced by alarms defined in MV ALARM. The view also contains hyperlinks to the Alerts Menu and to MV ALARM.

14 Press **F3** to return to EZDB2.

**Using the DB2 topic index menu**

Instead of always using the menu navigation, you can quickly find the views that you want through topic index views. For this practice procedure, assume that you
want to investigate a DB2 performance issue, specifically, data set open and close activity.

**To use the DB2 topic index menu**

1. On EZDB2, hyperlink on **DB2 Topic Index** to access the DB2 Topic Index menu, which provides alphabetic access to the defined topics.

2. To investigate data set open/close activity, type **TOPICD** on the **COMMAND** line to access a list of DB2 topics that start with the letter *D* (Figure 25 on page 35).

   **Note**

   You can complete this action in any MainView for DB2 view.

---

**Figure 25: DB2 topic index view**

<table>
<thead>
<tr>
<th>10MAR2011 17:19:48</th>
<th>INFORMATION DISPLAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND ====&gt;</td>
<td>SCROLL ====&gt; CSR</td>
</tr>
<tr>
<td>CURR WIN ====&gt; 1</td>
<td>ALT WIN ====&gt;</td>
</tr>
<tr>
<td>W1 =TOPICD=DEDM=====*========10MAR2011==16:50:48====MVDB2====D====1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DB2 Topic Index - D View</th>
<th>SSI Monitor</th>
<th>ZPARM</th>
<th>Acctg</th>
<th>Trace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Base Descriptors (DBD)</td>
<td>STEDMPD</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Data Capture(IFI)</td>
<td>STCHKPD</td>
<td>Y</td>
<td>ZPSYS</td>
<td>-</td>
</tr>
<tr>
<td>Data Definition Control</td>
<td>-</td>
<td>-</td>
<td>ZPDDLCTD</td>
<td>-</td>
</tr>
<tr>
<td>Data Manager Crit.Threshold</td>
<td>BFRPL</td>
<td>Y</td>
<td>ZPSYS</td>
<td>-</td>
</tr>
<tr>
<td>Data Sets</td>
<td>Y</td>
<td>-</td>
<td>ZPDDLCTD</td>
<td>-</td>
</tr>
<tr>
<td>Activity</td>
<td>-</td>
<td>-</td>
<td>ZPDDLCTD</td>
<td>-</td>
</tr>
<tr>
<td>Current Open</td>
<td>STDSAD</td>
<td>Y</td>
<td>DSOPN</td>
<td>-</td>
</tr>
<tr>
<td>Deferred (Pseudo) Close</td>
<td>STDSAD</td>
<td>Y</td>
<td>ZPDDLCTD</td>
<td>-</td>
</tr>
<tr>
<td>Management</td>
<td>-</td>
<td>-</td>
<td>ZPDDLCTD</td>
<td>-</td>
</tr>
<tr>
<td>Migrations</td>
<td>STDSAD</td>
<td>Y</td>
<td>MIGOS</td>
<td>-</td>
</tr>
<tr>
<td>Migrations - by BPool</td>
<td>BFRPL</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Open Requests</td>
<td>STDSAD</td>
<td>Y</td>
<td>DSOPR</td>
<td>-</td>
</tr>
<tr>
<td>Opens - by Buffer Pool</td>
<td>BFRPL</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Recall Timeouts</td>
<td>STDSAD</td>
<td>Y</td>
<td>RTO</td>
<td>ZPDDLCTD</td>
</tr>
<tr>
<td>Recall Timeouts-by Bpool</td>
<td>BFRPL</td>
<td>Y</td>
<td>RTO</td>
<td>ZPDDLCTD</td>
</tr>
<tr>
<td>Utilization</td>
<td>STDB2D</td>
<td>-</td>
<td>DSUTL</td>
<td>ZPDDLCTD</td>
</tr>
<tr>
<td>Data Sharing</td>
<td>EZDSHAR</td>
<td>Y</td>
<td>-</td>
<td>ZPDDLCTD</td>
</tr>
<tr>
<td>Castout Definitions</td>
<td>-</td>
<td>-</td>
<td>ZPDDLCTD</td>
<td>-</td>
</tr>
<tr>
<td>GBP Data-Group</td>
<td>STGBFRPD</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Locking</td>
<td>STGBLKD</td>
<td>Y</td>
<td>-</td>
<td>ZPDDLCTD</td>
</tr>
<tr>
<td>Wizard- Data Sharing</td>
<td>WZDSHAR</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>DBAS CPU</td>
<td>STDBSYSD</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>DB2 Definitions</td>
<td>-</td>
<td>-</td>
<td>ZPDDLCTD</td>
<td>-</td>
</tr>
<tr>
<td>DB2 Statistics</td>
<td>EZDSTATD</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>DB2 Status</td>
<td>STDB2D</td>
<td>Y</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>DB2 System Definitions</td>
<td>-</td>
<td>-</td>
<td>ZPDDLCTD</td>
<td>-</td>
</tr>
<tr>
<td>DB2s - Activity</td>
<td>THDDBAT</td>
<td>Y</td>
<td>-</td>
<td>HT</td>
</tr>
<tr>
<td>Active / Pooled</td>
<td>STDISTD</td>
<td>Y</td>
<td>THDAC</td>
<td>-</td>
</tr>
<tr>
<td>Queued</td>
<td>STDISTD</td>
<td>Y</td>
<td>DBTQD</td>
<td>ZPDDFD</td>
</tr>
<tr>
<td>Thread Control ZPARMs</td>
<td>-</td>
<td>-</td>
<td>ZPDDFD</td>
<td>-</td>
</tr>
</tbody>
</table>

3. In the resulting list of topics, locate **Data Sets**.

Several entries appear under this topic, including several for open/close activity. The first hyperlink column is usually the one you want to take when looking at a single DB2, but you can also access similar SSÍ views, access related monitors and ZPARMs, and identify relevant trace data.
4 Hyperlink on **STDSAD** to see the view of that name, which shows the statistics that you need.

5 Press **F3** until you return to EZDB2.

## Analyzing buffer pools

Use the following procedure to analyze buffer pools for the target DB2.

### To analyze buffer pools for the target DB2

1. From EZDB2, hyperlink on **Buffer Pools** to see a list of all defined pools with allocated space, utilization, and getpage rates, (Figure 26 on page 36).

   **Figure 26: Buffer pool statistics (BFRPL)**

   10MAR2011 17:04:18 ------------ INFORMATION DISPLAY -------------------------------
   COMMAND ===> SCROLL ===> CSR
   CURR WIN ===> 1 ALT WIN ===>
   >W1 =BFRPL=========DEDM=====*========04MAR2011==14:55:04====MVDB2====D===21
   
<table>
<thead>
<tr>
<th>Pool</th>
<th>DB2</th>
<th>Vpool</th>
<th>Vpool</th>
<th>Getpg</th>
<th>Get-</th>
<th>%</th>
<th>% Active</th>
<th>Alloc</th>
<th>Pool</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP0</td>
<td>DEDM</td>
<td>2000</td>
<td>2000</td>
<td>0.0</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP1</td>
<td>DEDM</td>
<td>1001</td>
<td>1001</td>
<td>0.0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP2</td>
<td>DEDM</td>
<td>1002</td>
<td>0.0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP3</td>
<td>DEDM</td>
<td>1003</td>
<td>0.0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP4</td>
<td>DEDM</td>
<td>1004</td>
<td>0.0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
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<tr>
<td>BP5</td>
<td>DEDM</td>
<td>1005</td>
<td>0.0</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP6</td>
<td>DEDM</td>
<td>1006</td>
<td>0.0</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP7</td>
<td>DEDM</td>
<td>1007</td>
<td>0.0</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP25</td>
<td>DEDM</td>
<td>1250</td>
<td>0.0</td>
<td>0</td>
<td>0</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Hyperlink on **Pool Name** to see all status and statistics for one pool.
Both interval and session counts are shown (Figure 27 on page 37).

**Figure 27: Local buffer pool statistics detail (BFRPLD)**

<table>
<thead>
<tr>
<th>Buffers Allocated</th>
<th>Current Active Buffers</th>
<th>Expansions/contractions</th>
<th>No Buffer - Pool Full</th>
<th>Expansion Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Virtual Pool Allocation.</th>
<th>Interval</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>VP Size</td>
<td>1002</td>
<td></td>
</tr>
<tr>
<td>Virtual Pool Sequential Threshold</td>
<td>B2</td>
<td></td>
</tr>
<tr>
<td>Deferred Write Threshold</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>Vertical Write Threshold</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Vertical Write Threshold (Buffers)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Parallel Sequential Threshold</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>Assisting Parallel Threshold</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Page Steal Algorithm</td>
<td>LRU</td>
<td></td>
</tr>
<tr>
<td>Autosize Attribute Y/N</td>
<td>N</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Getpages</td>
<td>Sequential Getpages</td>
<td>Async I/O</td>
<td>Requests</td>
<td>Requests</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sequential Getpages</td>
<td>0</td>
<td>Sync I/O</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>Sequential Sync I/O</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sync I/O</td>
<td>0</td>
<td>Destructive Reads</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>Destructive Reads Dequeue</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sequential Sync I/O</td>
<td>0</td>
<td>Page-Ins for I/O</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>Page-ins for I/O</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Destructive Reads</td>
<td>0</td>
<td>Page-Ins for I/O</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>Page-Ins for I/O</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Destructive Reads Dequeue</td>
<td>0</td>
<td>Page-Ins for I/O</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>Page-Ins for I/O</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Page-Ins for I/O</td>
<td>0</td>
<td>Page-Ins for I/O</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

3 Scroll down with F8 to see all of the data.

4 Press F3 to return to BFRPL.

5 Locate current and session ratios for one pool:

a Hyperlink on Getpg/sec.

A list of current hit ratios per pool is displayed, BFRPLH.

b Hyperlink on Pool Name.
A list of current and session ratios for one pool is displayed, (Figure 28 on page 38)

**Figure 28: Buffer pool rates detail (BFRPLHD)**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Sessions</th>
<th>Interval</th>
<th>Session</th>
<th>Activity per Second</th>
<th>Getpages</th>
<th>Page Updates</th>
<th>Sync I/O</th>
<th>Prefetch I/O</th>
<th>Write I/O</th>
<th>Data Set Opens</th>
</tr>
</thead>
<tbody>
<tr>
<td>10MAR2011</td>
<td>17:07:12</td>
<td>1</td>
<td>10MAR2011</td>
<td>17:07:12</td>
<td></td>
<td>143.20</td>
<td>29.78</td>
<td>0.40</td>
<td>15.51</td>
<td>0.80</td>
<td>0.00</td>
</tr>
</tbody>
</table>

6 Press F3 to return to EZDB2.

Group buffer pools are discussed later in the data sharing section.

---

**Related Information**

- “Tuning group buffer pools” on page 81

---

**Using the Catalog Browse facility**

MainView for DB2 also provides a Catalog Browse facility with hyperlinks to the CATALOG MANAGER product. If you are licensed for the full product, all of its functions are available directly from MainView for DB2.

**To use the Catalog Browse facility**

1 From EZDB2, hyperlink on CATALOG MANAGER–Local (for a DB2 that is in the same LPAR as your UAS) or CATALOG MANAGER–Remote (for a DB2 that is in a different LPAR).

The Catalog Browser Primary Menu is displayed (Figure 29 on page 39).
Note
If you have a full license for Catalog Manager, the Catalog Manager Primary menu is displayed with full functionality.

Figure 29: Catalog Browser Primary Menu

This menu allows you to browse most catalog objects.

2 Press F1 to see a complete list of objects.

3 Use the Tab key to move to the Object type selections, and type DB to see a list of databases.

You now see the object list display of all databases.

4 Enter a line command of either S or D next to one database to see the complete catalog row data for that database.

5 Press F3 to return to the database list.

6 Enter the TS line command to list the table spaces in the selected database.

7 For help on available actions, type COMMAND.

Tip
If you receive a message, you can type TSO BMCMSG msgid for more information.

Analyzing lock contention

Although locking problems must usually be resolved at the application level, the first indication of problems—and the simplest identification of the applications and resources involved—can best be seen at the system level.
To view locking problems in one DB2 (without data sharing)

If you are not sure whether you are having much lock contention, you might want to review the lockout and suspension counts and rates first in the STRATE view.

1. From EZDB2, hyperlink on Activity Rates.

   A certain number of lock suspensions (and even an occasional timeout or deadlock) is to be expected in an active DB2 system. However, because more frequent lockout conditions (timeouts or deadlocks) might be cause for concern because they might terminate associated SQL statements.

2. Press F3 to return to EZDB2.

3. Select Locking Menu.

The DB2 Locking easy menu EZDLOCK is displayed, Figure 30 on page 40.

Figure 30: DB2 locking menu (EZDLOCK)

<table>
<thead>
<tr>
<th>COMMAND</th>
<th>10MAR2011 12:41:15 INFORMATION DISPLAY 810</th>
<th>SCROLL</th>
<th>CSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>CURR WIN</td>
<td>1 CURRENTLY HELD LOCKS +-----------------------</td>
<td>LOCKOUTS - ONE DB2</td>
<td>810</td>
</tr>
<tr>
<td>ALT WIN</td>
<td>SCROLL 810</td>
<td>810 Lockout Analysis &gt;</td>
<td></td>
</tr>
<tr>
<td>DB2 Locking Menu</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CURRENTLY HELD LOCKS</td>
<td>+---------------</td>
<td>LOCKOUTS - ONE DB2</td>
</tr>
<tr>
<td></td>
<td>SUSPENDED THREADS</td>
<td>+-----------------</td>
<td>LOCKOUTS - DATA SHARING</td>
</tr>
<tr>
<td></td>
<td>RESOURCES WITH WAITERS</td>
<td>+-----------------</td>
<td>RESOURCE CONT. SUMMARY</td>
</tr>
<tr>
<td></td>
<td>LOCKS HELD / THREADS</td>
<td>+-----------------</td>
<td>BLOCKER / WAITER SUMMARY</td>
</tr>
<tr>
<td></td>
<td>LOCKS HELD / RESOURCES</td>
<td>+-----------------</td>
<td>CONTENTION ANALYSIS</td>
</tr>
<tr>
<td></td>
<td>LOCKOUTS - ONE DB2</td>
<td>&lt; LOCKOUT ANALYSIS &gt;</td>
<td>BLOCKER SUMMARY</td>
</tr>
<tr>
<td></td>
<td>LOCKOUT EVENTS BY TIME</td>
<td>RESOURCE CONT. SUMMARY</td>
<td>LOCKOUT EVENTS BY TIME</td>
</tr>
<tr>
<td></td>
<td>BLOCKER / WAITER SUMMARY</td>
<td>CONTENTTYPE CONT. SUMMARY</td>
<td>BLOCKER / WAITER SUMMARY</td>
</tr>
<tr>
<td></td>
<td>CONTENTION ANALYSIS</td>
<td>WAITER SUMMARY</td>
<td>RETURN</td>
</tr>
</tbody>
</table>

Although you might have analyzed lockout conditions one at a time before, the windows mode views provide additional analysis capabilities. They are available through the hyperlinks in EZDLOCK.

---

**Note**

EZDLOCK and its options are also available from EZDSSI to analyze locking across a data sharing group in an SSI context.

**Viewing current lock contention**

Use the following procedure to view current lock contention.

For more information, view the Quick Course "Monitoring DB2 Locking."
To view current lock contention

1. From the DB2 Locking Menu (EZDLOCK), hyperlink on **Suspended Threads**.

A list of active threads that are currently suspended for locks is displayed, (Figure 31 on page 41). Holding and waiting threads in current conflicts are identified.

**Figure 31: Suspended threads (LSTSUSPZ)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Information Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>10MAR2011</td>
<td>COMMAND ==&gt; SCROLL ==&gt; CSR</td>
</tr>
<tr>
<td>Curr Win ==&gt; 1</td>
<td>ALT WIN ==&gt;</td>
</tr>
<tr>
<td>W1 =LSTSUSPZ=</td>
<td></td>
</tr>
<tr>
<td>User</td>
<td>DB2</td>
</tr>
<tr>
<td>Id</td>
<td>target</td>
</tr>
<tr>
<td>Wait</td>
<td>Locks</td>
</tr>
<tr>
<td>Lock</td>
<td>Types</td>
</tr>
<tr>
<td>BOLDJW1</td>
<td>DECE</td>
</tr>
<tr>
<td>YES</td>
<td>7, 1, 6, BATCH, 00:00:54.82</td>
</tr>
<tr>
<td>BOLDJW1</td>
<td>DECE</td>
</tr>
<tr>
<td>YES</td>
<td>7, 1, 6, BATCH, 00:00:31.13</td>
</tr>
<tr>
<td>BOLDJW1</td>
<td>DECE</td>
</tr>
<tr>
<td>YES</td>
<td>129, 0, 129, BATCH, 00:00:00.72</td>
</tr>
</tbody>
</table>

**Note**

LSTSUSPZ is also accessible through hyperlinks in several thread views (THD xxx).

Views with thread data include all thread identifiers, and the current SQL statement. You might want to customize the views to see the identifiers most important for your workloads.

2. Press **F3** to return to EZDLOCK.

3. Hyperlink on **Locks Held / Threads**.

A list of all threads with lock counts is displayed, (Figure 32 on page 41).

**Figure 32: Locks held / threads (LSTLOCKZ)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Information Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>10MAR2011</td>
<td>COMMAND ==&gt; SCROLL ==&gt; CSR</td>
</tr>
<tr>
<td>Curr Win ==&gt; 1</td>
<td>ALT WIN ==&gt;</td>
</tr>
<tr>
<td>W1 =LSTLOCKZ=</td>
<td></td>
</tr>
<tr>
<td>User</td>
<td>DB2</td>
</tr>
<tr>
<td>Id</td>
<td>target</td>
</tr>
<tr>
<td>Wait</td>
<td>Locks</td>
</tr>
<tr>
<td>Lock</td>
<td>Types</td>
</tr>
<tr>
<td>BOLDJW1</td>
<td>DECE</td>
</tr>
<tr>
<td>YES</td>
<td>29, 28, BATCH, 1 NO</td>
</tr>
<tr>
<td>BOLDJW1</td>
<td>DECE</td>
</tr>
<tr>
<td>YES</td>
<td>7, 6, 1 NO</td>
</tr>
<tr>
<td>BOLDJW1</td>
<td>DECE</td>
</tr>
<tr>
<td>YES</td>
<td>7, 6, 1 NO</td>
</tr>
<tr>
<td>BOLDJW1</td>
<td>DECE</td>
</tr>
<tr>
<td>YES</td>
<td>130, 130, BATCH, 0 NO</td>
</tr>
<tr>
<td>NONE</td>
<td>DECE</td>
</tr>
<tr>
<td>2, 0 NO DISCONN, 2 NO</td>
<td></td>
</tr>
</tbody>
</table>

From both LSTSUSPZ and LSTLOCKZ, you can hyperlink on one thread to see all of its locked resources (or a resource that the thread is waiting on), and then drill down on a conflict to see the holder and waiter threads. The current elapsed time of each lock is also available.

4. Press **F3** to return to EZDLOCK.

5. Hyperlink on **Resources with Waiters**.

---

Analyzing a specific DB2

Chapter 2  Isolating DB2 performance problems    41
A list of resources in contention is displayed, (Figure 33 on page 42).

**Figure 33: Resources with waiters (LSRWAITZ)**

<table>
<thead>
<tr>
<th>10MAR2011 14:42:12</th>
<th>INFORMATION DISPLAY</th>
<th>SCROLL ===&gt; CSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND ===&gt;</td>
<td>SCROLL ===&gt; CSR</td>
<td></td>
</tr>
<tr>
<td>CURR WIN ===&gt; 1</td>
<td>ALT WIN ===&gt;</td>
<td></td>
</tr>
<tr>
<td>&gt;W1 =LSRWAITZ=DECE=10MAR2011==14:42:12===MVDB2==D==1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resource Name ------</td>
<td>DB2</td>
<td></td>
</tr>
<tr>
<td>Thrd Exclusive</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Shared Gbl</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Gbl</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Longest</td>
<td>00:02:13.51</td>
<td></td>
</tr>
<tr>
<td>Database Tspace</td>
<td>DWQADB01 DWQAX07A</td>
<td></td>
</tr>
<tr>
<td>Page / Part target</td>
<td>DECE</td>
<td></td>
</tr>
<tr>
<td>Wait</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Locks</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Locks Con</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Elapsed</td>
<td>00:02:13.51</td>
<td></td>
</tr>
</tbody>
</table>

6 Hyperlink on a resource in LSRWAITZ to see the lock holder and all waiters (LSRCONT), (Figure 34 on page 42).

**Figure 34: Lock resource contention (LSRCONT)**

<table>
<thead>
<tr>
<th>10MAR2011 14:43:04</th>
<th>INFORMATION DISPLAY</th>
<th>SCROLL ===&gt; CSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND ===&gt;</td>
<td>SCROLL ===&gt; CSR</td>
<td></td>
</tr>
<tr>
<td>CURR WIN ===&gt; 1</td>
<td>ALT WIN ===&gt;</td>
<td></td>
</tr>
<tr>
<td>&gt;W1 =LSRWAITZ=LSRCONT=DECE=10MAR2011==14:42:12===MVDB2==D==2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resource Name ------</td>
<td>Thread Lock Lock</td>
<td></td>
</tr>
<tr>
<td>Thrd Lock</td>
<td>Lock Time</td>
<td></td>
</tr>
<tr>
<td>Status State</td>
<td>Elapsed User</td>
<td></td>
</tr>
<tr>
<td>Type Duration</td>
<td>00:00:43.15 BOLDJW1</td>
<td></td>
</tr>
<tr>
<td>Database Tspace</td>
<td>DWQADB01 DWQAX07A</td>
<td></td>
</tr>
<tr>
<td>Page / Part target</td>
<td>WAITER EXCL PDSO MANUAL</td>
<td></td>
</tr>
<tr>
<td>Status State</td>
<td>00:02:13.51 BOLDJW1</td>
<td></td>
</tr>
</tbody>
</table>

7 Press **F3** until you return to EZDLOCK.

8 Hyperlink on **Locks Held / Resources**.
A list of all resources with locks is displayed, (Figure 35 on page 43).

![Figure 35: Locks held / resources (LSRHELDZ)](image)

9 Press F3 to return to EZDLOCK.

### Analyzing timeouts and deadlocks

Use the following procedure to analyze timeouts and deadlocks.

#### To analyze timeouts and deadlocks

1. On the EZDLOCK menu, hyperlink from **Lockout Events by Time** (for one DB2).
A list of timeouts and deadlocks is displayed, (Figure 36 on page 44).

**Figure 36: Lockout events (LKEVENT)**

<table>
<thead>
<tr>
<th>Date / Time</th>
<th>Type</th>
<th>Victim Plan</th>
<th>AuthID</th>
<th>Connect</th>
<th>CType</th>
<th>Corr ID</th>
<th>Re</th>
</tr>
</thead>
<tbody>
<tr>
<td>17SEP-16:58:56.41</td>
<td>DEADLOCK</td>
<td>AUDIT</td>
<td>BBLLAT5</td>
<td>TSO</td>
<td>TSO</td>
<td>BBLLAT5</td>
<td></td>
</tr>
<tr>
<td>17SEP-16:58:45.18</td>
<td>TIMEOUT</td>
<td>PAYROLL</td>
<td>DMRDLK3</td>
<td>BATCH</td>
<td>TSO</td>
<td>DMRDLK3</td>
<td></td>
</tr>
<tr>
<td>17SEP-16:42:34.18</td>
<td>TIMEOUT</td>
<td>PAYROLL</td>
<td>DMRTMO3</td>
<td>BATCH</td>
<td>TSO</td>
<td>DMRTMO3</td>
<td></td>
</tr>
<tr>
<td>17SEP-16:37:33.20</td>
<td>DEADLOCK</td>
<td>AUDIT</td>
<td>BBLLAT5</td>
<td>TSO</td>
<td>TSO</td>
<td>BBLLAT5</td>
<td></td>
</tr>
</tbody>
</table>

This view shows a chronological list of lockout events that have occurred since DB2 startup, sorted with the most current at the top of the screen. The most recent events are retrieved from an online buffer that holds a default of 100 events.

2 Type **SORT** on the **COMMAND** line and press the **Tab** key to move to the **Victim Plan** column. In the **Victim Plan** column, sort these lockout events by plan name to identify the applications for which SQL requests were terminated.

3 Hyperlink on the **Date/Time** field for an event (preferably a deadlock that involves multiple resources).

The first view shows the resources involved and the holder (blocker) and waiter plans.

4 Scroll right to see additional details for both resources at once, or hyperlink on the **Res Seq** field to see all of the available details for this conflict.

5 Press **F3** until you return to EZDLOCK.

6 Hyperlink on **Resource Cont. Summary**.

A list of resources involved in timeouts or deadlocks is displayed, (Figure 37 on page 44).

**Figure 37: Lockout resource summary (LKRESZ)**

<table>
<thead>
<tr>
<th>Database Object</th>
<th>Conflicts</th>
<th>% Total</th>
<th>Global</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSNBDS1A DSNBSS1E</td>
<td>5</td>
<td>11.4</td>
<td>2</td>
</tr>
<tr>
<td>DSNBDS1A DSNBSS1P</td>
<td>2</td>
<td>28.6</td>
<td>2</td>
</tr>
</tbody>
</table>

The first view, LKRESZ, summarizes all conflicts by resource name, usually database and table space. A deadlock with three resources and participants will result in three conflicts, not one, for the purposes of this analysis. With this view, you can easily identify those table spaces involved in the most contention.
7 Hyperlink on a resource name that shows one or more conflicts to see a breakdown of these conflicts by specific resource, down to a page or row level (LKRESNRZ).

With this view, hot spots in your tables are immediately visible, (Figure 38 on page 45).

Figure 38: Lockout resource number summary (LKRESNRZ)

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>10MAR2011</td>
<td>17:22:35</td>
</tr>
</tbody>
</table>

COMMAND ===> SCROLL ===> CSR

CURR WIN ===> 1 ALT WIN ===>

WL =LKRESZ===LKRESNRZ=DB2HC====*========10MAR2011==17:22:35====MVDB2====D====1

--Resource Name-- Resource   Resource  Total           % Total     Global
   Database Object   Number     Type      Conflicts       0...50...100 Conflicts
   DSN8D51A DSN8S51E 0000001200 DATAPAGE          5  71.4 ********            2

8 Hyperlink on either the resource name or the resource number to view a list of each lockout event that involved this resource (LKRESD), (Figure 39 on page 45).

The events are initially sorted in descending sequence by time, but you can use the SORT command to sort by any column. (To view the online Help, type HELP SORT on the COMMAND line.) Controlling the sort order allows you to identify quickly the applications (blocker planname, waiter planname) and users (blocker/waiter Corr ID, Connection, Victim Auth ID) who are involved.

Figure 39: Lockout resource conflict detail (LKRESD)

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>10MAR2011</td>
<td>17:24:34</td>
</tr>
</tbody>
</table>

COMMAND ===> SCROLL ===> CSR

CURR WIN ===> 1 ALT WIN ===>

WL =LKRESZ===LKRESD=DB2HC====*========10MAR2011==17:24:34====MVDB2====D====5

--Resource Name-- Resource   Resource   Time   Lockout  Blocker  Waiter   Gbl
   Database Object   Number     Type     -------- Type     PlanName PlanName Con
   DSN8D51A DSN8S51E 0000001200 DATAPAGE 16:58:56 DEADLOCK PAYROLL  AUDIT    Yes
   DSN8D51A DSN8S51E 0000001200 DATAPAGE 16:58:45 TIMEOUT  AUDIT    PAYROLL
   DSN8D51A DSN8S51E 0000001200 DATAPAGE 16:37:33 DEADLOCK PAYROLL  AUDIT    Yes
   DSN8D51A DSN8S51E 0000001200 DATAPAGE 16:36:53 TIMEOUT RXDB2    RXDB2

Although the solution to locking problems might involve application or table redesign, at least you now know where the problems lie.

9 Press F3 until you return to EZDLOCK.
10 Hyperlink on **Conntype Cont. Summary** if you suspect that the problem might lie in application scheduling, where applications with incompatible lock usage are running concurrently, (Figure 40 on page 46).

**Figure 40: Lockout connection summary (LKCONZ)**

| 10MAR2011 17:38:42 --------MainView WINDOW INTERFACE (V6.0.00) ----------- |
| COMMAND ===> | SCROLL ===> CSR |
| CURR WIN ===> 1 | ALT WIN ===> |
| W1=LKCONZ-------------DB2HC--------10MAR2011=17:38:41=MVDB2=D====1 |
| DB2   Victim  Victim  Blocker  Timeouts  Deadlocks  % Lockouts  |
| Target ConnType Connect Connect 0....50..100  |
| DB2HC  TSO      TSO      BATCH            0         2   40.0 ***** |
| DB2HC  BATCH    BATCH    TSO              2         0   40.0 ***** |
| DB2HC  CAF      DB2CALL  CAF              1         0   20.0 ***  |

The view LKCONZ summarizes the conflict data to identify, for example, whether batch jobs or utilities are blocking critical CICS or IMS transactions. As in the resource summaries, hyperlinks lead to lists of the exact events with time stamps, so that the critical time periods can be seen at a glance.

11 Press F3 until you return to EZDLOCK.

12 Hyperlink on **Blocker/Waiter Summary** to identify incompatible applications that are frequently blocking each other, (Figure 41 on page 46).

**Figure 41: Lockout blocker/waiter summary (LKBWZ)**

| 10MAR2011 17:40:24 --------MainView WINDOW INTERFACE (V6.0.00) ----------- |
| COMMAND ===> | SCROLL ===> CSR |
| CURR WIN ===> 1 | ALT WIN ===> |
| W1=LKBWZ-------------DB2HC--------10MAR2011=17:40:24=MVDB2=D====1 |
| Blocker  Waiter  Timeout  Deadlock  % Conflicts  Global  Participant  |
| PlanName PlanName  Involv.  Invovl.  .... 0....50...100  Confl. -Only Count  |
| AUDIT  PAYROLL        2        0   40.0 *****               0            0 |
| PAYROLL  AUDIT         0        2   40.0 *****               0            0 |
| RXDB2  RXDB2           1        0   20.0 ***                 0            0 |

The view LKBWZ summarizes the conflict data by blocker and waiter plans, so that you can quickly see which applications are causing the most conflicts. The hyperlinks again show all of the lockout events where the selected plan was involved.

13 Press F3 until you return to EZDB2.

**Tip**

If you want to print a lockout report, use one of the views designed for this purpose. The views LKPRINT, LKPR133, and LKPR133L combine the data from LKEVENT with the resource information from LKEVRES. For more information about the lock views, see the **MainView for DB2 User Guide**.

For information about printing views, see “Printing views and reports” on page 165.
Analyzing page set usage and I/O

Use the following procedures to analyze and tune page set usage, and I/O.

- “To look at data object issues with the focus still on a single DB2” on page 47
- “To view data set placement and volume I/O response times” on page 49
- “To analyze page usage in the buffer pools by page set” on page 51
- “To see if any objects are in restricted or advisory status, or are being accessed by a utility” on page 52

The tuning of physical I/O and page set usage in the buffer pools is a critical success factor in DB2.

DB2 itself uses many techniques to reduce or defer I/O, but the setup, from DASD volumes to buffer pool allocation and thresholds, all plays a part.

To look at data object issues with the focus still on a single DB2

1. From EZDB2, select the Page Set Menu option.

   The DB2 Object Menu (EZDPS) is displayed.

   Note
   MainView for DB2 collects these page set statistics with low overhead from DB2 control blocks.
   The I/O counts for low activity page sets are retained as interval counts until they reach the threshold of one I/O per second for a STATIME interval.

   Figure 42: DB2 Object Menu (EZDPS)

<table>
<thead>
<tr>
<th>Page Set Information</th>
<th>DB2 Object Menu</th>
<th>I/O by Page Set (SSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Status</td>
<td>Place Cursor On</td>
<td>Total I/Os - Session</td>
</tr>
<tr>
<td>Cache Statistics</td>
<td>Menu Item And</td>
<td>Total I/Os - Interval</td>
</tr>
<tr>
<td>List Page Sets (/DB2)</td>
<td>Press ENTER</td>
<td>Sync I/Os - Session</td>
</tr>
<tr>
<td>List Page Sets (SSI)</td>
<td></td>
<td>Sync I/Os - Interval</td>
</tr>
<tr>
<td>GBP-Dependent Status</td>
<td></td>
<td>Async I/Os - Session</td>
</tr>
<tr>
<td>Summaries</td>
<td>Set DB2 Context</td>
<td>Async I/Os - Interval</td>
</tr>
<tr>
<td>By Volume (SSI)</td>
<td>Catalog Manager-Local</td>
<td>Status Summaries</td>
</tr>
<tr>
<td>By Volume (/DB2)</td>
<td>* Database List</td>
<td>Restricted Objects</td>
</tr>
<tr>
<td>By Buffer Pool</td>
<td>* TableSpace List</td>
<td>Utility Jobs</td>
</tr>
<tr>
<td>By Data Base</td>
<td>* IndexSpace List</td>
<td>Stored Procedures</td>
</tr>
<tr>
<td>By Object</td>
<td></td>
<td>Return...</td>
</tr>
</tbody>
</table>

2. To review the status of all open page sets, hyperlink on Status.
3 Type **SORT D** and move to the **EXT** column by pressing the **Tab** key.

Sort on the **EXT** column to identify the data sets with the highest number of extents (a potential performance impact).

4 If you want to limit the view by selecting only certain page sets, use the **WHERE** command (which works like the SQL **WHERE** clause):

   a For a column on which you want to filter the view, place the cursor in the column header and press **F1**.

   b In the displayed Help, find the element name for that column.

   c Enter **WHERE** on the **COMMAND** line.

   d In the **Where Condition** field, enter the column's element name and the condition that you want to apply.
Example
To show only data sets that have more than five extents, use a column with the element name IO_EXT, enter \texttt{IO\_EXT > 5}.
To see only data sets in use by Database DSNDB06, use a column with the element name IO\_DBTSP, enter \texttt{IO\_DBTSP = DSNDB06*}.
DSNDB06* refers to all data sets on the PSSTAT view that are in a page set that starts with DSNDB06 (which may be part or all of the Data Base name).


e  Press \textbf{F3} to return to PSSTAT.

f  Repeat steps Step 4.a on page 48 through Step 4.e on page 49 for each column on which you want to filter the view.

Tip
For any view, you can determine which filters are in effect by using the SHOWFILT command.

5  Hyperlink on the \textbf{Page Set} field to see complete details about the selected page set, including size, volume, buffer pool cache data, and detailed I/O counts and elapsed wait times.

You might need to scroll down with F8 to see all of the data.

6  Press \textbf{F3} to return to PSSTAT.

7  Choose one of the following actions:

- To view the threads currently accessing this page set, hyperlink on the \textbf{Users} column.

- To view possible I/O errors and page sets that are currently in restricted or advisory status, hyperlink on the \textbf{Err} column.
  The hyperlink displays the OBJDETL view to show more details about that object and its status.

8  Press \textbf{F3} to return to EZDB2.

One of the most important issues to check periodically is data set placement and volume I/O response times.

To view data set placement and volume I/O response times

1  Hyperlink on \textbf{Volume I/O Summary}.  

Chapter 2 Isolating DB2 performance problems  49
A list of the volumes in use for DB2 databases is displayed, (Figure 44 on page 50).

**Figure 44: Volume I/O summary–session (PSVOLSZ)**

<table>
<thead>
<tr>
<th>Volume Target</th>
<th>Nr.</th>
<th>Sync</th>
<th>% Sync Avg</th>
<th>Max % Sync Avg</th>
<th>Async % Sync Avg</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAB309 DB2H</td>
<td>1</td>
<td>9</td>
<td>2.0</td>
<td>77</td>
<td>13</td>
</tr>
<tr>
<td>BAB310 DB2H</td>
<td>16</td>
<td>141</td>
<td>31.0</td>
<td>144</td>
<td>16</td>
</tr>
<tr>
<td>BAB312 DB2H</td>
<td>21</td>
<td>144</td>
<td>32.9</td>
<td>144</td>
<td>24</td>
</tr>
<tr>
<td>BAB314 DB2H</td>
<td>5</td>
<td>25</td>
<td>5.5</td>
<td>27</td>
<td>14</td>
</tr>
<tr>
<td>BAB316 DB2H</td>
<td>4</td>
<td>4</td>
<td>1.1</td>
<td>23</td>
<td>14</td>
</tr>
<tr>
<td>BAB318 DB2H</td>
<td>9</td>
<td>50</td>
<td>11.0</td>
<td>50</td>
<td>22</td>
</tr>
<tr>
<td>BAB319 DB2H</td>
<td>1</td>
<td>2</td>
<td>0.4</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>BAB320 DB2H</td>
<td>1</td>
<td>2</td>
<td>0.4</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>BAB321 DB2H</td>
<td>1</td>
<td>3</td>
<td>0.7</td>
<td>3</td>
<td>22</td>
</tr>
<tr>
<td>BAB325 DB2H</td>
<td>13</td>
<td>40</td>
<td>8.8</td>
<td>47</td>
<td>20</td>
</tr>
<tr>
<td>BAB330 DB2H</td>
<td>1</td>
<td>3</td>
<td>0.7</td>
<td>3</td>
<td>22</td>
</tr>
</tbody>
</table>

2. To sort the volumes with the highest average delays to the top, type **SORT D** on the **COMMAND** line and use the **Tab** key to move to **Sync Avg I/O Wait**.

These values are based on activity since DB2 startup.

3. To see a 2-hour summary of activity for one volume broken down into 15-minute intervals, hyperlink on **Sync I/Os**.

4. Press **F3** to return to PSVOLSZ.

5. To see a list of all page sets on that volume, hyperlink on a volume.

You can scroll to the right to see the asynchronous I/Os made for prefetch because these I/Os have different access characteristics and delay times than do synchronous I/Os.

6. Return to EZDPS:
   a. Press **F3** until you return to EZDB2.
   b. Hyperlink on the **Page Set Menu** option.

7. To view I/O counts and wait times per page set, hyperlink on any of the **I/O by Page Set** options.
   - To identify the highest average delays that can point out DASD response time problems, sort on the **Avg I/O Wait** column.
   - To identify occasional contention problems that are masked in the averages, sort on the **Max I/O Wait** column.
**Note**
The maximum is calculated since DB2 startup, not per interval. This limitation does reduce its usefulness.

---

8 Press F3 until you return to EZDPS.

**To analyze page usage in the buffer pools by page set**

1 On EZDPS, hyperlink on Cache Statistics.

The Page Set cache (PSCACHE) is displayed, (Figure 45 on page 51).

**Figure 45: Page Set cache (PSCACHE)**

<table>
<thead>
<tr>
<th>Database</th>
<th>Object</th>
<th>Prt ID</th>
<th>Current</th>
<th>Maximum</th>
<th>Changed</th>
<th>Max Chng</th>
<th>% All</th>
<th>%BP</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB2HWORK</td>
<td>DSN4K01</td>
<td>001 BP00</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>DSNDB01</td>
<td>DBO01</td>
<td>001 BP00</td>
<td>7</td>
<td>23</td>
<td>0</td>
<td>6</td>
<td>4.0</td>
<td>3.5</td>
</tr>
<tr>
<td>DSNDB01</td>
<td>DSNLLX01</td>
<td>001 BP00</td>
<td>9</td>
<td>10</td>
<td>0</td>
<td>6</td>
<td>5.2</td>
<td>4.5</td>
</tr>
<tr>
<td>DSNDB01</td>
<td>DSNLX02</td>
<td>001 BP00</td>
<td>3</td>
<td>8</td>
<td>0</td>
<td>6</td>
<td>1.7</td>
<td>1.5</td>
</tr>
<tr>
<td>DSNDB01</td>
<td>DSNLUX01</td>
<td>001 BP00</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>1.7</td>
<td>1.5</td>
</tr>
<tr>
<td>DSNDB01</td>
<td>DSNLUX02</td>
<td>001 BP00</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>1.2</td>
<td>1.0</td>
</tr>
<tr>
<td>DSNDB01</td>
<td>DSNCT02</td>
<td>001 BP00</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>DSNDB01</td>
<td>DSNST01</td>
<td>001 BP00</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>DSNDB01</td>
<td>DSNST02</td>
<td>001 BP00</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>DSNDB01</td>
<td>SCT02</td>
<td>001 BP00</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>3</td>
<td>0.6</td>
<td>0.5</td>
</tr>
<tr>
<td>DSNDB01</td>
<td>SPT01</td>
<td>001 BP00</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>3</td>
<td>0.6</td>
<td>0.5</td>
</tr>
<tr>
<td>DSNDB01</td>
<td>SYSLGRNX</td>
<td>001 BP00</td>
<td>8</td>
<td>13</td>
<td>0</td>
<td>7</td>
<td>4.6</td>
<td>4.0</td>
</tr>
<tr>
<td>DSNDB01</td>
<td>SYSUTILX</td>
<td>001 BP00</td>
<td>3</td>
<td>12</td>
<td>0</td>
<td>5</td>
<td>1.7</td>
<td>1.5</td>
</tr>
<tr>
<td>DSNDB06</td>
<td>DSNADH01</td>
<td>001 BP00</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>1.2</td>
<td>1.0</td>
</tr>
<tr>
<td>DSNDB06</td>
<td>DSNAGH01</td>
<td>001 BP00</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>1.2</td>
<td>1.0</td>
</tr>
<tr>
<td>DSNDB06</td>
<td>DSNAPH01</td>
<td>001 BP00</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>DSNDB06</td>
<td>DSNTX01</td>
<td>001 BP00</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>1.2</td>
<td>1.0</td>
</tr>
<tr>
<td>DSNDB06</td>
<td>DSNTX02</td>
<td>001 BP00</td>
<td>6</td>
<td>6</td>
<td>0</td>
<td>2</td>
<td>3.5</td>
<td>3.0</td>
</tr>
<tr>
<td>DSNDB06</td>
<td>DSNTX03</td>
<td>001 BP00</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>1.7</td>
<td>1.5</td>
</tr>
<tr>
<td>DSNDB06</td>
<td>DSNUH01</td>
<td>001 BP00</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1.2</td>
<td>1.0</td>
</tr>
<tr>
<td>DSNDB06</td>
<td>DSNCX01</td>
<td>001 BP00</td>
<td>7</td>
<td>7</td>
<td>0</td>
<td>4</td>
<td>4.0</td>
<td>3.5</td>
</tr>
<tr>
<td>DSNDB06</td>
<td>DSNDX01</td>
<td>001 BP00</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>1.2</td>
<td>1.0</td>
</tr>
<tr>
<td>DSNDB06</td>
<td>DSNX02</td>
<td>001 BP00</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>DSNDB06</td>
<td>DSNX03</td>
<td>001 BP00</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>1.2</td>
<td>1.0</td>
</tr>
<tr>
<td>DSNDB06</td>
<td>DSNXX01</td>
<td>001 BP00</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>1.2</td>
<td>1.0</td>
</tr>
</tbody>
</table>

You can sort on the VP Current column (descending) to show page sets with the highest current storage usage at the top. The VP Changed and VP Max Chng columns identify page sets with update activity.

2 Press F3 until you return to EZDPS.
The view PSBPSZ gives you a quick overview of how buffer pools are being used.

Sort on the VP Current column (descending) to show page sets with the highest current storage usage at the top.

The VP Changed and VP Max Chng columns identify those page sets with update activity.

Press F3 until you return to PSBPSZ.

Hyperlink on VP Current for a 2-hour history.

Press F3 until you return to EZDPS.

**To see if any objects are in restricted or advisory status, or are being accessed by a utility**

Hyperlink on Object Status Summary.

If Util Thds is set to Y, you can hyperlink to the THDUTIL view to display the utility threads that are associated with the restricted objects.

Press F3 until you return to EZDB2.

---

**Using monitors to isolate problems**

Monitors sample key measurements over time and save short-term history.
When thresholds are specified, the measured values are compared and automatic warnings are generated.

A default set of monitors defined in BBPARM member BLKDMRW is started automatically. You can tailor this set for each DB2 system with different monitors or different thresholds.

**To view the active monitors**

1. Choose one of the following actions:
   - Type `AT` on the COMMAND line.
   - On EZDB2, hyperlink on Active/Admin.
   - On EZDBA, hyperlink on Monitors: Active/Admin.

   **Figure 48: Active monitors (AT)**

   ![Figure 48: Active monitors (AT)]

   All active monitors are listed here. The current measurement values are shown and plotted compared to the thresholds. The W in the middle of the graph marks the warning threshold values. All monitors with acceptable values remain on the left side of the W. Those in warning status extend to the right and are highlighted.

**To start a monitor and modify an active monitor**

1. On the AT view, type `SM` (Start Monitors) on the COMMAND line.
The Start Monitor view is displayed listing all available monitor services.

**Figure 49: Start Monitors view (SM)**

<table>
<thead>
<tr>
<th>CMD Service</th>
<th>Num</th>
<th>Title</th>
<th>Parm Type</th>
<th>Area</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>#PFRQ</td>
<td></td>
<td>PREFETCH REQUESTS</td>
<td>(IDENTIFIER)</td>
<td>WKLD</td>
<td></td>
</tr>
<tr>
<td>#PRLF</td>
<td></td>
<td>I/O PRLL-FALLBACK-SEQ</td>
<td>(IDENTIFIER)</td>
<td>WKLD</td>
<td></td>
</tr>
<tr>
<td>#PRLG</td>
<td></td>
<td>I/O PRLL-GROUPS EXEC</td>
<td>(IDENTIFIER)</td>
<td>WKLD</td>
<td></td>
</tr>
<tr>
<td>#PRLR</td>
<td></td>
<td>I/O PRLL-GROUPS REDUCED</td>
<td>(IDENTIFIER)</td>
<td>WKLD</td>
<td></td>
</tr>
<tr>
<td>#PRLS</td>
<td></td>
<td>SYSPLEX PRLL QUERY FAILS</td>
<td>(IDENTIFIER)</td>
<td>WKLD</td>
<td></td>
</tr>
<tr>
<td>#PROC</td>
<td>3</td>
<td>DB2 TRANS PROCESSED</td>
<td>(IDENTIFIER)</td>
<td>WKLD</td>
<td></td>
</tr>
<tr>
<td>#RDIO</td>
<td></td>
<td>READ I/Os</td>
<td>(IDENTIFIER)</td>
<td>WKLD</td>
<td></td>
</tr>
<tr>
<td>#REOP</td>
<td></td>
<td>REOPTIMIZATIONS</td>
<td>(IDENTIFIER)</td>
<td>WKLD</td>
<td></td>
</tr>
<tr>
<td>#SPRC</td>
<td></td>
<td>SPROCS EXECUTED</td>
<td>(IDENTIFIER)</td>
<td>WKLD</td>
<td></td>
</tr>
<tr>
<td>#SQLA</td>
<td></td>
<td>ADMINISTRATIVE STMTS</td>
<td>(IDENTIFIER)</td>
<td>WKLD</td>
<td></td>
</tr>
<tr>
<td>#SQLC</td>
<td></td>
<td>SQL STMTS PER COMMIT</td>
<td>(IDENTIFIER)</td>
<td>WKLD</td>
<td></td>
</tr>
<tr>
<td>#SQLD</td>
<td></td>
<td>DDL SQL STATEMENTS</td>
<td>(IDENTIFIER)</td>
<td>WKLD</td>
<td></td>
</tr>
<tr>
<td>#SQLM</td>
<td>1</td>
<td>DATA MANIPULATIVE SQL</td>
<td>(IDENTIFIER)</td>
<td>WKLD</td>
<td></td>
</tr>
<tr>
<td>#SUSP</td>
<td></td>
<td>SUSPENSIONS</td>
<td>(IDENTIFIER)</td>
<td>WKLD</td>
<td></td>
</tr>
<tr>
<td>#TMO</td>
<td></td>
<td>TIMEOUTS</td>
<td>(IDENTIFIER)</td>
<td>WKLD</td>
<td></td>
</tr>
<tr>
<td>#UPDP</td>
<td></td>
<td>UPDATE PAGE REQUESTS</td>
<td>(IDENTIFIER)</td>
<td>WKLD</td>
<td></td>
</tr>
<tr>
<td>#WRT</td>
<td></td>
<td>WRITE IMMEDIATEST</td>
<td>(IDENTIFIER)</td>
<td>WKLD</td>
<td></td>
</tr>
<tr>
<td>@CPU</td>
<td></td>
<td>AVERAGE CPU USED</td>
<td>(IDENTIFIER)</td>
<td>WKLD</td>
<td></td>
</tr>
<tr>
<td>@CPUD</td>
<td></td>
<td>AVG CPU IN DB2</td>
<td>(IDENTIFIER)</td>
<td>WKLD</td>
<td></td>
</tr>
<tr>
<td>@ELAP</td>
<td>1</td>
<td>AVG ELAPSED TIME</td>
<td>(IDENTIFIER)</td>
<td>WKLD</td>
<td></td>
</tr>
<tr>
<td>@ELCL</td>
<td></td>
<td>AVG ELAPSED FOR CLAIM WT</td>
<td>(IDENTIFIER)</td>
<td>WKLD</td>
<td></td>
</tr>
</tbody>
</table>

Monitors look either at resources/system activity (resource monitors) or at workload activity (workload monitors). All workload monitor names start with # (for a count) or with an @ (for an average). One workload monitor can be started multiple times to look at different workloads, which can help isolate specific workload-related problems. Some resource monitors also have parameters to support multiple requests—for example, buffer pool number.

You can scroll through the list by using the **F7** and **F8** keys, sort on any of the columns, or select only monitors for the area in which you are interested.

2. To select the SQLM workload monitor, type **S** in the **CMD** column next to the #SQLM service.
By selecting #SQLM, you can view immediate activity because this service measures the number of DML statements issued.

**Figure 50: Start Workload Monitor dialog**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARM</td>
<td>You can specify any name as an ID if you want several requests for this monitor to look at different workloads.</td>
</tr>
</tbody>
</table>
| START     | Use the default to start at the next even minute, or type a future time in the format of *hh:mm:ss*.  
**Note:** The monitors are synchronized to the even minute to make it easier for you to compare the history values that they collect. |
<p>| INTERVAL  | Use the default (00:01:00) of one-minute data collection intervals. |
| STOP      | Use the default of no stop time, or type a time at which you want the monitor to stop in the format of <em>hh:mm:ss</em>, or the number of intervals (minutes). |
| WVAL      | A warning message is issued automatically when a sampling exceeds the monitor threshold. Type a low value so that you can see a warning. For example, if you expect 100 statements in a minute, type 50. You can change this setting to a more appropriate value later. |</p>
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WIF</td>
<td>Wait ( n ) intervals before issuing a warning. This parameter is optional; accept the default.</td>
</tr>
<tr>
<td>WMSG</td>
<td>If you leave this parameter blank, a warning message is sent to the Journal log when sampling exceeds the monitor threshold. This can be used to trigger MainView AutoOPERATOR EXECs. Current warnings are shown on DB2EX. Specify WTO if you want to send a message to the MVS console, or enter a TSO ID to send a message to that user.</td>
</tr>
<tr>
<td>WIN</td>
<td>Wait ( n ) intervals before sending ( n )th warning. This parameter is optional; accept the default.</td>
</tr>
<tr>
<td>WLIM</td>
<td>Limit number of warnings sent. This parameter is optional; accept the default.</td>
</tr>
<tr>
<td>RST</td>
<td>Monitor the reaction if DB2 stops and is restarted. This parameter is optional; accept the default.</td>
</tr>
<tr>
<td>QIS</td>
<td>Action to be taken when a target is not active. This parameter is optional; accept the default.</td>
</tr>
<tr>
<td>TITLE</td>
<td>Display title for the monitor service. This parameter is optional; accept the default.</td>
</tr>
<tr>
<td>PLOTMAX</td>
<td>Specify maximum value of X Axis on monitor plot display. This parameter is optional; accept the default.</td>
</tr>
<tr>
<td>RANGES</td>
<td>Set limits for range distribution statistics on plot display. This parameter is optional; accept the default.</td>
</tr>
<tr>
<td>LOG</td>
<td>Record a hardcopy plot in the BBI-SS PAS Image log. This parameter is optional; accept the default.</td>
</tr>
</tbody>
</table>

Specify a CONNTYPE to qualify workload monitor data collection by connection type: BATCH, CAF, CICS, DDF, DLI, DRDA, IMS, IMSBMP, IMSCTL, IMSMPP, IMSTBMP, RRSAF, TSO, UTIL, or blank. Blank collects data for all connection types.

Optionally, type one or more names next to DB2PLAN, DB2AUTH, DB2CONN, DB2CORR, DB2LOC, DB2PKG, and/or DB2RTN, where name can be a TSO, BATCH, DB2CALL, an IMSID, or a CICS Jobname. Leave blank for total workload.

DB2AUTH userid, userid, userid

For an explanation of the other workload selection criteria, see the online Help.
5 Press **Enter** to start the monitor and return to the list of monitors.

6 Press **F3** to return to the Active Monitors view (AT).

7 Press **Enter** repeatedly until the new monitor shows an ACTIVE status and current measurement values.

( Remember, the monitors were synchronized to start at an even minute.) You might need to scroll right to see the status field.

8 Modify a monitor in warning status (highlighted).

   a Type **M** (modify) next to the monitor ID to view the monitor options in effect.

   b Modify any of the options that you can tab to.

   **Note**
   
   If you did not start this monitor, you need special authorization to modify or purge it.

9 Choose an active monitor and change its threshold value.

   a Type **M** (modify) next to the monitor ID.

   b Set the threshold value in the WVAL field:

      ■ To set a maximum value, type **>n**

      ■ To set a minimum value, type **< n**

10 Press **F3** to return to the SM view, and press **F3** again to return to the AT view.

Look at how the graph of the current value compared to the new threshold has changed.

**Note**

To stop a monitor, use the **Z** line command.

You now know how to start and modify monitors. Next, you will learn how to look at the data.
Reviewing critical problems

The following sections explain how to use exceptions, warnings, workload objectives, and audit trails to investigate critical problems.

Viewing a list of exceptions

Use the following procedure to view a list of exceptions.

1. On EZDB2, hyperlink on Current Exceptions.

An overview of background sampler system exceptions, thread exceptions, and outstanding messages for monitors in warning status is displayed, (Figure 51 on page 58).

Figure 51: DB2 exceptions (STEXC)

<table>
<thead>
<tr>
<th>10MAR2011</th>
<th>08:51:39</th>
<th>MainView WINDOW INTERFACE (V6.0.00)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND</td>
<td>===&gt;</td>
<td>SCROLL ===&gt; CSR</td>
</tr>
<tr>
<td>CURR WIN</td>
<td>===&gt; 1</td>
<td>ALT WIN ===&gt;</td>
</tr>
<tr>
<td>W1 =STEXC</td>
<td>==&gt;(ALL==*==)</td>
<td>10MAR2011==08:51:39==MVDB2==D==7</td>
</tr>
<tr>
<td>DB2</td>
<td>Warning System Thread</td>
<td>Target Monitors Exceptions Exceptions Warning Msg</td>
</tr>
<tr>
<td>DEDM</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>DEEN</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>DEFG</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>DIT1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>DIT2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>QADHW2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>QADIB2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

This view identifies immediately whether any exceptions have been detected, and shows the types detected. Hyperlinks lead to additional details.

- **Warning Monitors** indicates the number of conditions that have been detected by timer-driven sampling monitors defined with warning thresholds. Typically, a predefined group of monitors is started automatically and remains active.

- **System Exceptions** are conditions that are detected by a background sampler and are not governed by a threshold (for example, a problem with log archiving).

- **Thread Exceptions** are thread-related conditions that a background sampler detects. Threshold conditions can be defined per attach type (for example, IBM IMS, CICS, or batch).

The first three types generate warning messages that can be viewed while active, tracked historically in the journal log, or fed into an automated operator product like MainView AutoOPERATOR.
- **Warning Msg** shows the most important of several conditions that are checked per interval or on request, as part of the total DB2 status and statistics data collection for windows mode views. These conditions can also be identified by one of the other exception samplers.

2. To see exception conditions that background samplers have detected, hyperlink on either the **Thread Exceptions** or **System Exceptions** column.

**Figure 52: Monitor exceptions (STMONEX)**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Name</th>
<th>Parm</th>
<th>ID</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>10MAR2011</td>
<td>08:54:51</td>
<td>UCPU</td>
<td>DZ0650W</td>
<td>RUNAWAY CAF USER BOLDJW1 CPU-TOTAL=12</td>
<td></td>
</tr>
<tr>
<td>08:54:50</td>
<td>UCPU</td>
<td>DZ0620W</td>
<td>RUNAWAY</td>
<td>CICS TRANSACTION USER BOLWTN1</td>
<td></td>
</tr>
<tr>
<td>08:54:45</td>
<td>UCPU</td>
<td>DZ0620W</td>
<td>RUNAWAY</td>
<td>CICS TRANSACTION USER BOLWTN1</td>
<td></td>
</tr>
<tr>
<td>08:54:25</td>
<td>UCPU</td>
<td>DZ0670W</td>
<td>RUNAWAY</td>
<td>DBAT USER BOLDJW1 GETPAGES=70</td>
<td></td>
</tr>
<tr>
<td>08:49:00</td>
<td>@ELTM</td>
<td>CICS</td>
<td>NO</td>
<td>CICS DB2 Workload(CICS) = 2.627 (&gt;2.</td>
<td></td>
</tr>
<tr>
<td>08:44:00</td>
<td>RIDUT</td>
<td>DS0620W</td>
<td>RID POOL % UTILIZATION(TOTAL) = 100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08:17:00</td>
<td>THDAB</td>
<td>DS0130W</td>
<td>ROLLBACK REQUESTS(TOTAL) = 23 IN 01:0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08:17:00</td>
<td>THDAB</td>
<td>DS0130W</td>
<td>ROLLBACK REQUESTS(TOTAL) = 32 IN 01:0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08:13:00</td>
<td>@ELTM</td>
<td>DBATDRDA</td>
<td>NO</td>
<td>DBAT DRDA Workload(DBATDRDA) = 2.290</td>
<td></td>
</tr>
<tr>
<td>08:13:00</td>
<td>@ELTM</td>
<td>DBATDRDA</td>
<td>NO</td>
<td>DBAT DRDA Workload(DBATDRDA) = 2.245</td>
<td></td>
</tr>
<tr>
<td>07:33:11</td>
<td>UCPU</td>
<td>DZ0630W</td>
<td>RUNAWAY</td>
<td>TSO QUERY USER BOLHHH2 CPU-T0</td>
<td></td>
</tr>
<tr>
<td>06:37:00</td>
<td>@ELTM</td>
<td>RRSAF</td>
<td>NO</td>
<td>RRSAF DRDA Workload(RRSAF) = 1.697 (</td>
<td></td>
</tr>
<tr>
<td>06:37:00</td>
<td>@ELTM</td>
<td>CAF</td>
<td>NO</td>
<td>CAF DB2 Workload(CAF) = 0.748 (&gt;0.27</td>
<td></td>
</tr>
<tr>
<td>17:05:41</td>
<td>UCPU</td>
<td>DZ0630W</td>
<td>RUNAWAY</td>
<td>TSO QUERY USER BADBPL1 GETPAG</td>
<td></td>
</tr>
<tr>
<td>16:15:48</td>
<td>UCPU</td>
<td>DZ0630W</td>
<td>RUNAWAY</td>
<td>TSO QUERY USER BODBPL3 CPU-T0</td>
<td></td>
</tr>
</tbody>
</table>

Scroll to the right to see more of the message text. For an explanation of the message, you can hyperlink on the **Message ID** column.

For exceptions related to specific threads (DZ06nnn messages), the **Mon Name** column hyperlinks to the active thread view THDACTV. For most other exceptions, the **Mon Name** column hyperlinks to a plot view.

3. Press **F3** to return to STEXC.

**Viewing monitors in warning status**

Use the following procedure to view monitors in warning status.

1. On STEXC, hyperlink on **Warning Monitors**.
The MONWARN view is displayed, Figure 53 on page 60. This view provides a summary of monitors that are in a warning status.

**Figure 53: Monitors in warning status (MONWARN)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Monitor</th>
<th>Value</th>
<th>Value</th>
<th>Monitor Warning</th>
<th>Value</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:19:28</td>
<td>CAF DB2 Workload</td>
<td>75.7830</td>
<td>0.2700</td>
<td>&gt;&gt;&gt;&gt;&gt;&gt;&gt;&gt;&gt;&gt;&gt;W&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;</td>
<td>00:01:30</td>
<td></td>
</tr>
<tr>
<td>11:19:28</td>
<td>CAF DB2 Workload</td>
<td>24.9347</td>
<td>1.3000</td>
<td>&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;W&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;</td>
<td>00:01:30</td>
<td></td>
</tr>
<tr>
<td>11:19:28</td>
<td>CICS DB2 Workload</td>
<td>2.5836</td>
<td>2.4400</td>
<td>&gt;&gt;&gt;&gt;&gt;&gt;&gt;&gt;&gt;&gt;&gt;W&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;</td>
<td>00:01:30</td>
<td></td>
</tr>
<tr>
<td>11:19:28</td>
<td>DBAT DRDA Workload</td>
<td>1.3842</td>
<td>1.3000</td>
<td>&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;W&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;</td>
<td>00:01:30</td>
<td></td>
</tr>
<tr>
<td>11:19:28</td>
<td>RRSASF DRDA Workload</td>
<td>73.6360</td>
<td>1.2400</td>
<td>&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;W&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;</td>
<td>00:01:30</td>
<td></td>
</tr>
<tr>
<td>11:19:28</td>
<td>RRSASF DRDA Workload</td>
<td>25.7405</td>
<td>1.2400</td>
<td>&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;W&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;</td>
<td>00:01:30</td>
<td></td>
</tr>
<tr>
<td>11:19:28</td>
<td>CSA % UTILIZATION</td>
<td>82.0000</td>
<td>80.0000</td>
<td>W</td>
<td>00:01:00</td>
<td></td>
</tr>
<tr>
<td>11:19:28</td>
<td>CSA % UTILIZATION</td>
<td>82.0000</td>
<td>80.0000</td>
<td>W</td>
<td>00:01:00</td>
<td></td>
</tr>
<tr>
<td>11:19:28</td>
<td>CSA % UTILIZATION</td>
<td>82.0000</td>
<td>80.0000</td>
<td>W</td>
<td>00:01:00</td>
<td></td>
</tr>
<tr>
<td>11:19:28</td>
<td>CSA % UTILIZATION</td>
<td>82.0000</td>
<td>80.0000</td>
<td>W</td>
<td>00:01:00</td>
<td></td>
</tr>
</tbody>
</table>

The view shows the number of active, completed (or invalid) and quiesced monitors. The row data shows the request, its parameter, the observed monitor value, the warning threshold, and a plotted graph of the observed value against the warning threshold.

2. To display additional information in a plot view, hyperlink on the Requests column.

**Figure 54: Sample plot view**

<table>
<thead>
<tr>
<th>Time</th>
<th>Elapsed</th>
<th>Events</th>
<th>Parm</th>
<th>Value</th>
<th>Value</th>
<th>Monitor Warning</th>
<th>Value</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:19:00</td>
<td>11:19:00</td>
<td>75.7830</td>
<td>1</td>
<td>DB2SAMP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:17:30</td>
<td>74.776</td>
<td>1</td>
<td>Warning..</td>
<td>0.27</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:16:00</td>
<td>91.450</td>
<td>1</td>
<td>Max/Min..</td>
<td>Maximum</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:14:30</td>
<td>61.236</td>
<td>2</td>
<td>Value..</td>
<td>86450.37</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:13:00</td>
<td>76.060</td>
<td>1</td>
<td>Time....</td>
<td>04:16:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:11:30</td>
<td>89.435</td>
<td>1</td>
<td>Graph Max</td>
<td>91.45</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:10:00</td>
<td>74.506</td>
<td>1</td>
<td>Target...</td>
<td>DEDM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:08:30</td>
<td>83.884</td>
<td>1</td>
<td>Descript.</td>
<td>CAF DB2 Workload</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:07:00</td>
<td>81.353</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:05:30</td>
<td>64.646</td>
<td>2</td>
<td>Samples..</td>
<td>452</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>26.463</td>
<td>16032</td>
<td>Sample Int.</td>
<td>00:15:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prev Pd</td>
<td>59.910</td>
<td>14</td>
<td>Start.....</td>
<td>00:01:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Curr Pd</td>
<td>72.772</td>
<td>13</td>
<td>Elapsed..</td>
<td>11:18:28</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The standard plot view shows the latest 10 values measured by the monitor. For further trending information, the values for the total monitoring period and the last 2 periods (10 samples each) are also shown. The threshold value is indicated with a W in the graph. Count type monitors show **Avg/Sec** rate calculations on the right side of the screen. Average type monitors (like the one shown in Figure 54 on page 60) show the number of events (threads).
Reviewing workload objectives

Special workload monitors are started automatically for you to provide service-level monitoring of response time per workload.

Several default workloads have been predefined for transaction and query connections to DB2, based on connection type. If you want to add workloads or modify the response time objectives of the existing workloads, see the MainView for DB2 User Guide.

To review your response time goals for the defined workloads

1. From EZDSSI, hyperlink on Monitors–Workload Objectives.

A list of workload objectives is displayed, (Figure 55 on page 61).

![Figure 55: Objectives review (DOBJ)](image-url)

The graph shows what percentage of all threads in that workload have met the response time goal.

You can access additional DOBJ* views by using the hyperlinks on the DOBJ view or EZDTHD easy menu.

Objectives monitor data includes the average response time, the thread rate, and what percentage of the goal has been attained. This data is also available in MainView Explorer charts. The charts provide an easy-to-use, historical perspective of the previous four hours.

Related Information

- "Analyzing workload history with MainView Explorer charts" on page 149
Viewing an audit trail

You can view an audit trail of problems throughout the day.

To view an audit trail

1 Use one of the following methods:

- Full-screen mode
  On the Primary Option Menu, select Option L, Log Display.

- Windows mode
  — On the EZDBA easy menu, hyperlink on Journal (Messages).
  — On the EZDB2 view, hyperlink on Journal Log.
  — On the COMMAND line, enter TRAN db2target DB2;LOG.

All MainView for DB2 messages are shown chronologically, (Figure 56 on page 62).

Figure 56: Sample log display

```
BMC Software --------------------- Log Display ----------------- General services
COMMAND ===> TGT ===> DB2G
LINE= 12,340 LOG= #1 STATUS= INPUT TIME= 17:51:38 INTV==> 3
12:11:00 DS0560W (04) 12:11:00 ECSA % UTILIZATION(TOTAL) = 71 (>70) ********
12:12:00 DS0560W (05) 12:12:00 ECSA % UTILIZATION(TOTAL) = 71 (>70) ********
12:12:55 XS6311I BBI/SESSION FOR -CPS17 - TERMINATED
12:13:00 DS0560W (06) 12:13:00 ECSA % UTILIZATION(TOTAL) = 71 (>70) ********
12:14:00 DS0560W (07) 12:14:00 ECSA % UTILIZATION(TOTAL) = 71 (>70) ********
12:15:00 DS0560W (08) 12:15:00 ECSA % UTILIZATION(TOTAL) = 72 (>70) ********
12:16:00 DS0560W (09) 12:16:00 ECSA % UTILIZATION(TOTAL) = 71 (>70) ********
12:17:00 DS0560W (10) 12:17:00 ECSA % UTILIZATION(TOTAL) = 71 (>70) ********
12:22:11 XS6304I BBI/SESSION FOR -LAA1 - TO -D31X- INITIATED
13:12:00 DS0561I 13:12:00 ECSA % UTILIZATION(TOTAL) NO LONGER > 70
13:28:48 DSNW131I - STOP TRACE SUCCESSFUL FOR TRACE NUMBER(S) 05
13:28:49 DSN9022I - DSNWCM1 'STOP TRACE' NORMAL COMPLETION
13:53:02 DS0560W (01) 13:53:00 ECSA % UTILIZATION(TOTAL) = 72 (>70) ********
13:54:00 DS0560W (02) 13:54:00 ECSA % UTILIZATION(TOTAL) = 74 (>70) ********
13:55:01 DS0560W (03) 13:55:00 ECSA % UTILIZATION(TOTAL) = 74 (>70) ********
13:56:00 DS0560W (04) 13:56:00 ECSA % UTILIZATION(TOTAL) = 74 (>70) ********
13:57:01 DS0560W (05) 13:57:00 ECSA % UTILIZATION(TOTAL) = 74 (>70) ********
13:58:00 DS0560W (06) 13:58:00 ECSA % UTILIZATION(TOTAL) = 74 (>70) ********
13:58:12 DSN3201I + ABNORMAL EOT IN PROGRESS FOR USER=LGS11
13:58:12 CONNECTION-ID=0DB2CALL CORRELATION-ID=LGS11
```

You also can request an online audit trail of all DB2 system messages by specifying LOG=YES per target DB2 in the DMRBEXxx member of the BBPARM data set.

2 To check for exceptions that occurred in a specific period (Locate Time), type Thhmm on the COMMAND line.
To FIND a specific exception, type \texttt{FIND DZnnnnnn}, where \textit{nnnnnn} is the exception message number.

Press \texttt{F5} for RFIND.

You might enter any of the following FIND commands on the \texttt{COMMAND} line:

- \texttt{FIND DW0200W} to find the #SQLM monitor warning
- \texttt{FIND DSNT375} to find DB2 deadlock messages
- \texttt{FIND DZ0630W} to find a runaway TSO query
- \texttt{FIND RUNAWAY} to find a runaway thread from any connection
- \texttt{FIND DW0} to find all workload monitor warnings

Scroll to the left with \texttt{F10} to see the origin of the messages. You can use this value to select a subset of the messages in the Journal log.

Type \texttt{PROFILE} on the \texttt{COMMAND} line to access the Enhanced Journal Facility, (Figure 57 on page 63).

Type your \texttt{DB2} target name (see the TGT field) in the \textbf{Included Origins} column, and return to the Log Display to view the messages only from that DB2.

To also include DB2 messages, specify the target name followed by a plus sign (+), such as \texttt{DB2G+}. This specification selects messages from the DB2 address spaces, such as DB2GMSTR.

To automatically select the messages from the current target DB2 subsystem, issue the \texttt{PROFILE} command and specify \texttt{&TARGET} in the \textbf{Included Origins} column.
**Note**
Specify the BBI-SS PAS ID to include MainView for DB2 messages.

**Issuing DB2 commands**

If you have the proper authorization in MainView for DB2 (different from DB2 authorization), you can also issue DB2 commands from the full-screen COMMAND line (usually from the Log Display so that you can see the response).

**To issue DB2 commands**

1. Issue the DISPLAY THREAD command by entering `-DIS THD(*)` on the COMMAND line.

The command is routed automatically to the DB2 system that is shown in the target field. You do not need to know the subsystem recognition character (SSRC) for each DB2.

The command response is displayed, (Figure 58 on page 64).

**Figure 58: Log Display**

```
BMC Software ------------------------ Log Display ------------------------ General services
COMMAND ===> TGT ==> DB2G
LINE= 30,270 LOG= #1 STATUS= INPUT TIME= 16:01:28 INTV==> 3
16:00:20 DSNV401I - DISPLAY THREAD REPORT FOLLOWS -
16:00:20 DSNV402I - ACTIVE THREADS -
16:00:20 NAME ST A REQ ID AUTHID PLAN ASID
16:00:20 DB2CALL T * 143 DB231 D31X 0068
16:00:20 DB2CALL T 30 OLTF OLTF 00CF
16:00:20 X18H N 300 0001DSN8IC0 PDRIVER 010D
16:00:20 X18H N 2 BABUSER 00FC
16:00:20 CICSCN3 N 3 BABUSER 0117
16:00:20 CICSCN3 N 0 0117
16:00:20 CICSCN3 N 0 0117
16:00:20 CICSCN3 N 0 0117
16:00:20 CICSCN3 N 0 0117
16:00:20 CICSCN3 N 0 0117
16:00:20 CICSCN3 N 0 0117
16:00:20 CICSCN3 N 0 0117
16:00:20 CICSCN3 N 0 0117
16:00:20 CICSCN3 N 0 0117
16:00:20 CICSCN3 N 0 0117
16:00:20 DISPLAY ACTIVE REPORT COMPLETE
16:00:20 DSN9022I - DSNVDT '-DIS THD' NORMAL COMPLETION
```
Viewing all DB2 commands

The MainView for DB2 - Data Collector provides a chronological log of DB2 commands. You can view all DB2 commands that have been issued since DB2 started.

To view all DB2 commands

1. From the EZDB2 easy menu, select DB2 Event Traces.

   The System Event Traces easy menu (EZDEVENT) is displayed, (Figure 59 on page 65).

   **Figure 59: EZDEVENT easy menu–DB2 system event traces**

2. From the EZDEVENT easy menu, hyperlink on Commands Executed.

   The DB2 Command History view (CMDLIST) is displayed.

   From the CMDLIST view, you can identify who has issued commands and hyperlink to the CMDTEXT view to see the complete text.
Reviewing critical problems
Monitoring a DB2 data sharing group

Monitoring DB2 data sharing increases the complexity of both the environment and the number of tuning knobs that need to be analyzed and optimized.

The first key requirement is to be able to focus on the level of data that is required to understand how the data sharing group is performing, or to solve a particular problem. Since a data sharing group consists of multiple DB2 members, and these members work together and share resources, viewing each DB2 individually is no longer adequate.

These scenarios show you how to look at all members concurrently so that you can easily compare activity and resource usage across the group. You can also access summarized data for the whole group, such as group buffer pool activity, total database I/O to the shared tables, or global lock contention. Of course, you will still drill down to an individual DB2 member for details as needed.

In this practice session, you will:

1. Define a Single System Image (SSI) context for the data sharing groups
2. Check on current group activity
3. Look at page set considerations
4. Analyze global lock contention
5. Tune group buffer pools

*Note*
This practice session takes approximately one hour to complete.
Defining the group context

You can use product-defined dynamic contexts to group data sharing member targets by their data sharing group name. The product address space (PAS) defines these contexts internally for active data sharing targets. The contexts are maintained for the life of the associated coordinating address space (CAS).

To use the product-defined dynamic contexts, specify CONTEXT DSG:dsgroup, where dsgroup is the data sharing group name.

If your site has already defined group contexts, or you want to use your own group context names, complete the following procedures:

- “To view defined SSI contexts” on page 68
- “To define an SSI context” on page 68

To view defined SSI contexts

1. On the EZDSSI menu (described in “Checking the status of all DB2 subsystems” on page 17), hyperlink on Set SSI Context (the first option under Tools And Menus).

This action presents a view of all defined SSI contexts for MainView for DB2, (Figure 60 on page 68).

Figure 60: SSI context selection list (CONASEL)

<table>
<thead>
<tr>
<th>10MAR2011 16:17:22</th>
<th>MainView WINDOW INTERFACE (V6.0.00)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND ===</td>
<td>SCROLL ===</td>
</tr>
<tr>
<td>CURR WIN ===</td>
<td>1</td>
</tr>
<tr>
<td>W1 =CONASEL=<strong><strong><strong><strong>SYSD=</strong></strong></strong></strong>=10MAR2011=16:17:21=PLEXMGR=D=4</td>
<td></td>
</tr>
<tr>
<td>CMD SSI</td>
<td>Product</td>
</tr>
<tr>
<td>---</td>
<td>---------</td>
</tr>
<tr>
<td>ALL</td>
<td>MV082</td>
</tr>
<tr>
<td>ALLDB2</td>
<td>MV082</td>
</tr>
<tr>
<td>DBGHC</td>
<td>MV082</td>
</tr>
</tbody>
</table>

If you already have a context defined for the data sharing group that you want to monitor, hyperlink on the context name to set the new context in effect.

To define an SSI context

1. On the COMMAND line, type CONACTZ.

This view lists all SSI contexts (as known by your CAS and any connected CASs). Your CASID is shown on the window information line.

If you have multiple MainView products installed, you can observe one of the most powerful features of SSI here: the same context can be defined for several different MainView products. Obviously, because each product might look at different target types, the selection criteria can vary.
2 Select the default context of **ALL** for MainView for DB2.

The CONACT view showing each of the defined DB2 target subsystems is displayed, (Figure 61 on page 69).

**Figure 61: SSI context activity manager (CONACT)**

<table>
<thead>
<tr>
<th>COMMAND</th>
<th>SCROLL</th>
<th>CSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>CURR WIN</td>
<td>1</td>
<td>ALT WIN</td>
</tr>
<tr>
<td>&gt;W1 =CONACTZ==CONACT===SYSD==</td>
<td>10MAR2011==11:02:43==PLEXMGR==D==3</td>
<td></td>
</tr>
<tr>
<td>CMD SSI Product Target Status Description</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>ALL MVDB2 DB0HC ACTIVE MainView for DB2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALL MVDB2 DB1HC ACTIVE MainView for DB2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALL MVDB2 DB2HC ACTIVE MainView for DB2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3 Type **CONDEF** on the COMMAND line.

The context definition dialog is displayed.

4 Browse an example of a context definition.

If a data sharing group context already exists, hyperlink on the SSI context name to see how the target filters were defined. If you do not see the group, select any other context. (You will at least see the default context of **ALL**.)

5 Press **F3** to return to CONDEF.

6 Type **EDIT** on the COMMAND line to obtain an edit lock.

7 Type **ADD** on the COMMAND line to display the Add SSI Context Definition panel, (Figure 62 on page 69).

**Figure 62: Add SSI Context Definition panel**

<table>
<thead>
<tr>
<th>COMMAND</th>
<th>SCROLL</th>
<th>CSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>CURR WIN</td>
<td>1</td>
<td>ALT WIN</td>
</tr>
<tr>
<td>&gt;W1 =CONDEF==</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSI Context Description</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Inclusion Filters: (Target is included if any are true)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>TGTNAME IN (DB1P, DB2P)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Equivalent SUBSTITUTION parameters to be used in filter expression:</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>%1=TGTNAME %2=TGTSYSTEM %3=TGTPRODUCT %4=TGTSERVER %5=TGTDESC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type END to add the SSI context definition CANcel to leave without adding</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>
In this panel, you define the context name and description, and the selection filters for the targets that will be part of this context. Help is available on each of the fields.

You can define several filter conditions, but, in this case, all you will need is to filter by TGTNAME. (The shorthand is %1). Because most sites use some kind of naming convention for the members, you probably need only one filter condition. The following example would include DB2s named DB1P, DB2P, and so on:

%1 = DB?P

If you prefer, you can define an IN list. The following example would include only the DB2s named DB1P and DB2P:

TGTNAME IN (DB1P,DB2P)

8 Type the following commands to activate this definition:

<table>
<thead>
<tr>
<th>Command</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>END</td>
<td>To return to the CONDEF view and complete the ADD</td>
</tr>
<tr>
<td>SAVE</td>
<td>To save the information</td>
</tr>
<tr>
<td>INSTALL</td>
<td>To dynamically activate this SSI context in this CAS</td>
</tr>
</tbody>
</table>

9 If multiple CASs are involved, you need to complete this definition in each CAS.

CASACT will show you a list of CASs and you can type CON casID to switch to another CAS.

10 If the CASs all share the same BBPARM (you still see the new definition after you switch to another CAS), you only need to type CONDEF, then EDIT, and then INSTALL.

--- Note ---
If the CASs do not share the same BBPARM, repeat steps Step 7 on page 69 through Step 9 on page 70 for each CAS.

11 Press F3 until you return to EZDSSI.

**Checking current group activity**

Use the following procedure to check the health of each member of your data sharing group and their activity levels. The previous dialogs covered multiple DB2
subsystems and their active threads. For data sharing, you focus on a data sharing group, instead of the default SSI context of ALL (which earlier procedures used).

**Note**
You must set the context when checking group activity. The context should be set already (set in the previous procedure). For future reference, you can set the context by typing `CON context` (for example, `CON DBGHC` to set the context to the DBGHC group).

**To view activity for a data sharing group**

1. Select options from the EZDSSI menu to look at only this group:
   - Select SSI Status - List DB2s to view a list of the DB2s in the data sharing group. This version of the STDB2 view is a good place to see how each DB2 member is performing. You can also drill down into details about a member.
   - Select Current Threads (Elap) to view all threads in the data sharing group, sorted by elapsed time.

2. Press F3 to return to EZDSSI.

3. Now choose the Data Sharing Wizard option to access the Data Sharing Wizard (WZDSHAR) menu, (Figure 63 on page 71)

**Figure 63: Data sharing wizard (WZDSHAR)**

This wizard collects the most used options for data sharing in one place. You can access group buffer pool activity and status, global lock contention, and page set analysis that summarizes activity from all members. You will return here later.
The rest of this exercise covers use of the wizards, but you also have direct access to some detailed data views here.

4 To find information quickly about data sharing, use the topic index to look up relevant DB2 terms, such as "Group Buffer Pools" and "GBP-Dependent" in the TOPIC G view or "Locks-Global" in the TOPICL view, (Figure 64 on page 72).

At any point when looking at another view, you can enter view name TOPICx to directly access topics starting with that letter; for example, type TOPIC L for lock information.

Figure 64: Topic index view (TOPIC L) for topics beginning with the letter L

![Table showing topic index details]

5 Press F3 until you return to EZDSSI.
Data sharing means that some or all of the DB2 tables can be accessed concurrently from all members of the group. Native DB2 tools provide only a limited understanding of the impact of data sharing. This section illustrates the power of SSI to give you a more in-depth understanding of the impact.

**To view page set considerations**

One of the key tuning areas in DB2 is I/O analysis. But looking at I/O for shared page sets or volumes from one DB2 member at a time does not give a complete picture.

1. On EZDSSI, hyperlink on Data Sharing Menu.
2. On EZDSHAR, select Volume I/Os (SSI).

A view of total I/O per volume from all members (PSVOLSSI) is displayed, (Figure 65 on page 73).

**Figure 65: Volume I/O SSI summary—session (PSVOLSSI)**

3. Select one of the volumes to see how many page sets are being accessed on that volume from each DB2 (PSVOLSZ), (Figure 66 on page 73).

**Figure 66: Volume I/O summary—session (PSVOLSZ)**
4 Hyperlink on **Nr. PSs** for one of the members to see a list of each page set (PSVOLPS) with I/O data for that member only.

5 Press **F3** to return to PSVOLSZ.

6 Hyperlink on **Volume** for the same member.

Now you see a list of all page sets on that volume (PSVOLPSZ) and how many members access each. The I/O data here shows totals for the group.

7 **Hyperlink on Volume** once again.

Now the list shows each page set with the I/O data broken down per member (PSVOLPS), *(Figure 67 on page 74)*.

**Figure 67: Volume page sets (PSVOLPS)**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Command</th>
<th>Scroll</th>
<th>Current Window</th>
<th>Alternate Window</th>
</tr>
</thead>
<tbody>
<tr>
<td>10MAR2011</td>
<td>15:53:44</td>
<td>--------</td>
<td>MainView WINDOW INTERFACE (V6.0.00)</td>
<td>--------</td>
<td>SCROLL ==&gt; CSR</td>
</tr>
<tr>
<td>W1 =PSVOLPS--(DBGHC==*)===</td>
<td>10MAR2011==15:53:33==MVDB2==D==30</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volume</td>
<td>Database Object</td>
<td>Page Set</td>
<td>Prt Target</td>
<td>I/Os</td>
<td>I/O Wait</td>
</tr>
<tr>
<td>BAB312</td>
<td>DSNDB01</td>
<td>DSLLX02</td>
<td>001 D81HC</td>
<td>4</td>
<td>29</td>
</tr>
<tr>
<td>BAB312</td>
<td>DSNDB01</td>
<td>DSLLX02</td>
<td>001 D82HC</td>
<td>11</td>
<td>28</td>
</tr>
<tr>
<td>BAB312</td>
<td>DSNDB01</td>
<td>DSNSTP01</td>
<td>001 D81HC</td>
<td>5</td>
<td>28</td>
</tr>
<tr>
<td>BAB312</td>
<td>DSNDB01</td>
<td>DSNSTP01</td>
<td>001 D82HC</td>
<td>8</td>
<td>29</td>
</tr>
<tr>
<td>BAB312</td>
<td>DSNDB01</td>
<td>SPT01</td>
<td>001 D81HC</td>
<td>3</td>
<td>36</td>
</tr>
<tr>
<td>BAB312</td>
<td>DSNDB01</td>
<td>SPT01</td>
<td>001 D82HC</td>
<td>21</td>
<td>40</td>
</tr>
<tr>
<td>BAB312</td>
<td>DSNDB06</td>
<td>DSNADH01</td>
<td>001 D81HC</td>
<td>3</td>
<td>43</td>
</tr>
<tr>
<td>BAB312</td>
<td>DSNDB06</td>
<td>DSNADH01</td>
<td>001 D82HC</td>
<td>23</td>
<td>221</td>
</tr>
<tr>
<td>BAB312</td>
<td>DSNDB06</td>
<td>DSNTX01</td>
<td>001 D82HC</td>
<td>13</td>
<td>145</td>
</tr>
<tr>
<td>BAB312</td>
<td>DSNDB06</td>
<td>DSNTX02</td>
<td>001 D81HC</td>
<td>12</td>
<td>155</td>
</tr>
<tr>
<td>BAB312</td>
<td>DSNDB06</td>
<td>DSNTX02</td>
<td>001 D82HC</td>
<td>139</td>
<td>98</td>
</tr>
</tbody>
</table>

8 Press **F3** until you return to EZDSSI.

9 Select the Data Sharing Wizard.

10 **View the options under Page Set Considerations?**.

The options under **Page Set Considerations?** provide another way to access the volume I/O data that you viewed previously.

a **Select Check GBP-DEP by Member.**

The WZDSDEP view *(Figure 68 on page 74)* shows the level of sharing.

**Figure 68: Data sharing wizard GBP-DEP/member (WZDSDEP)**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Command</th>
<th>Scroll</th>
<th>Current Window</th>
<th>Alternate Window</th>
</tr>
</thead>
<tbody>
<tr>
<td>10MAR2011</td>
<td>16:01:31</td>
<td>--------</td>
<td>MainView WINDOW INTERFACE (V6.0.00)</td>
<td>--------</td>
<td>SCROLL ==&gt; CSR</td>
</tr>
<tr>
<td>W1 =WZDSDEP--(DBGHC==*)===</td>
<td>10MAR2011==16:01:30==MVDB2==D==2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB2</td>
<td>MVS</td>
<td>GBP</td>
<td>Local Remote Log Recs Ckpts To Mins. To Delete</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB1HC</td>
<td>SYSC</td>
<td>4</td>
<td>4</td>
<td>4 50000</td>
<td>5 10 0 0</td>
</tr>
<tr>
<td>DB2HC</td>
<td>SYSC</td>
<td>4</td>
<td>4</td>
<td>3 50000</td>
<td>5 10 8 8</td>
</tr>
</tbody>
</table>
This view summarizes how many GBP-dependent page sets are in the group per DB2 member. The view also includes the key ZPARM values that affect how long a page set remains in this status.

b Move the cursor to the column header, Mins to PCLOSE(T), and press F1 to get field Help on this value, (Figure 69 on page 75).

Many field Help panels, like this one, contain tuning tips in addition to the field definition.

Figure 69: Field Help

![Field Help Image]

This value lists the amount of time, in minutes, that must elapse before a data set can be a candidate for pseudo-close (QWP1TMR). ZPARM name: PCLOSET in DSN6SPRM
Tuning Tip: The PCLOSEN and PCLOSET parameters are associated with pseudo-close. PCLOSEN defaults to 5 system checkpoints and PCLOSET defaults to 10 minutes. There is a trade off in setting these parameters. If these values are set too high, data sets may remain GBP-dependent for longer than necessary and incur unnecessary performance overhead. If these values are set too low, data sets may be pseudo-closed too early, leading to potential performance impact.

c Press F3 until you return to the Data Sharing Wizard (WZDSHAR).

11 Under Page Set Considerations?, select Check GBP-DEP by GBP/PS.

The Buffer pool page set GBP-DEP summary (PSBPGBPZ) is displayed (Figure 70 on page 75).

Figure 70: Buffer pool page set GBP-DEP summary (PSBPGBPZ)

![Buffer pool page set GBP-DEP summary Image]

This view summarizes the same data, also for the whole group, but now organizes it per group buffer pool and member.

a Select one pool (under Bfrpl ID) to see a list of all open page sets in that pool for all targets.
b Press **F3** to return to PSBPGBPZ.

c Hyperlink on the GBP Dependent column to list only the GBP-dependent page sets in that pool (PSGBP), *(Figure 71 on page 76)*.

**Figure 71: Page set GBP-DEP status (PSGBP)**

You can see which members are GBP-dependent, which members have Read/Write Interest, and how many pages from that page set are cached in each member’s local buffer pool.

12 Press **F3** until you return to the Data Sharing Wizard (WZDSHAR).

### Analyzing global lock contention

Analyzing global lock contention

One of the most important issues in data sharing is to control global lock contention. Contention not only causes the usual problems of application availability in one DB2, but it can also significantly degrade performance in a data sharing group.

**To analyze global lock contention**

1 From the Data Sharing Wizard (WZDSHAR), select **Lock Contention Wizard**.
The Global Lock Wizard (WZLKGOPT) is displayed, (Figure 72 on page 77).

**Figure 72: Global lock wizard (WZLKGOPT)**

<table>
<thead>
<tr>
<th>10MAR2011 16:20:50</th>
<th>MainView WINDOW INTERFACE (V6.0.00)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND</td>
<td>SCROLL ==&gt; CSR</td>
</tr>
<tr>
<td>CURR WIN ==&gt; 1</td>
<td>ALT WIN ==&gt;</td>
</tr>
<tr>
<td>W1=WZLKGOPT=DBGHC</td>
<td></td>
</tr>
</tbody>
</table>

**LOCK WIZARD - GROUP **

<table>
<thead>
<tr>
<th>Group Name........</th>
<th>DBGHC</th>
</tr>
</thead>
<tbody>
<tr>
<td># DB2s.............</td>
<td>2</td>
</tr>
</tbody>
</table>

- Check Member Contention? (& Select any Member) Global Suspends... 45 2384
- Review History and set TIME? (If Current Interval OK) Interval 40 3.9
- Any Gross Locks? (2 hrs) GrossLocks...... 0 0
- (Reduced Concurrency) Timeouts......... 0 1
- (Contention Victims) Deadlocks....... 0 3
- Which Resources Involved? (Data Hot Spots)
- Compatible Workloads?
- Analyze Plans In Lockouts?
- Global Blockers/Waiters
- Blocker Plans
- Waiter Plans

The Global Lock Wizard helps you step through the analysis of lock contention in DB2 for a data sharing group. You can look at current status or choose an earlier time interval, perhaps one that has previously caused problems.

A history of the most important symptoms of lock problems—timeouts and deadlocks—is available, and information about system considerations and statistics that can point out potential causes of problems.

2 Select **Check Member Contention?** to see the key indicators for all of the members together (Figure 73 on page 77).

This view lets you quickly identify any global contention issues that need to be analyzed. The counts shown are for the time since DB2 started.

**Figure 73: Lock wizard global members (WZLKGMEM)**

<table>
<thead>
<tr>
<th>10MAR2011 16:21:53</th>
<th>MainView WINDOW INTERFACE (V6.0.00)</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND</td>
<td>SCROLL ==&gt; CSR</td>
</tr>
<tr>
<td>CURR WIN ==&gt; 1</td>
<td>ALT WIN ==&gt;</td>
</tr>
<tr>
<td>W1=WZLKGOPT=WZLKGEMM(DBGHC=)</td>
<td>10MAR2011==16:20:49==MVDB2==D====2</td>
</tr>
<tr>
<td>DB2 MVS</td>
<td>Total Lockouts Suspends Susp. Suspends 0...50..100 Lock Re</td>
</tr>
<tr>
<td>Target System</td>
<td>Local False Global % of Group SyncXES</td>
</tr>
<tr>
<td>DHH1 SJSE</td>
<td>0 134 848 1168 49.0 1421</td>
</tr>
<tr>
<td>DHH2 SJSE</td>
<td>1 154 848 1216 51.0 8384</td>
</tr>
</tbody>
</table>

Analyzing global lock contention
3 From here, you can hyperlink on any DB2 to analyze its contribution to (or victimization by) global lock contention, (Figure 74 on page 78).

**Figure 74: Lock wizard global/local contention (WZLKGCON)**

This view provides the information to analyze both global and local lock contention for a selected member. Besides the most critical statistics, both for the current interval and since DB2 startup, the two key indicators of % global contention and % false contention are calculated for you. Thresholds are defined to highlight any value that exceeds the recommended value. Placing the cursor on the % Global Contention header or fields explains the calculation.

4 Press **F3** to return to the Lock Wizard - Group panel (WZLKG OPT).

5 Select List Group Lockouts?.

A list of the latest timeouts and deadlocks that have occurred in all the members of the group is displayed.
The Global Contention flag on the right is set to YES if the conflict occurred between threads running on different members, (Figure 75 on page 79).

**Figure 75: Global lockout events (LKEVSSI)**

From here, you can drill down for more information about the resources involved in a specific event, and then to a detail view of each lock holder or waiter.

---

**Tip**

If you are looking at a distributed thread, scroll right to see the additional workstation identifiers and identifiers that are specially formatted for SAP.

---

**To analyze resource conflicts**

1. Press F3 to return to the Lock Wizard - Group panel (WZLKGOPT).

2. Select Which Resources Involved?.

A list of resource conflicts in the group is displayed, (Figure 76 on page 79).

**Figure 76: Lockout resource summary (LKRESZ)**

The first view summarizes all conflicts by table space and index space, so that you can quickly identify the objects with the most contention. The count on the right shows how many conflicts exist between members (global).

3. Hyperlink on a resource name that shows several conflicts to see a breakdown of these conflicts by specific resource, down to a page or row level (LKRESNRZ).
With this view, hot spots in your tables are immediately visible, (Figure 77 on page 80).

**Figure 77: Lockout resource number summary (LKRESNRZ)**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Command</th>
<th>SCROLL</th>
<th>CSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>10MAR2011</td>
<td>16:28:44</td>
<td>10MAR2011 16:28:44</td>
<td>MainView WINDOW INTERFACE (V6.0.00)</td>
<td>1</td>
</tr>
</tbody>
</table>

With this view, hot spots in your tables are immediately visible, (Figure 77 on page 80).

**Figure 77: Lockout resource number summary (LKRESNRZ)**

<table>
<thead>
<tr>
<th>Database Object</th>
<th>Number</th>
<th>Type</th>
<th>Conflicts</th>
<th>% Conflicts</th>
<th>Total Conflicts</th>
<th>% Total Conflicts</th>
<th>Global Conflicts</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSN8D51A</td>
<td>DSN8S51E</td>
<td>DATAPAGE</td>
<td>8</td>
<td>72.7</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4 Hyperlink on either the resource name or the resource number to view a list of each lockout event that involved this resource (LKRESD), (Figure 78 on page 80).

**Figure 78: Lockout resource conflict detail (LKRESD)**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Command</th>
<th>SCROLL</th>
<th>CSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>10MAR2011</td>
<td>16:30:21</td>
<td>10MAR2011 16:30:21</td>
<td>MainView WINDOW INTERFACE (V6.0.00)</td>
<td>1</td>
</tr>
</tbody>
</table>

This view helps you quickly determine which plans are involved in the contention and whether the problem was occurring only at a particular time, perhaps because of an application affinity problem.

5 Press F3 to return to the Lock Wizard - Group panel (WZLKGOPT).

6 Select Global Blockers/Waiters.

A list of plans that are involved in the lockouts is displayed, (Figure 79 on page 80).

**Figure 79: Lockout global blocker waiter summary (LKBWZSSI)**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Command</th>
<th>SCROLL</th>
<th>CSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>10MAR2011</td>
<td>16:31:40</td>
<td>10MAR2011 16:31:40</td>
<td>MainView WINDOW INTERFACE (V6.0.00)</td>
<td>1</td>
</tr>
</tbody>
</table>

This view summarizes blocker/waiter plans and systems. You can identify conflicting plans across multiple data sharing DB2 members. Again, the list of events for a particular combination is available with a hyperlink, so you can quickly check to see if any application scheduling problems exist.
7 Press PF3 until you return to EZDSSI.

8 Select Locking Menu to access the DB2 Locking easy menu, EZDLOCK (shown in “Analyzing lock contention” on page 39), which shows current lock contention in SSI mode for the data sharing group.

The steps in “Viewing current lock contention” on page 40 that you followed to analyze current lock contention for a single DB2 work the same in SSI mode for a data sharing group.

---

**Tip**

If you want to print an SSI lockout report, use the view LKPRINT, which combines the data from LKEVSSI with the resource information from LKEVRES. Customize LKPRINT to include the two hidden fields that show the waiter and blocker DB2 member names. For more information about the lockout views, see the *MainView for DB2 User Guide*.

---

9 Press F3 until you return to the Data Sharing Wizard (WZDSHAR).

---

**Related Information**

- “Printing views and reports” on page 165

---

**Tuning group buffer pools**

After global locking, the next most important area of data sharing tuning involves determining:

- Whether the group buffer pools are the right size

- Whether the pools have the correct ratio of directory to data entries to support your workload, based on the amount of inter-DB2 sharing that is occurring

If one of these resources is lacking, overhead increases in the group buffer pools, the coupling facility, and the local pools. The increased overhead can cause unnecessary I/O.

**To tune the group buffer pools**

1 On the Data Sharing Wizard (WZDSHAR), select **Review Group (Session)** to see an overview of key statistics about:

- Global contention
- Group buffer pool performance
- GBP-dependent page sets
- Coupling facility activity (castouts, failures)

**Figure 80: Data sharing wizard group members (WZDSGMEM)**

This view shows you some of the key indicators per member and lets you quickly identify whether you have any performance issues to analyze. The counts shown are for the time since DB2 was started.

From here, you can hyperlink on any DB2 to see all group buffer pool statistics for both the current interval and the session data since DB2 startup. Alternatively, you can return to WZDSHAR to follow some of the analysis paths.

1. Press F3 to return to the Data Sharing Wizard (WZDSHAR)
2. Select Check GBPs.

The GBP analysis section of the Data Sharing Wizard is displayed. This decision panel provides options to analyze GBP size and the ratio of directory to data entries, (Figure 81 on page 82).

**Figure 81: Data sharing wizard GBP options (WZDSBOPT)**

Three diagnostic paths are available. For this session, you are going to follow the path to analyze directory entries. Even if the pools are large enough, a lack of directory entries (used to register each page) can cause problems.

The key indicators on the right help you decide whether you need to do additional analysis by following one or more paths. On this panel, all of these values are for the whole group, summarized for all GBPs.
Possible symptoms of too few directory entries are:

- The occurrence of directory reclaims so that new pages can be registered
- Cross-invalidations of pages in the members’ local buffer pools, occurring because of these directory reclaims

If one of these indicators is greater than 0, the field is highlighted in red.

4 Hyperlink on Too Few Directory Entries?

A tabular list of all defined group buffer pools is displayed, (Figure 82 on page 83).

**Figure 82: Data sharing wizard GBP directory entries (WZDGSGR)**

<table>
<thead>
<tr>
<th>Name</th>
<th>Curr. Ratio</th>
<th>Pend. Ratio</th>
<th>Entries</th>
<th>Data Entries</th>
<th>Directory Reclaims</th>
<th>XI from Dir. Recl.</th>
<th>Miss</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP0</td>
<td>5</td>
<td>5</td>
<td>942</td>
<td>187</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>6.2</td>
</tr>
<tr>
<td>BP1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>BP2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>BP4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>BP5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>BP9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>BP11</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>BP32K</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>BP32K9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Now you can see each group buffer pool with the current definitions, the two key indicators that you saw before for all pools (*Directory Reclaims* and *XI from Dir. Recl. columns*), and some additional related statistics.

5 Select a single GBP for further analysis, (Figure 83 on page 83).

**Figure 83: Data sharing wizard GBP directory detail (WZDSGRD)**

<table>
<thead>
<tr>
<th>GBP Directory Entry Analysis - Detail BP0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reclaims for Directory Entries?</td>
</tr>
<tr>
<td>Directory Reclaims Causing XI?</td>
</tr>
<tr>
<td>Also Increasing DASD Reads?</td>
</tr>
<tr>
<td>. Check Members for:</td>
</tr>
<tr>
<td>* XI Miss ==&gt; DASD Reads</td>
</tr>
<tr>
<td>GBP Hit Ratio Low?</td>
</tr>
<tr>
<td>. Check Members for:</td>
</tr>
<tr>
<td>* Low GBP Hit Ratio</td>
</tr>
<tr>
<td>Definitions</td>
</tr>
<tr>
<td>Total Size (4K Blocks)</td>
</tr>
<tr>
<td>Directory Entries</td>
</tr>
<tr>
<td>Data Entries</td>
</tr>
<tr>
<td>Current Ratio</td>
</tr>
<tr>
<td>Pending Ratio</td>
</tr>
</tbody>
</table>
This analysis panel provides details to help you determine whether a group buffer pool might have too few directory entries to support its part of the data sharing workload. This panel addresses the main issue—whether directory reclaims are causing cross-invalidations (XI) and probably increasing I/O.

In this panel, you now see the two key indicators again, but as interval (current activity) and session (total since DB2 startup) counts.

The answer to the additional question of whether this situation is increasing DASD reads can be seen only by looking at statistics per member instead of at the group level.

6 Hyperlink on Check Members for XI Miss.

A view containing data sharing session activity counts per member for this group buffer pool is displayed, (Figure 84 on page 84).

Figure 84: Data sharing wizard GBP size activity (WZDSGBSA)

<table>
<thead>
<tr>
<th>Name</th>
<th>Target</th>
<th>Hit %</th>
<th>XI Read</th>
<th>NF Read</th>
<th>Changed</th>
<th>Clean</th>
<th>Sync Read</th>
<th>Async Read</th>
<th>Total</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP0</td>
<td>DB1HC</td>
<td>14.0</td>
<td>3</td>
<td>40</td>
<td>12</td>
<td>0</td>
<td>50</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP0</td>
<td>DB2HC</td>
<td>22.2</td>
<td>1</td>
<td>13</td>
<td>20</td>
<td>0</td>
<td>18</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The XI Read Miss column now shows whether any members had to do additional I/O to read in pages lost through reclaims and cross-invalidation. Non zero counts are highlighted. From here, you can also hyperlink on a GBP to see interval and session counts for that GBP.

You have seen a few of the most important areas for data sharing monitoring. You have used a Single System Image context to enable you to monitor all members of a group, both individually and summarized, and to pull all of the relevant data together. Now you have the tools to master the new and complex data sharing performance issues.

7 Return to EZDB2.
Using MainView Explorer and the DB2 Health Navigator

The previous sections described how to isolate DB2 performance problems and monitor multiple DB2s, single DB2s, and DB2 data sharing groups by using views and monitors in 3270 mode.

In 3270 mode, views provide access to extensive performance data over time, which can be summarized, sorted, and filtered. You can use this data to analyze a specific problem, for example:

- An end user complaint about performance at a particular time in the past
- High CPU usage
- Poorly performing EDM pools

However, working with a large volume of data and navigating the numerous menus in 3270 mode can be very time consuming. For general analysis, MainView Explorer can greatly simplify tasks, such as gaining a historical perspective of system activity; detecting problems that you were not aware of; and correlating different measurements and indicators over time. By using MainView Explorer charts, you can easily identify anomalies in normal patterns, and quickly drill down to additional information.

For more information about MainView Explorer, see the online Help or the MainView User Guide.

Using MainView Explorer for the first time

MainView Explorer runs in your web browser, so it is simple to access, and any necessary software installation or updates are performed automatically.

If you are already familiar with MainView Explorer, skip this section and see “Viewing chart configurations” on page 89.
Before you begin

Ask your system administrator for the URL for MainView Explorer on the mainframe system that you would normally use to access MainView for DB2.

The MainView Explorer data server must be active and connected to the CAS in that system.

The URL format is: http://system:port/

To begin using MainView Explorer

1. Open a web browser and enter the URL.

2. After a security prompt, a logon dialog box is displayed.

3. Enter your TSO user ID and password.

   (Logging on to MainView Explorer does not log you in to a TSO session, and your TSO session can be active concurrently).

4. Review the template for the user data sets and add a prefix if necessary. If you would like to customize charts and configurations, you will need a BBCDEF data set.

   The MainView Explorer window is displayed.
The navigation frame on the left contains a context tree and a product tree. The frame on the right shows the systems that you can access.

5 Click on the **Product** tab at the top of the navigation frame.

6 Expand the **MVDB2** node and the system name (**SJSE** in this example) to see a list of individual DB2s per system and any defined SSI contexts.

7 Right-click on one DB2 and select **Set context**.

The product tree for **MVDB2** is displayed.
The view folders in the product tree provide view access by area, similar to the MAIN view in 3270 mode.

8 Expand the BFRPOOL node and double-click the BFRPLD view.

The view opens in a tab.

9 Right-click the BFRPLD tab to see various options, and then select the Close this view option to close the tab.

10 Expand the EZExplorer node to access a navigation path that similar to easy menus in 3270 mode. This navigation path is recommended.

11 Expand the Views node, the Single DB2 (EZDB2) node, and the Threads node to see a list of thread views.
12 Double-click any view to open it in a tab and then close that tab and collapse the Views node.

**Viewing chart configurations**

Before you access the charts in the Configurations node, review the following MainView Explorer terminology.

- **Charts**
  Graphic representations of the data in a view. There are multiple chart types, such as two dimensional (2D) line charts and three dimensional (3D) area charts.

- **Containers**
  A special type of view that can hold multiple views and charts, either tiled, cascaded, or free form. MainView for DB2 uses containers to chart multiple data items from one view together for easier comparison and reduced overhead (data is retrieved only once).
- Configurations
  Used to save one or more views, charts or containers together, and preserve properties such as chosen items or sort order. They can also be used to distribute charts with a product release.

**To view chart configurations**

1. To see the three main configuration groups, expand the **Configurations** node.

The DB2 Health Navigator configurations can help you to quickly identify problem areas and analyze key data. Hyperlinks to additional data are provided only when needed.

The second and third configuration groups focus on historical DB2 workload analysis and are described in “Analyzing workload history with MainView Explorer charts” on page 149.

**Viewing DB2 Health navigator charts**

Use the following procedure to view DB2 Health navigator charts.

1. Right click on the **DB2 Health Navigator** configuration node and select the option **Expand node fully**. All of the available configurations in that group are displayed. Each configuration is displayed as a dashboard that shows the status overview at the chosen context.
2. In the **Contexts by product** tree, select the context **ALL**, and double-click on **SSI DB2 Health Overview** to see the health status of all of your DB2 subsystems. This configuration also includes an exception history for the past hour per DB2.
To see an additional container that shows a history chart of thread rate per DB2, click on the **Thread Rate per DB2** tab.

3 Select a DB2 subsystem for which you want to view more information. In the **DB2 Target** column, right-click on the DB2 target name and select the hyperlink.

A dashboard for the selected subsystem opens in a new tab.

**Note**

This dashboard is also available in a single DB2 context from the navigation tree.

In the top panel, the stoplights quickly highlight problematic areas. Over 80 exception metrics are organized into nine DB2 areas. The stoplights turn red (critical) or yellow (warning) where one or more exception thresholds have been exceeded. The **Resource % Utilization** chart and the **Thread % Utilization** chart display additional key indicators of DB2 health.

4 Return to the SSI DB2 Health Overview by selecting the SSI DB2 Health tab.

5 Select a row for a DB2 subsystem for which you want to view more information about the current exceptions. In the **Total Exceptions** column, right-click the exception value and select the hyperlink.
A DB2 Health Status dashboard for the selected subsystem opens in a new tab.

**Note**

This configuration is also available in a single DB2 context from the navigation tree.

---

6 Where an exception condition is shown, right click on that area gauge and select the hyperlink.

A consolidated exception view highlighting all of the defined exceptions is displayed in a pop-up. Those elements in exception status will be highlighted red or yellow. You can also see other elements that may be approaching their own exception thresholds.
To view a related area dashboard, select a hyperlink from one of the following locations:

- The highlighted hyperlink in the exception view
- Any health gauge with no exception indicated - either the DB2 dashboard stoplights, or the DB2 Health Status half-circle gauges

**Note**

Each of the area dashboard configurations is also available in a single DB2 context from the navigation tree.
Each area dashboard shows one or more key indicators of area activity for the last 60 minutes. The Thread % Utilization chart and the Recent Thread Issues chart highlight other key indicators or exception conditions to be aware of. If the first entry in one of these charts is non-zero, right-click to see if there is a hyperlink defined. If a hyperlink is displayed, follow it to view a history chart of those metrics.

Also included is a detail area analysis dashboard. Maximize this view for easier access. The dashboard displays all of the exception elements, and other important metrics. Hyperlinks in the first column provide quick access to related information. Right click any highlighted field to see the available hyperlink.

8 If you are monitoring data sharing, you can view either one group or multiple groups, and then view the individual members for any group by hyperlinking on the **Member Count** field. To concentrate on one group, select a dsgroup context (in the Contexts by Product pane). To view multiple groups, choose a higher-level SSI context, such as **ALL**.

There are two configurations provided under **Multiple DB2s (SSI DSG Context)**. The group summary displays the total number of current exceptions for all members per group. It also includes exception counts in special sub-areas specific to data sharing activity - global locking, group buffer pools, and sysplex parallelism. The member status dashboard shows these counts for each member within a group, and provides hyperlinks to analyze any exceptions.
Tuning an application with trace

These scenarios teach you how to navigate easily through the MainView for DB2 trace setup panels and the displays of trace data, and acquaint you with the trace print utility.

In this practice session, you will:

1. Start an application trace and review the available options
2. Review tips on running your tests with trace
3. Look for application problems by using the various trace displays
4. Print a trace report for offline review

**Note**

To complete the first exercise, you must have authorization to start detail traces. If you do not have authorization, contact your system administrator. If SAF security is in use, the resource name is “prefix.ssID.BBI.target.TRACE.D” or “prefix.ssID.BBI.target.TRACE.ALL”. If USERID security in BBPARM is in use, the parameter to be specified is DB2TRACE=D or ALL.

This practice session takes approximately two hours to complete.

Starting an application trace

When you start an application trace you should begin by checking the current traces.

**To start an application trace**

1. From the EZDB2 easy menu, select the Current Traces option in the Thread Activity section.
The CT view lists all current traces, (Figure 85 on page 98). The Status column indicates whether the trace is active and collecting data from DB2, or already completed but not yet purged. You will return here later to view your own trace.

**Figure 85: Current traces (CT)**

| 24FEB2011  14:12:52 ------ MainView WINDOW INTERFACE (V6.0.00) ---------------- |
|-----------------------------|-----------------------------|
| COMMAND ====> 1             | SCROLL ====> CSR            |
| W1  =CT================DIT2=====*========24FEB2011==14:12:52====MVDB2====D====2 |
| -                             | Current Traces               |
| Commands:   ST  (Start Application Trace)    HT  (History Traces)  JOURNAL |
| Line CMDs:  S (Select), W (Show), M (Modify), I (Switch) |
| Z (Stop), P (Purge), R (Replicate), Q (Quiesce Logging) |
| CM Trace ID Typ User ID Trace Title              Start Date Start Status   Log |
| -- -------- --- ------- ------------------------ ---------- Time  -------- Stat |
| BIGELAP  Sum BOLDJW1 LARGE ELAPSED TIMES      23FEB2011  11:00 Active |
| THRDHIST Sum BOLDJW1 THREAD HISTORY           23FEB2011  11:00 Active |

2 Type **ST** on the COMMAND line to display the Start DB2 Trace Request dialog.

You must be authorized to start a trace and to specify certain options. See your system administrator for the trace privileges you have. If you cannot start a trace, browse these instructions and then go to “Identifying application problems with trace displays” on page 107 to view an already active trace.

### Specifying trace options

On the Start DB2 Trace Request dialog you can specify various options for your trace. Many traces can be started by using only the first dialog. If you want to review other options, they are available on additional dialogs.

**Note**

You should review the recommendations in *MainView for DB2 User Guide* before executing detail traces of long-running threads.

**Figure 86: Start DB2 Trace Request dialog**

<table>
<thead>
<tr>
<th>COMMAND ====&gt;</th>
<th>Start DB2 Trace Request</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCROLL ====&gt; PAGE</td>
<td></td>
</tr>
<tr>
<td>Target DEEH</td>
<td></td>
</tr>
<tr>
<td>Trace Attributes:</td>
<td></td>
</tr>
<tr>
<td>PARM (Trace Identifier) START (hh:mm:ss)</td>
<td></td>
</tr>
<tr>
<td>TYPE S (S-Summary,D-Detail) STOP (hh:mm/mins)</td>
<td></td>
</tr>
<tr>
<td>STORAGE 1000K (Display Buffer Size) WRAP YES (Y/N wrap buffer)</td>
<td></td>
</tr>
<tr>
<td>LOGTRAC Y (Y/N log trace) RST HOT (HOT,PUR,QIS)</td>
<td></td>
</tr>
<tr>
<td>TITLE DB2 APPLICATION TRACE</td>
<td></td>
</tr>
<tr>
<td>Specify additional trace options: (*-processed)</td>
<td></td>
</tr>
<tr>
<td>Selection Criteria N (Y/N)</td>
<td></td>
</tr>
<tr>
<td>Exception Filters N (Y/N)</td>
<td></td>
</tr>
<tr>
<td>Detail Trace Options N (Y/N)</td>
<td></td>
</tr>
<tr>
<td>Trace Log Data Set Options N (Y/N)</td>
<td></td>
</tr>
<tr>
<td>Additional Trace Targets N (Y/N) Context</td>
<td></td>
</tr>
</tbody>
</table>
To specify trace options

1. Define a trace by using mostly defaults.

Table 1: DB2 trace request keywords

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Operand/Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARM</td>
<td>id</td>
</tr>
<tr>
<td></td>
<td>If you want to run multiple trace requests, specify an ID in the <strong>PARAM</strong> field to make the trace unique. The identifier is used to specify which set of trace data is to be displayed with the application trace services. <strong>Note:</strong> Blanks can be used as an identifier for one trace, but BMC does not recommend this usage.</td>
</tr>
<tr>
<td>TYPE</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>S (the default) requests a summary application trace of completed transactions. D requests a detail application trace that also collects major events in the life of the transaction.</td>
</tr>
<tr>
<td>STORAGE</td>
<td>n</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> In windows mode, display storage is managed by MainView Infrastructure; the STORAGE keyword is not used. For full-screen trace displays, this value determines the size of the online trace display buffer to contain the trace entries per active trace. The size is specified in K format, where K is the number of 1024 byte blocks; for example, 200K is (200 \times 1024 = 204800) bytes. This value is primed from the default specified in DMRBEXxx. If no value is specified, the value from BBIISPxx is used. For a detail trace, this value must be at least four times TRSIZE. If the specification is less than four times TRSIZE, it will be adjusted upward to the maximum of 16383K.</td>
</tr>
<tr>
<td>LOGTRAC</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>This value specifies whether to write all trace records for this request to a unique trace log data set (TLDS) for this trace. If Y is specified with no additional summary or detail trace logging options, a single data set is allocated dynamically using the defaults specified in DMRBEXxx for this DB2. <strong>Note:</strong> The BBI-SS PAS started task user ID must be authorized to use dynamic allocation.</td>
</tr>
</tbody>
</table>
### Starting an application trace

2 Request additional trace options by specifying **Y** for one of the following options:
- Selection criteria - to select the transactions to be traced
- Exception filters - to reduce the amount of data saved
- Detail trace options - to trace additional events

---

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Operand/Description</th>
</tr>
</thead>
</table>
| **TITLE** | *c...c*  
This value defines a title for the trace (1 to 24 characters). If you are logging the trace, BMC recommends that you specify a more specific title to help identify the contents of this trace at a later time. |
| **START** | *hh:mm:ss*  
This value requests trace start time. If the time specified is more than 10 minutes prior to the current time, 24 hours are added to the specified time and the request is started the next day. To start a request at midnight, specify **24:00:00**.  
The default is the next full minute. |
| **STOP** | *nnn / hh:mm:ss*  
This value requests trace stop limit as a timestamp or number of minutes to process. The default is set from **TRTIME** in **DMRBEXxx**.  
Processing ends at the end of the last interval before the specified stop time. This time is displayed in the **STOP** field when the request is viewed with the **R**, **P**, **M**, and **W** line commands from the **CT** view. |
| **WRAP** | **Y** | **N**  
The buffer is used in a wraparound method to store the entries and the wrap can be automatic, **WRAP=Y** (default), or user-controlled, **WRAP=N**. |
| **RST** | **HOT** | **PUR** | **QIS**  
This value defines the restart option to be used when a service is quiesced because of an inactive DB2 subsystem or **BLK=RRR** (restart all monitors) request, as follows:  
- **HOT** restarts the trace automatically without the loss of previous data.  
- **PUR** purges the trace automatically when the target DB2 terminates.  
- **QIS** keeps the trace in a quiesced state until it is purged by an authorized user.  
  
**Note:** For dynamic or auto-connected targets, all traces are purged when the target terminates; the **RST** setting is ignored. |
- Trace log data set options - to specify additional data set allocation and processing options
- Additional trace targets - to start the same trace for multiple targets

3 Press **Enter**.

If you specified Y for **Selection Criteria** or this is a detail trace, the DB2 Trace Selection Criteria dialog is displayed.

Figure 87: DB2 Trace Selection Criteria dialog

<table>
<thead>
<tr>
<th>COMMAND ===&gt;</th>
<th>DB2 Trace Selection Criteria</th>
<th>SCROLL ===&gt;</th>
<th>CSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specify selection criteria:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB2PLAN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB2AUTH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB2CORR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB2CONN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONNTYPE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB2LOC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB2PKG</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB2RTN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB2ROLE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specify End User Work Station Criteria:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB2UID</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB2UTX</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DB2UWN</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ENTER to accept the selection criteria
HELP to view related help

4 To trace your own tests, and prefetch reads, specify your user ID and SYSOPR.

**Example**

DB2AUTH ==> *userid,SYSOPR*

You can also specify other selection criteria when starting a trace. When starting a detail trace, you must specify at least one valid Plan (DB2PLAN) or Authorization ID (DB2AUTH) to limit DB2 tracing. This is subject to DB2 restrictions (1 plan /8 authids, or vice versa). For more information, see the *MainView for DB2 User Guide*.

**Note**

If you qualify by plan, prefetch read I/O events cannot be captured.

5 Press **Enter**.
If you specified Y for Exception filters or this is a detail trace, the DB2 Trace Exception Filters dialog is displayed.

**Figure 88: DB2 Trace Exception Filters dialog**

<table>
<thead>
<tr>
<th>COMMAND ===&gt;</th>
<th>SCROLL ===&gt; CSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specify Exception Filters:</td>
<td></td>
</tr>
<tr>
<td>ELAP</td>
<td>GETPAGE</td>
</tr>
<tr>
<td>CPU</td>
<td>PGUPD</td>
</tr>
<tr>
<td>ABORT</td>
<td>READIO</td>
</tr>
<tr>
<td>UIDCOM</td>
<td>LOCKSUSP</td>
</tr>
<tr>
<td>GETRIO</td>
<td>RIDFAIL</td>
</tr>
<tr>
<td>RLF</td>
<td>TIMEOUT</td>
</tr>
<tr>
<td>PWAITIO</td>
<td>PWAITLK</td>
</tr>
<tr>
<td>PFREQS</td>
<td>PFFREADS</td>
</tr>
<tr>
<td>PRLRRED</td>
<td>PRLLFALB</td>
</tr>
<tr>
<td>ELAPDB2</td>
<td>CPUDP2</td>
</tr>
<tr>
<td>SQLTOT</td>
<td>SOLSEL</td>
</tr>
<tr>
<td>SOLUID</td>
<td>SOLDYN</td>
</tr>
<tr>
<td>SOLDDL</td>
<td></td>
</tr>
</tbody>
</table>

You can specify filters to discard thread accounting records that do not meet the qualification. The value can be a maximum (n) or a minimum (<n). For example, specifying ELAP ==> 10 only keeps threads with an elapsed time greater than 10 seconds. This filter is very useful when you are looking for poorly performing applications in an existing DB2 workload.

**Note**
If you specify several filters, they are ORed. A trace record is retained if any one of the comparisons is valid.

6 Press Enter.

If you specified Y for Detail trace options or this is a detail trace, the DB2 Detail Trace Options dialog is displayed.

**Figure 89: DB2 Detail Trace Options dialog**

<table>
<thead>
<tr>
<th>COMMAND ===&gt;</th>
<th>SCROLL ===&gt; PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specify additional events:</td>
<td></td>
</tr>
<tr>
<td>SQL</td>
<td>Y (Y/N)</td>
</tr>
<tr>
<td>SCANS</td>
<td>N (Y/N)</td>
</tr>
<tr>
<td>I/O</td>
<td>N (Y/N)</td>
</tr>
<tr>
<td>LOCKS</td>
<td>N (Y/N)</td>
</tr>
<tr>
<td>DDF</td>
<td>N (Y/N)</td>
</tr>
<tr>
<td>DDFVTAM</td>
<td>N (Y/N)</td>
</tr>
<tr>
<td>Specify event compression:</td>
<td></td>
</tr>
<tr>
<td>GROUP SQL</td>
<td>Y (Y/N)</td>
</tr>
<tr>
<td>Specify data collection buffer options:</td>
<td></td>
</tr>
<tr>
<td>TRSIZE</td>
<td>400K (Trace buffer size)</td>
</tr>
<tr>
<td>TRBUFF</td>
<td>20 (# of trace buffers)</td>
</tr>
</tbody>
</table>
Y compresses many consecutive identical SQL statements together to save space and make the event trace easier to read; for example, combine many FETCHes.

This value is the size of a data collection buffer. Without logging, the data collected for one thread is limited to two buffers. If you are tracing long-running applications, you might need to increase the size. With logging, multiple buffers can be written per thread and combined automatically when recalled online or printed.

You might need to increase this value to trace more concurrent threads or to provide multiple buffers for the logging of long-running applications. The recommended number is three or more times the number of concurrent threads to be traced.

Note

MainView for DB2 User Guide has additional recommendations that can help you trace special situations like capturing part of a long-running thread.

7 Specify the additional DB2 events that you want to trace.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQL ==&gt; Y</td>
<td>Default is Y for standard application tuning.</td>
</tr>
<tr>
<td>SCANS ==&gt; Y</td>
<td>Default is N. Specify Y this time.</td>
</tr>
<tr>
<td>I/O ==&gt; Y</td>
<td>Default is N. Specify Y this time.</td>
</tr>
<tr>
<td>LOCKS ==&gt; N</td>
<td>Default is N. Leave as is - very expensive.</td>
</tr>
<tr>
<td>DDF ==&gt; N</td>
<td>Default is N. These events are needed only for distributed work.</td>
</tr>
<tr>
<td>DDFVTAM ==&gt; N</td>
<td>Default is N. These events are needed only for DDF VTAM analysis.</td>
</tr>
</tbody>
</table>

Each of the other groups of events adds additional overhead. You can specify any combination; for example, SQL and I/O but not SCANS.

8 Press Enter.
If you specified Y for **Trace log data set options** or this is a detail trace, the Trace Log Data Set Options dialog is displayed. Leave the default values.

**Figure 90: Trace Log Data Set Options dialog**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Logs ===&gt; 1</td>
<td>Multiple logs are usually needed only for continuous system traces for workload history.</td>
</tr>
<tr>
<td>First Log DSN ===&gt;</td>
<td>Leave this blank to take the generated default. You must be authorized for dynamic allocation of a trace log. See your system administrator. If you are not authorized, there is a batch job (JXT011) to preallocate a log data set. Type the name here and change <strong>Disposition</strong> to OLD.</td>
</tr>
<tr>
<td>Overwrite Logs ===&gt; Y</td>
<td>Y allows the latest trace data to be kept if it does not all fit in the log. N keeps the earliest trace data by quiescing the trace when full.</td>
</tr>
<tr>
<td>Archive PROC ===&gt;</td>
<td>Leave blank. This option is not needed for simple single-log traces.</td>
</tr>
<tr>
<td>Log Switch Time ===&gt;</td>
<td>Leave blank. This option is not needed for simple single-log traces.</td>
</tr>
<tr>
<td>Disposition ===&gt; NEW</td>
<td>Leave NEW unless you had to preallocate a log.</td>
</tr>
<tr>
<td>Volumes</td>
<td>This field should be filled in with the default volumes for your site. If not, specify a volume the MainView <strong>for DB2</strong> product address space (BBI-SS PAS) is allowed to use.</td>
</tr>
<tr>
<td>Primary Cyls ===&gt;</td>
<td>Use the default.</td>
</tr>
</tbody>
</table>

9 If your site requires them and the defaults are not set, specify SMS values.

**SMS Storage Class ===>**
When all extension dialogs are processed, the Start DB2 Trace Request dialog displays an asterisk (*) next to each processed option. The request is not submitted until all options display N or *. This feature gives you the opportunity to review and change your options before sending the request.

**Examples for defining requests**

This topic contains examples for defining requests:

- To define requests for automatic startup (BLKDMRW member in BBPARM):
  
  — Summary Trace example
  
  ```
  REQ=ATRAC THRDHIST TYPE=SUMMARY TITLE='THREAD HISTORY'
  STORAGE=4000K LOGTRAC=Y TRNUMDS=3 TRSWTIME=24:00
  TRDSN='Mypfx.Trace.Dsn.V01'
  ```

  — Detail Trace example
  
  ```
  REQ=ATRAC DETLABC DB2PLAN=ABC TYPE=SQL,SCAN,IO STORAGE=4000K
  WRAP=Y TITLE='I/O TRACE OF ABC' GROUPSQL=Y TRBUFF=0, TRSIZE=400K
  ```

  — Monitor example
  
  ```
  REQ=BPUTL BP0 WMAX=85 I=00:01:00 WLIM=99 LOG=ATWARN
  ```

  See sample member BLKDMRKY in BBPARM for a description of the keywords that you can use.

- To define requests to check active thread exceptions ("runaway queries") or other background exception conditions (DMRBEXxx member in BBPARM):

  — TSO Exception example
  
  ```
  MSG=DZ0630W,CPUTOT=1000,GPTOT=100000
  ```

  For a complete list of background monitors, see sample member DMRBEXBB in BBPARM, or the monitors and exception detection section in the *MainView for DB2 User Guide*.

  To display the active background samplers, type **BG ON** from the Active Timer Requests full-screen application.
To activate, modify, or purge individual traces, use the line commands on the Current Traces (CT) view.

To activate, modify, or purge individual monitors, use the Monitors Active (AT) view Start Monitors (SM) command.

To activate or purge a block request that contains a set of additional monitors or traces, use the full-screen Start Monitors (SM) panel BLK option and enter the block member name.

To purge all existing requests from BLKDMRW manually, type on any full-screen display:

SERV ===> SET
PARM ===> PRG=BLKDMRW

Testing traces

There are many different scenarios for testing. This topic lists the most common tests, and gives tips on running the tests.

Testing your new application during development

1 Qualify the trace by your own AUTHID.
   DB2 trace overhead is only incurred for the tests of your application. Depending on the number of users of the MainView for DB2 trace in your test DB2 system, you might be able to keep your trace request active through several test iterations, consolidating them on one trace log. (Only four detail traces can be active at one time.)

2 BIND your program after the trace is started.
   The text and EXPLAIN data of all static SQL statements is captured in your trace output for reference when analyzing performance. EXPLAIN=YES is not required.

3 If you do not set an automatic stop time when requesting your trace, don’t forget to stop it when you have completed testing. You can stop a trace by using the Z (Stop) line command on the CT view.
   If you have logged the trace data, you should also purge the trace when complete. You can still browse and print the data from the log (HT view). Otherwise, analyze the data from the online buffers and purge the trace when you are done.

Analyzing the performance of an existing application
1 If you have SQL Explorer, RxD2/FlexTools, or a similar tool, you can qualify the trace by PLAN.

2 Set automatic start and stop times to cover a time span in which you expect sufficient activity.

3 If the application usually runs well with only a few occurrences of poor performance, specify exception filters to save only those that you need to analyze. For example, select only those with high elapsed or CPU times, or with many GETPAGE requests or I/Os.

- Improving the performance of a bad SQL statement

1 You might have identified a poorly performing SQL statement and want to try out several different variations in the syntax to determine which is best. Using RxD2/FlexTools or a similar tool, you can modify and execute the statement directly from the source while in ISPF edit. Otherwise, make the statement executable from SPUFI.

2 Start the trace qualified by your AUTHID.

3 Modify and execute each variation as dynamic SQL.
   You want to force the thread to terminate so an accounting record will be produced. This termination is done automatically with RxD2. With SPUFI, you must exit each time to terminate the thread.

4 The trace automatically captures the SQL text, EXPLAIN data (with cost factor), and the accounting record and SQL performance statistics.
   You now have all variations captured together in one trace for easy comparison.

- Comparing test to production
   Save the detail trace log from the last test run. Run a short detail trace in production after cutover to compare performance. You can either print batch reports or browse both trace logs in split screen mode.

Identifying application problems with trace displays

This section describes how to use the trace displays for application tuning.
Although all of the trace data at the thread accounting level is available in windows mode, detail trace event data is available only in full-screen mode. From the list of traces in the HTLOGS view, you can display detail trace data in full-screen mode.

**To identify application problems with trace displays**

1. Enter one of the following views by typing the view name on the **COMMAND line**.
   - **CT (Current traces)**
     
     The CT view lists all currently active or complete trace requests. From this view, you can also execute the following actions for a trace:
     - Show defined trace options (W)
     - Modify a trace (M)
     - Switch to another trace (I)
     - Stop a trace (Z)
     - Purge a trace (P)
     - Replicate a trace (R)
     - Quiesce a trace (Q)
     
     On this view you can see the trace data as it is being collected. After the trace is complete, the data remains available until you purge the trace.
     
     Trace data is posted to the display buffer only when the accounting record is written.
     
     If you are tracing a longer running thread (detail), you can view the detail events as they occur with the UTRAC display. (Select the current USERS analyzer display, line select the detail display (DUSER) for your thread, and expand to UTRAC.)
     
     When you trace long-running threads, logging is recommended so that data is not lost because of buffer shortages. The data should also be viewed from the logs instead of the buffers, which is available from the HT view.
   - **HT (History traces)**
     
     The HT view lists all known trace log data sets. Traces that are logged are also accessible through this view. From this view, you can also execute the following actions for a trace:
     - Show defined trace options (W)
     - Print a trace (P)
     - Delete a trace (D)
     - Reset a trace (E)
     - Verify a trace (V)
     - Archive a trace (A)
Free a trace (F)

You can view your trace when it is running, after it is complete, and even after you have purged the original trace request. On the HT view you can compare different tests (even if they were run month or more apart), without keeping stacks of paper.

From the log you can recall the data online or print selected reports. The trace log data sets are displayed in descending order by date and time, so you can easily find a newly created log. If you are looking for an older log, you can sort the display by any of the columns.

**Note**

The same summary trace thread accounting data that is shown in the full-screen LTRAC and STRAC displays is also available in windows mode views, as described in “Analyzing recent workload history” on page 133. However, when analyzing applications with a detail trace, it is simpler to stay in full-screen mode.

The following figure summarizes many of the ways you can navigate among the trace displays that are accessed from the CT and HT views.
Identifying application problems with trace displays

Current Traces view  History Traces view

\(\text{S Line Commands}\)

\(\text{Line Selection}\)
Subset by AUTHID, Connection, Location, Plan, Correlation ID, or Time

LTRAC
List of Traced Transactions
(Accounting Records)

\(\text{TSUMx}\)
Trace Summaries by:
- AUTHID
- CONNECTION
- LOCATION
- PLAN
- CORRELATION ID
- TIME

\(\text{Cursor Select}\)

STRAC
Summary Data for One Transaction

\(\text{Expand}\)

\(\text{Expand}\)

STRAC
Accounting Data Sections:
- ENV
- ELAPSED
- SQLCOUNTS
- BPOOL
- LOCKS
- PRLR=10
- DDF
- PKG
- SPAS

\(\text{Expand}\)

DTRAC
Chronological List of Detail Trace Events
(Level=1,2,3)

\(\text{Cursor Select}\)

\(\text{Expand}\)

TSTAT
Trace Totals

\(\text{Expand}\)

DTRAC
Event Pop-ups

Detail Traces ONLY
Viewing all trace entries (DB2 accounting records)

You can access the trace displays through the CT or HT views. The views differ slightly depending on which view you are navigating from. In this example, we will access the views through the HT view.

To view all trace entries in a trace log data set

1. On the HT view, select the trace log data set that you created by typing S in the CM field next to the trace ID.

You can search for the trace log data set by taking the following steps:

   a. Type SORT US on the COMMAND line.
   b. Locate your user ID (like ISPF LOCATE), by typing L userid on the COMMAND line.

The first panel of trace data is displayed, (Figure 91 on page 111).

Figure 91: DB2 Trace Entries display (LTRAC)

LTRAC lists all threads (trace entries) in chronological sequence, with the newest at the bottom. Each entry corresponds to a completed transaction, query, or batch job. There is one entry for each DB2 accounting record. In addition to the thread identifiers (plan, authid, connection), some of the most important performance indicators are shown.

2. Use the scroll keys F7 and F8 to scroll back and forth in the list.
ENTRIES IN DATASET on line 4 tells you how many threads were traced. (This line says ENTRIES IN BUFFER from a current trace.) Compare the values for ELAPSED, CPU, #STMTS, and GETPAGE and look for high activity.

**Note**

Use the HISTORY option to see all of the data from the current TLDS. You must use this option to see data for a long-running thread that has not yet terminated.

3 Move to any entry and press Enter.

The STRAC panel is displayed, which contains detailed summary data for this thread.

### Viewing data for a single thread

This section contains procedures for viewing data for a single thread using the STRAC display.

The following procedures are included:

- “Viewing DB2 accounting data” on page 113
- “Viewing SQL statement summary data” on page 116
- “Viewing table space index space scans” on page 119
- “Analyzing lock and I/O problems” on page 119

The Summary Trace Entry display, STRAC, shows summary data for this thread. It contains complete activity statistics from the DB2 accounting record. For a detail trace, there are also summaries of the captured detail events, such as SQL statements.

The most critical information is summarized in the base section, shown in Figure 92 on page 113. It includes:

- Identifiers
- Completion status
- Commits and rollbacks
- Runtime graphic analysis of elapsed and CPU times
- Most important activity counts
Key indicators of failures or possible problems

Figure 92: Summary Trace Entry display (STRAC)–base section

BMC SOFTWARE --------------  SUMMARY TRACE ENTRY    -------------  RX AVAILABLE
SERV ==> STRAC            INPUT 14:25:51  INTVL=> 3  LOG=> N  TGT==> DB2K
PARM ==> BIGELAP SEQ=209                            ROW 1 OF 119 SCROLL=> CSR
EXPAND: MON(WKLD), DETAIL
ACCOUNTING: ENV, ELAPSED, SOLCOUNTS, BPOOL, LOCKS, PRL, PKG, RTN, DDF
STOP.....16OCT 11.16.37.94 PLAN...............DSNTEP7I TYPE..............ALLIED
START....16OCT 11.16.27.53 AUTHID.............BOLDJW1 CONNECT........BATCH/TSO
ELAPSED..............10 s  ORIG PRIM AUTH.....BOLDJW1 CORR ID.....BOLDJW4A
TERM....DDF/RRSAF #LIMIT COMMITS............1 ROLLBACKS................0
------------------------------------------------------------------------------
RUNTIME ANALYSIS IN DB2 IN APPL. TOTAL % IN DB2(*) TOTAL(*)
---------------------------------- -------- -------- -------- .............. ..............
ELAPSED TIME 10 s 103 ms 10 s | ===================* |
CPU TIME 172 ms 17 ms 188 ms | <                    |
DB2 WAIT TIME 10 s | ===================  |
- - - - ACTIVITY - - - - - - - - - KEY INDICATORS - - - - - - - - - - - -
TOTAL SQL...........................63 FILTER: ELAPSED = 10,412 (>10,000)
GETPAGES....................4,112 SQL: SELECT= 0, FETC= 20
SYNC READS (PRL=00) .........887 SQL: DYNAMIC(PREPARE)= 11
PREFETCH PAGES READ...........919 I/O RSP: SYNC= 5,543 us, ASYNC= 24 ms
UPDATES/COMMIT................0.0 DDF/RRSAF ROLL UP RECORD, COUNT= 5
BFR HIT RATIOS:...VP= 57%,HP= 0%

Viewing DB2 accounting data

You can scroll down or expand sections showing complete details on SQL statements by type, lock counts, buffer activity, and parallel I/O and package accounting.

To view DB2 accounting data

1 On STRAC, select ELAPSED in the ACCOUNTING EXPAND line.
If you run DB2 with Accounting Trace 2 or 3 active, an Elapsed Time Analysis section is displayed, (Figure 93 on page 114).

**Figure 93: STRAC Elapsed Time Analysis (ELAPSED) section**

```
BMC SOFTWARE --------------  SUMMARY TRACE ENTRY -----------PERFORMANCE MGMT
SERV ==> STRAC            INPUT   09:55:09  INTVL=> 3  LOG=> N  TGT==> DEGQ
PARM ==> AKS1,SEQ=3,ELAPSED                          ROW 1 OF 33 SCROLL=> CSR
EXPAND: MON(WKLD), DETAIL, CURRENT
          ACCOUNTING: ENV, ELAPSED, SQLCOUNTS, BPOOL, LOCKS, PRLL, PKG, RTN, DDF
          ELAPSED TIME ANALYSIS (ACCTG CLASSES 2 3 ONLY)

CATEGORY       #EVENTS AVG/EVENT  ELAPSED  %TOTAL
---------------- ------- --------- -------- ------- 0 ...25...50...75..100%
ELAPSED TIME                                          |                      |
IN DB2                                10 s    99.00 | *******************  |
IN APPLICATION                       103 ms    0.99 | <                    |
--TOTALS--                             10 s   100.00 | ********************|
WAITS IN DB2 (LOCAL)                                  |                      |
LOCK/LATCH              4      6 us    23 us    0.00 |                      |
I/O WAIT                  887  5,543 us 4,917 ms   47.22 | *********            |
OTHER READ I/O            218     24 ms 5,181 ms   49.76 | *********            |
OTHER WRITE I/O            0      0 us     0 us    0.00 |                      |
UNIT SWITCH EVENTS                                  |                      |
..COMMIT/ROLLBK          0      0 us     0 us    0.00 |                      |
..OPEN/CLOSE            0      0 us     0 us    0.00 |                      |
..SYSLGRNG              0      0 us     0 us    0.00 |                      |
..DATASPACE MGR         0      0 us     0 us    0.00 |                      |
..OTHER                0      0 us     0 us    0.00 |                      |
ARCH. LOG(QIS)           0      0 us     0 us    0.00 |                      |
ARCH.READ(TAPE)         0      0 us     0 us    0.00 |                      |
DRAIN LOCK              0      0 us     0 us    0.00 |                      |
CLAIM RELEASE          0      0 us     0 us    0.00 |                      |
PAGELATCH CONT.          0      0 us     0 us    0.00 |                      |
SPAS SERVER TCB         0      0 us     0 us    0.00 |                      |
...TOTAL WAITS---    1,109  9,106 us    10 s    96.98 | *******************  |
*NOT ACCOUNTED                           38 ms    0.36 | <
```

The graph tells you at a glance where the most time is being spent—and what you should concentrate on in tuning. For example, more time in the application or in DB2. Or, if in DB2, are the times for I/O, prefetch reads, or lock waits unusually high?

2 Select **BPOOL** in the **ACCOUNTING EXPAND** line.
This section provides a complete summary of activity for each buffer pool accessed plus totals, (Figure 94 on page 115).

**Figure 94: STRAC Buffer Pool (BPOOL) section**

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>TOTAL</th>
<th>BP0</th>
<th>BP1</th>
<th>BP2</th>
</tr>
</thead>
<tbody>
<tr>
<td>GETPAGES...........</td>
<td>4,112</td>
<td>80</td>
<td>2,032</td>
<td>2,000</td>
</tr>
<tr>
<td>SYNC READS...........</td>
<td>887</td>
<td>0</td>
<td>887</td>
<td>0</td>
</tr>
<tr>
<td>GETPAGES/READIO.....</td>
<td>4.6</td>
<td>0.0</td>
<td>2.3</td>
<td>0.0</td>
</tr>
<tr>
<td>COND. GP FAILURES..</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>SEQ. PREFETCH REQS.</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>LIST PREFETCH REQS.</td>
<td>200</td>
<td>0</td>
<td>0</td>
<td>200</td>
</tr>
<tr>
<td>DYNAMIC PREFETCHES.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PAGES/PREFETCH REQ.</td>
<td>4.4</td>
<td>0.0</td>
<td>0.0</td>
<td>4.6</td>
</tr>
<tr>
<td>PAGE UPDATES.......</td>
<td>40</td>
<td>40</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>IMMEDIATE WRITES...</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>HP SYNC READS........</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>HP SYNC READ FAIL.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>HP ASYNC PAGES READ</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>919</td>
</tr>
<tr>
<td>HP SYNC WRITES.....</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>HP WRITE FAILURES.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

--- BUFFER POOL ACTIVITY ---

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>TOTAL</th>
<th>BP0</th>
<th>BP1</th>
<th>BP2</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF READS (BUFFER CROSS INVALIDATION)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- DATA RETURNED...</td>
<td>2</td>
<td>-</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>- R/W INTEREST....</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>CF READS (DATA NOT IN BUFFER POOL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- DATA RETURNED...</td>
<td>2</td>
<td>-</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>- R/W INTEREST....</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>CF-WRITE (CHANGED).</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>- WAR REQUESTS....</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>- WARM REQUESTS..</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>CF-WRITE (CLEAN)...</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>UNREGISTER PAGE...</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>EXPLICIT XI1......</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>SECONDARY BP WRITES</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>COMPLETION CHECKS...</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>ILXCACHE PRI GBP...</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>ILXCACHE SEC GBP...</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>PAGE P-LOCK REQUESTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- SPACE MAP PAGE...</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>- DATA PAGE....</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>- INDEX PAGE.....</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>PAGE P-LOCK UNLOCK.</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>PAGE P-LOCK SUSPENDS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- SPACE MAP PAGE...</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>- DATA PAGE....</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>- INDEX PAGE.....</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

The GETPAGE/READ I/O ratio can give you a good indication of synchronous READ efficiency, which directly affects thread elapsed time. However, you should also check the prefetch requests, because some I/O might be occurring asynchronously.

3 Select each of the expand options shown in the ACCOUNTING line.

This data is all that you would see with a low-overhead summary trace.
4 The package accounting section is available only if DB2 accounting class 7 is active, and shows a breakdown of elapsed, CPU, and wait times (class 8) per package/DBRM, (Figure 95 on page 116).

**Figure 95: STRAC Package/DBRM Overview (PKG) section**

<table>
<thead>
<tr>
<th>PACKAGE/DBRM</th>
<th>NO. SQL</th>
<th>CPU TIME</th>
<th>WAIT TIME</th>
<th>ELAPSED Time</th>
<th>%TOTAL ELAP.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RXSEL1M</td>
<td>5</td>
<td>23 ms</td>
<td>611 ms</td>
<td>860 ms</td>
<td>9.78</td>
</tr>
<tr>
<td>RXSEL2M</td>
<td>6</td>
<td>21 ms</td>
<td>514 ms</td>
<td>538 ms</td>
<td>6.12</td>
</tr>
<tr>
<td>RXSEL3M</td>
<td>24</td>
<td>38 ms</td>
<td>193 ms</td>
<td>250 ms</td>
<td>2.84</td>
</tr>
<tr>
<td>RXSEL4M</td>
<td>8</td>
<td>22 ms</td>
<td>765 ms</td>
<td>828 ms</td>
<td>9.43</td>
</tr>
<tr>
<td>RXSEL5M</td>
<td>9</td>
<td>24 ms</td>
<td>298 ms</td>
<td>337 ms</td>
<td>3.83</td>
</tr>
<tr>
<td>RXSEL6M</td>
<td>10</td>
<td>25 ms</td>
<td>363 ms</td>
<td>408 ms</td>
<td>4.64</td>
</tr>
<tr>
<td>RXSEL7M</td>
<td>11</td>
<td>26 ms</td>
<td>179 ms</td>
<td>211 ms</td>
<td>2.40</td>
</tr>
<tr>
<td>RXSEL8M</td>
<td>12</td>
<td>28 ms</td>
<td>270 ms</td>
<td>299 ms</td>
<td>3.40</td>
</tr>
<tr>
<td>RXSEL9M</td>
<td>13</td>
<td>27 ms</td>
<td>288 ms</td>
<td>351 ms</td>
<td>3.99</td>
</tr>
<tr>
<td>RXSELAM</td>
<td>14</td>
<td>28 ms</td>
<td>256 ms</td>
<td>286 ms</td>
<td>3.25</td>
</tr>
</tbody>
</table>

Select one package to see further details in a pop-up display.

5 Press F3 to return to STRAC.

**Viewing detail event summaries (detail trace only)**

Because you started a detail trace, several more sections with data summarized from detail event records are available. You do not have to collect and analyze each type of data separately, the MainView for DB2 trace does it all for you. You can keep scrolling to see all of the data, but there is a quicker way to select only the data that you want.

**Viewing SQL statement summary data**

Use the following procedure to view summary data for each SQL statement.

**To view summary data for each SQL statement:**

1 On STRAC, on the SUMMARIES EXPAND line, navigate to the SQL option, and press Enter.

The SQL Summary is displayed, (Figure 96 on page 117), with important statistics for each SQL statement, showing totals and averages across all executions. If the
A plan contains multiple DBRMs, the statements are sorted by package/DBRM (program).

Figure 96: STRAC SQL Summary section

<table>
<thead>
<tr>
<th>Stmt Type</th>
<th>Stmt</th>
<th>Count</th>
<th>Elapsed Avg</th>
<th>Elapsed Avg %</th>
<th>CPU Avg</th>
<th>CPU Avg %</th>
<th>ReCs</th>
<th>Inx</th>
<th>Data</th>
<th>Work</th>
<th>Ref</th>
<th>Pgs Scanned</th>
</tr>
</thead>
<tbody>
<tr>
<td>SELECT</td>
<td>3347</td>
<td>2</td>
<td>25 ms</td>
<td>2.7</td>
<td>1,930 us</td>
<td>0.3</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>SELECT</td>
<td>3283</td>
<td>1</td>
<td>0.1</td>
<td></td>
<td>0.1</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>SELECT</td>
<td>3671</td>
<td>6</td>
<td>112 ms</td>
<td>74.1</td>
<td>414 ms</td>
<td>74.9</td>
<td>8</td>
<td>7</td>
<td>1187</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

2 Scan the PERCENT ELAPSED (% ELAP) column.

The percent tells you how much this statement is contributing to the total thread elapsed time. If an average is high, but the statement is only executed a few times, it might not be worth tuning it.

3 Scan the SORT RECS column to see which statements invoked a sort.

Although EXPLAIN tells you a sort will be used, it cannot tell you whether many rows will be selected and sorted, or a few. This column does. (Of course, as always, you must adjust the value by any differences between your test and production tables.)

4 Scan the PAGES SCANNED - INDX column.

This column tells you whether an index was accessed and how many pages were scanned. If this value does not meet your expectations, there is more information about index accesses a little further along.
5 To check for referential integrity processing. See the PAGES SCANNED - REF column.

6 Sort the display by PAGES SCANNED - DATA.

   PARM ==> traceID,SEQ= nn,SQL, SORT=PD

7 Sort the display by PAGES SCANNED - DATA within Program.

   PARM ==> traceID,SEQ= nn,SQL, SORT=PDP

   The first characters of the column header are used to request a sort. Adding P as
   the third character keeps all statements for each DBRM together. All options are
   defined in the HELP panels (F1). (The sort is supported only when you expand to
   the section, not when you scroll to it.)

8 Place the cursor on one of the SQL statement lines and press Enter.

This pop-up display, (Figure 97 on page 118), shows the complete statistics for
that statement, displayed as averages per execution. Where the single line shows
total counts of pages scanned, the pop-up display shows averages not only for
pages but also rows accessed.

**Figure 97: STRAC SQL statement pop-up display**

<table>
<thead>
<tr>
<th>BMC Software --------------</th>
<th>DETAIL TRACE ENTRY</th>
<th>RX AVAILABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERV ==&gt; STRAC</td>
<td>INPUT 10:22:51</td>
<td>INTVL=&gt; 3</td>
</tr>
<tr>
<td>PARM ==&gt; TEST3,SEQ=000017</td>
<td>LOG=&gt; N</td>
<td>TGT==&gt; DB2G</td>
</tr>
<tr>
<td>EXPAND: SQLTEXT(EXPLAIN)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STATEMENT: 350 SELECT</td>
<td>NUMBER OF EXECUTIONS:</td>
<td></td>
</tr>
<tr>
<td>2PLAN: DSNESPRR</td>
<td>ELAPSED: AVERAGE 2,794 us TOTAL 5,588</td>
<td></td>
</tr>
<tr>
<td>usPROGRAM: DSNTIAUL</td>
<td>CPU: AVERAGE 1,271 us TOTAL 2,543</td>
<td></td>
</tr>
<tr>
<td>usLOCATION: DB1D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INDEX SEQ-DATA</td>
<td>ROWS PROCESSED ALL TYPES</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 2 0 ROWS PROCESSED CORRECT TYPE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 2 0 ROWS QUALIFIED BY DM (STAGE 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 0 0 ROWS QUALIFIED BY RDS (STAGE 2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 0 0 ROWS INSERTED</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 0 0 ROWS UPDATED</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 0 0 ROWS DELETED</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 0 0 PAGES SCANNED</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8 2 0 REFERENTIAL INTEGRITY PROCESSING:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PAGES SCANNED 0 0 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DELETED/SET NULL 0 0 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LOB- PAGES 0 0 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SCANNED 0 0 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>UPDATED 0 0 0</td>
<td></td>
</tr>
</tbody>
</table>

These are the statistics that allow you to evaluate the SQL predicates. For
example, ROWS QUALIFIED BY RDS are caused by Stage 2 predicates and are
more expensive than rows qualified in the first stage by the Data Manager
(ROWS QUALIFIED BY DM). Of course, there might be variations per execution
depending on host variable values. You will see how to find the statistics per
single statement execution later, see “Viewing detail event statistics” on page 122.
If RxD2 is installed and this SQL statement is static, the SQLTEXT(EXPLAIN) expand option is highlighted. You can select this option to view the SQL text from the catalog and access available EXPLAIN data from a PLAN_TABLE or do a dynamic EXPLAIN.

If the MainView for DB2 - Data Collector component is available, you can access more thorough EXPLAIN information by using the EXPLAIN button on the DUSER display, or by hyperlinking on the MVDB2/DC Admin/Archive option on the EZDB2 Menu and then selecting Option E, EXPLAIN Interface. You can view static SQL EXPLAIN data from the plan or package SQL data, or from PLAN_TABLE data that has been previously populated.

Press F3 to return to STRAC.

**Viewing table space index space scans**

Use the following procedure to view table space and index space scans.

1. On STRAC, on the EXPAND line, navigate to the SCANS option and press Enter.

A summary of all scans by table space and index space is displayed, (Figure 98 on page 119).

### Figure 98: STRAC Database Summary section

This data is available only if you requested SCANS on the trace request. You can review the number of rows and pages accessed per page set, and also see which indexes were used.

**Analyzing lock and I/O problems**

Use the following procedure to analyze lock and I/O problems.
1. On STRAC, on the **EXPAND** line, navigate to the **IO/LOCK** option and press **Enter**.

This display, ([Figure 99 on page 120](#)), is a summary of all lock and I/O activity by this application, shown by table space and index space. The lock data is available with any detail trace. The I/O data is available only if you requested I/O events on the trace request, which can be expensive, depending on the application characteristics.

**Figure 99: STRAC Database Lock and I/O Summary section**

<table>
<thead>
<tr>
<th>BMC Software</th>
<th>SUMMARY TRACE ENTRY</th>
<th>RX AVAILABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERV ==&gt; STRAC</td>
<td>INPUT 14:27:53</td>
<td>LOG=&gt; N TGT==&gt; DB2G</td>
</tr>
<tr>
<td>PARM ==&gt; PBCR02,SEQ=5,IOLOCK,SORT=DP</td>
<td>ROW 1 OF 11 SCROLL=&gt; CSR</td>
<td></td>
</tr>
<tr>
<td>EXPAND: MON(WKLD), DETAIL, HISTORY</td>
<td>ACCOUNTING: ENV, ELAPSED, SQLCOUNTS, BPOOL, LOCKS, PLL, PKG, SPAS, DDF</td>
<td></td>
</tr>
<tr>
<td>SUMMARIES: SOL, SCANS, IO/LOCK, SORTS</td>
<td>DATABASE LOCK AND I/O SUMMARY (DETAIL TRACE ONLY)</td>
<td></td>
</tr>
<tr>
<td>- - - - - - - - DATABASE LOCK AND I/O SUMMARY (DETAIL TRACE ONLY) - - - - - - - -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DATABASE</td>
<td>PAGESET</td>
<td>MAX. SUSP. TM/OUT</td>
</tr>
<tr>
<td>B1C0DB</td>
<td>BB040A12</td>
<td>0 0 1 0</td>
</tr>
<tr>
<td>B2C0DB</td>
<td>BB051012</td>
<td>0 0 1 0</td>
</tr>
<tr>
<td>B3C0DB</td>
<td>BB09TS02</td>
<td>0 0 1 0</td>
</tr>
<tr>
<td>**** TOTALS *****</td>
<td>0 0 1 0</td>
<td>39 ms 19 ms</td>
</tr>
</tbody>
</table>

For traces by AUTHID, where SYSOPR is included, you will also see counts for prefetch read requests and the number of pages read for this thread. The other counts are all for synchronous I/O within the application. In other words, the ELAPSED time shown here is part of the total thread elapsed time. Reducing the total number of synchronous I/Os has a direct effect on performance.

**Avoiding expensive lock event traces**

A lock trace is usually only requested to analyze a specific locking problem. It causes a great deal of DB2 overhead and generates many trace records for MainView for DB2 to store online or in a log.

Therefore, before you decide to trace LOCK events, you should analyze the following detail trace events available in DTRAC:

<table>
<thead>
<tr>
<th>Lock event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCK-SUMMARY (display LEVEL=2)</td>
<td>This event appears near the end of the thread processing. It shows the maximum number of page locks held and the highest lock state for each page set (table/index space) accessed.</td>
</tr>
<tr>
<td>DEADLOCK / TIMEOUT (display LEVEL=1)</td>
<td>One of these events is shown for any thread that terminated due to a timeout or deadlock. It shows the page set involved in a timeout, or the number of resources involved in a deadlock. The complete details about the holder, waiters, and resource are in shown the event pop-up display.</td>
</tr>
</tbody>
</table>
### Lock event

<table>
<thead>
<tr>
<th>Lock event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCK-SUSP (display LEVEL=2)</td>
<td>This event is shown for all lock suspensions. It shows the elapsed time suspended, the page set, the type of entity locked (for example, a data page, index tree, and so on), page number if applicable, and lock state.</td>
</tr>
</tbody>
</table>

### Sorting information

Use the following procedure to evaluate the impact of sorting.

1. On STRAC, on the EXPAND line, navigate to the SORTS option and press Enter.

   A Sort Summary of all sort activity for this plan execution is displayed, (Figure 100 on page 121).

   **Figure 100: STRAC Sort Summary section**

<p>| BMC Software------------SUMMARY TRACE ENTRY---------RX AVAILABLE |
| SERV ==&gt; STRAC INPUT 14:27:16 INTVL=&gt;3 LOG=&gt;N TGT==&gt;DB2G |
| PARM ==&gt; PBCR02,SEQ=5,SORTS ROW 1 OF 18 SCROLL=&gt;CSR |
| EXPAND: MON(WKLD), DETAIL, HISTORY |
| ACCOUNTING: ENV, ELAPSED, SQLCOUNTS, LOCKS, PLL, PKL, SPAS, DDF |
| SUMMARIES: SQL, SCANS, IO/Lock, SORTS |
| SORT SUMMARY (DETAIL TRACE ONLY) -------------|</p>
<table>
<thead>
<tr>
<th>SORT</th>
<th>ELAPSED</th>
<th>RECORDS</th>
<th>SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF SORTS.......6 AVERAGE 135 ms 31 353M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AVG # WORK FILES......1.3 MAXIMUM 263 ms 86 2,118M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MINIMUM 263 ms 3 0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL 263 ms 187 N/A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   When scrolling through STRAC, this section is at the end of the display. You can evaluate the impact of sorting on the total thread elapsed time using the SORT ELAPSED column. Because there might be multiple sorts, the values are shown as averages, maximums, minimums, and totals.

   Now you have seen all of the summarized data for one thread by browsing through the STRAC (Summary Trace Entry) display. The complete accounting data, elapsed time analysis, buffer pool usage analysis, and DDF information is available even with a low-overhead summary trace. The other summarized data depends on the type of events you decide to trace: SQL, SCANS, IO, LOCKS.

2. Press F3 until you return to the initial STRAC display.

### Viewing another thread

If you have traced several thread executions, you might want to view another thread.
Look at the **PARM** field. The sequence number of the trace entry (accounting record plus summarized details) is displayed in the **SEQ= nnnnnn** field. You can navigate between entries.

**To view another thread**

1. On STRAC, press **F11** to scroll to the next chronological entry.
2. Press **F10** to scroll back to the previous entry.
3. Select the **SQLCOUNTS** expand option to view the summary of all SQL statements; then press **F10** several times.

The display shows the SQL counts for the following threads. This is an easy way to compare particular statistics (such as SQL, elapsed times, or GETPAGEs) for several threads.

**Viewing detail event statistics**

There is another level of trace data available for a detail trace. It shows all traced events for a thread in chronological sequence.

**To see the detail event statistics**

1. On STRAC, on the **EXPAND** line, navigate to the **DETAIL** option and press **Enter**.
You can follow the sequence of events during thread processing using the DTRAC (Detail Trace Entry) display, (Figure 101 on page 123).

**Figure 101: Detail trace display for a thread (level 2)–DB2 requests**

```
BMC Software ----------------- DETAIL TRACE ENTRY ----------------- PERFORMANCE MGMT
SERV ==> DTRAC           INPUT    10:21:48  INTVL=> 3  LOG=> N  TGT==> DB2G
PARM ==> TEST3,SEQ=000017,LEVEL=2              ROW     1 OF 35 SCROLL=> CSR
EXPAND:  LINESEL(DETAIL), HISTORY
START: 09:17:11 AUTH: JEK1     PLAN: DSNTEST21 CORR: DB221REQ  CONN: BATCH

<table>
<thead>
<tr>
<th>EVENT</th>
<th>AT</th>
<th>ELAPSED</th>
<th>CPU</th>
<th>DETAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>CREATE-THD</td>
<td>0.000</td>
<td>45 ms</td>
<td>4,492 us</td>
<td>ISOLATION=CS ACQ=USE REL=COMMIT</td>
</tr>
<tr>
<td>PLAN-ALLOC</td>
<td>0.045</td>
<td></td>
<td></td>
<td>*DSNESPICS ISO=CS ACQ=USE REL=COMIT</td>
</tr>
<tr>
<td>PKG-ALLOC</td>
<td>0.065</td>
<td></td>
<td></td>
<td>*DSN8D21A TS=XDEPT3</td>
</tr>
<tr>
<td>PREPARE</td>
<td>350</td>
<td>0.069</td>
<td>1,361 ms</td>
<td>*RC( 0) C=DT Rel=COMIT</td>
</tr>
<tr>
<td>SQL-TEXT</td>
<td>0.070</td>
<td></td>
<td></td>
<td>*TYPE=DYNAMIC TEXT=SELECT * FROM DS+</td>
</tr>
<tr>
<td>EXPLAIN</td>
<td>0.078</td>
<td></td>
<td></td>
<td>*PLAN=DSN8IC22 COST(4.6)</td>
</tr>
<tr>
<td>EDM-REQ</td>
<td>1.302</td>
<td>1.454 ms</td>
<td>3,964 us</td>
<td>*RC( 0) C=DT Rel=COMIT</td>
</tr>
<tr>
<td>OPEN</td>
<td>524</td>
<td>1.489</td>
<td>204 us</td>
<td>353 us *RC( 0) C=DT Rel=COMIT</td>
</tr>
<tr>
<td>FETCH</td>
<td>532</td>
<td>1.489</td>
<td>204 us</td>
<td>353 us *RC( 0) C=DT Rel=COMIT</td>
</tr>
<tr>
<td>OPEN-TS</td>
<td>2.235</td>
<td>2.607</td>
<td>364 us</td>
<td>353 us *RC( 0) C=DT Rel=COMIT</td>
</tr>
<tr>
<td>FETCH</td>
<td>532</td>
<td>2.608</td>
<td>364 us</td>
<td>353 us *RC( 0) C=DT Rel=COMIT</td>
</tr>
<tr>
<td>FETCH</td>
<td>532</td>
<td>2.608</td>
<td>364 us</td>
<td>353 us *RC( 0) C=DT Rel=COMIT</td>
</tr>
<tr>
<td>FETCH</td>
<td>532</td>
<td>2.608</td>
<td>364 us</td>
<td>353 us *RC( 0) C=DT Rel=COMIT</td>
</tr>
<tr>
<td>FETCH</td>
<td>532</td>
<td>2.608</td>
<td>364 us</td>
<td>353 us *RC( 0) C=DT Rel=COMIT</td>
</tr>
<tr>
<td>FETCH</td>
<td>532</td>
<td>2.608</td>
<td>364 us</td>
<td>353 us *RC( 0) C=DT Rel=COMIT</td>
</tr>
<tr>
<td>FETCH</td>
<td>532</td>
<td>2.608</td>
<td>364 us</td>
<td>353 us *RC( 0) C=DT Rel=COMIT</td>
</tr>
</tbody>
</table>

The number and type of events shown depend on how much you decided to trace (more events, more overhead). The simplest detail trace captures only the major events and exceptions in the life of the thread. This trace also has SQL, SCANS, and IO.

Subordinate events are indented in the display. Whenever possible, nesting at different levels is provided, although this nesting is somewhat dependent on the sequence in which the IFCIDs are received.

Look at the first event, **CREATE-THD**.

Events like this example, with start and end trace records, are matched and displayed on one line with relative start time, elapsed, and CPU times. Events that occur within another event (like I/O for a scan) are indented.

Look at the **PARM** field.

The SEQ number is the same as that shown on the Summary display (STRAC). But now there is a new parameter of **LEVEL=2**. With this parameter you can widen or narrow your view of the traced events. Level 2 shows you the major events (for example, the first event you see is probably PLAN-ALLOCTation) and SQL.

2 To see only the SQL statements, change the level to 1.

**PARM ==> traceid , SEQ= nnnnnn , LEVEL=1**
Browse through the SQL statements to find one you want to know more about.

3 Move to that statement and press F7 to scroll it to the top (SCROLL => CSR).

4 To see SCANS and I/O, change the level to 3.

```plaintext
PARM ==> traceid , SEQ= nnnnnn , LEVEL=3
```

The events always remain in chronological sequence, and the event at the top of
the screen remains there. Now you can see all of the events that occurred in
processing the SQL statement—index scans, data scans, table space opens, sorts,
dynamic SQL text and EXPLAIN data, I/O, and so on.

5 Move the cursor to an SQL statement and press Enter.

The statistics for the single SQL statement, (Figure 102 on page 124), are available
in a pop-up display whenever you need them, but are out of the way when
browsing the events.

**Figure 102: DTRAC SQL statement pop-up display**

```
BMC Software --------------- DETAIL TRACE ENTRY ------------- RX AVAILABLE
SERV ==> DTRAC           INPUT    10:48:24  INTVL=> 5  LOG=> N  TGT==> DB2HSR
PARM ==> ALLNEW51,SEQ=4,LEVEL=2                      ROW 1 OF 17 SCROLL=> CSR
EXPAND: .SQLTEXT(EXPLAIN)

================================================================================
EVENT        AT     ELAPSED     CPU   DETAIL
-------------- -------- -------- -------- -------------------------------------
CREATE   1817     0.475    14 s     62 ms *RC(   0) TABLESPACE DEMOS51D
================================================================================
CURSOR:    DEMOS51D
LOCATION:  DB2H
ISOLATION: READ STABILITY
REOPTIMIZ: REOPTIMIZATION FOR INPUT VARS
PACKAGE:   SAJUYH2I
PROGRAM:   DSNTIAD                            INDEX  SEQ-DATA
--------  --------
ROWS PROCESSED ALL TYPES                  6         6
ROWS PROCESSED CORRECT TYPE              12         6
ROWS QUALIFIED BY DM (STAGE 1)            6         0
ROWS QUALIFIED BY RDS (STAGE 2)           0         0
ROWS INSERTED                             0         0
ROWS UPDATED                              0         0
ROWS DELETED                              0         1
PAGES SCANNED                            17        14
REFERENTIAL INTEGRITY PROCESSING:
    PAGES SCANNED                          0         0
    ROWS DELETED/SET NULL                  0         0
    LOB- PAGES SCANNED                     0         0
    - PAGES UPDATED                       0         0
```

Any event that has an asterisk at the beginning of the DETAIL column has a pop-
up display. The detail column shows the most important data, but many trace
records have more information available. This data varies by event type. For
example, for an SQL statement, you see the return code, cursor, indicators about
data access (Data/Index/Work = D/X/W), and pages scanned.

You have already seen the SQL pop-up display; the same row/page statistics are
available per scan. Some other important pop-up displays are:
### Pop-up display

<table>
<thead>
<tr>
<th>Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIND-TEXT</td>
<td>For DB2 Version 7.1 and earlier, text of dynamic SQL (also static SQL if BIND traced)</td>
</tr>
<tr>
<td>EXPLAIN</td>
<td>EXPLAIN data for dynamic SQL (also from BIND)</td>
</tr>
<tr>
<td>LOCK-SUMMARY</td>
<td>Summary of locks held per page set</td>
</tr>
<tr>
<td>TIMEOUT/ DEADLOCK</td>
<td>Lock contention events that cause a SQL statement or thread to fail</td>
</tr>
<tr>
<td>RIDLIST</td>
<td>Statistics on RID list processing, success, or failure</td>
</tr>
<tr>
<td>SQL-TEXT</td>
<td>Text of dynamic SQL (also static SQL if BIND traced)</td>
</tr>
</tbody>
</table>

6 Press F3 until you return to the LTRAC list of thread entries.

### Viewing summarized data for all threads

Use the following procedure to view summarized data for all threads that have been traced.

**To view summarized data for all threads**

1. On LTRAC, move to the **TOTALS** expand option and press **Enter**.

TSTAT is displayed (Figure 103 on page 125).

**Figure 103: Summary statistics for all trace buffer entries (TSTAT)–base section**

<table>
<thead>
<tr>
<th>Number Threads</th>
<th>Elapsed</th>
<th>Average</th>
<th>Maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>211</td>
<td>12:08:02</td>
<td>0:03:27</td>
<td>07:20:52</td>
<td>10 s</td>
</tr>
<tr>
<td>210</td>
<td>0:50:24</td>
<td>00:14:25</td>
<td>00:01:45</td>
<td>851 ms</td>
</tr>
<tr>
<td>208</td>
<td>CPU</td>
<td>55 s</td>
<td>260 ms</td>
<td>9,606 ms</td>
</tr>
<tr>
<td>207</td>
<td>CPU-DB2</td>
<td>40 s</td>
<td>188 ms</td>
<td>758 ms</td>
</tr>
<tr>
<td>207</td>
<td>WAITS</td>
<td>00:47:29</td>
<td>14 s</td>
<td>36 s</td>
</tr>
<tr>
<td>207</td>
<td>SQL</td>
<td>00:47:29</td>
<td>14 s</td>
<td>36 s</td>
</tr>
<tr>
<td>207</td>
<td>GETPAGES</td>
<td>00:47:29</td>
<td>14 s</td>
<td>36 s</td>
</tr>
<tr>
<td>207</td>
<td>SYNC</td>
<td>184,661</td>
<td>875</td>
<td>1,019</td>
</tr>
<tr>
<td>207</td>
<td>PFCH</td>
<td>188,996</td>
<td>895</td>
<td>1,257</td>
</tr>
<tr>
<td>207</td>
<td>UPD/COMT</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>207</td>
<td>BFR HIT RATIO:</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**KEY INDICATORS**

- SQL: SELECT: 0, FETCH: 4, 143
- SOL: DYNAMIC(PREPARE): 2, 279
- I/O RSP: SYNC: 7, 110 us, ASYNC: 37 ms
- DDF/RRSAF ROLLUP, LIMIT: 5, STG: 0, TIME: 0
- RID LIST PROCESSING USED = 2, 070
The TSTAT (Trace Statistics) display provides a summary of all traced threads. Much of the data is similar to that shown for one thread in the STRAC display, browse through it by using the F8 key or select the desired accounting data sections from the EXPAND line.

TSTAT can be useful in application tuning when you trace only one plan. It gives you an overview of the performance of the plan to see if you even need to go into further detail analysis of single thread executions. If the average values meet expectations and the maximum and minimum don’t vary greatly, you may be able to stop here. Also, TSTAT summarizes the key indicator values to show whether any exceptional conditions, such as RID pool failures, have occurred. After all, the art of performance analysis and tuning is to spend your time where you get the biggest payback.

2 Press F3 to return to LTRAC.

Viewing detail trace data for active threads

When you are running a detail trace, the events that you have recently looked at in the DTRAC displays are available from the Detail User Status (DUSER) display for an active thread that is being traced.

To view a detail trace data for active threads

1 Access the DUSER display by following the steps in “Accessing current thread activity information” on page 20.

2 Use the Tab key to move to the UTRAC option on the EXPAND line and press Enter to view this data from the buffers.

As the threads complete processing, the data becomes available from the Current Traces and History Traces options as described previously in this chapter.

Printing a trace report

You have now run a trace and viewed it online. However, depending on the results, you might want to have a hardcopy for further analysis. Batch reports can also be valuable tools during an application review meeting.

Note

This section describes printing a trace, but you might also want to look at the accounting reports produced from SMF data, either from DB2 tables or directly from the extracted DB2 accounting records. For more information, see the MainView for DB2 Performance Reporter User Guide.
Printing all data per traced thread

Use the following procedure to print a trace report showing all data per traced thread.

**To print a trace report showing all data per traced thread**

To begin this exercise, press F3 until you return to the HT view.

1. On the HT view, type P (Print) in the CM field for a trace.

   The Batch Trace Print dialog is displayed, (Figure 104 on page 127).

   **Figure 104: Batch Trace Print dialog**

   | BMC Software ------------ BATCH TRACE PRINT ------------ PERFORMANCE MGMT |
   | COMMAND =>                      | TIME --- 15:00                          |
   | Update job => N (Y/N - update job statement) | (END to edit JCL)                   |
   | Title line 1 =>                 |                                             |
   | Title line 2 =>                 |                                             |
   | Data Selection:                |                                             |
   | From date => 16SEP2003 Time => 1125 |                                             |
   | To date => 17SEP2003 Time => 1412 |                                             |
   | PLAN =>                        |                                             |
   | AUTHID =>                      |                                             |
   | CONNECT =>                     |                                             |
   | CORR =>                        |                                             |
   | LOC =>                         |                                             |
   | DB2PKG =>                      |                                             |
   | REPORT SELECTION:              |                                             |
   | LTRAC => NO                    | (YES/NO)                                   |
   | STRAC => NO                    | (NO/ALL,SUMMARY,section1,section2..)        |
   | DTRAC => NO                    | (YES/NO)                                   |
   | POPUP => NO                    | (NO/ALL/SQL/event1,event2,....)            |
   | TSUM => (A/C/L/P/T)            | SORT => (for any TSUMx)                     |
   | TSTAT => NO (SUMMARY/ALL/NO)   | INTERVAL => 1H (for TSUMT only)            |

2. If you are using this option for the first time, you must update your job statements. Specify:

   Update Job => Y

3. Press **Enter** to display a job statement data entry panel.

   Fill in the required information and return using **F3** when you are finished.

4. Set the **Update job** option to **N**.

5. Fill in the options for a report.

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TITLE1 =&gt; <em>any title</em></td>
<td>Optional. Centered in first report header.</td>
</tr>
</tbody>
</table>
Data Selection is optional. The selection fields can be used to reduce the amount printed from a long trace. The date and time fields are primed with the start and end date-time of the trace.

Example

In this example, all data per thread traced from STRAC is printed:

```
LTRAC ==> N
STRAC ==> ALL
DTRAC ==> N
POPOP ==> N
TSUM ==> N
TSAT ==> N
```

There are many different reports that can be generated, either singly or in combination. For a full explanation of the options and to see sample reports, browse the printing a trace section in MainView for DB2 User Guide. You can also use the sample JCL member DZTBPRNT to generate multiple reports, or to print reports from SMF data. The control statements for several sample reports are provided in BBSAMP member DZJPnnnn, with comments to point out some of the most useful variations.

The reports are based on printouts of the online displays, so the options are selected using the names of these displays, like LTRAC, STRAC, DTRAC. In this tutorial you have chosen STRAC=ALL as the most useful report for application tuning. It shows the following for each thread traced:

- Basic DB2 accounting record data
- Environmental Indicators section
- Elapsed Time Analysis section
- SQL Statement Execution Counts section
- Buffer Pool Usage Analysis section, including Global Buffer Pools
- Lock Activity section, including Global Locks
- I/O Parallelism section
- Routines section (stored procedures and user-defined functions)
- DDF Summary section (if distributed work was done)
- Package/DBRM Overview section (if accounting trace 7 is active)

These sections are included for detail traces:

- SQL Summary section with summary statistics per SQL statement
- Database Summary section with scans per page set
- Database Lock and I/O section with locks and/or I/O data per page set
- Sort Summary section (if any sorts were performed)

6 Press Enter to validate your specifications.
These options are saved in your profile and used to initialize the fields the next time this panel is requested.

7 Press F3 to review the generated JCL in edit mode.

The options that you specified are inserted into a pattern job DZJPTRAC in BBPROF. You might want to copy this JCL into your own UBBPROF profile data set and modify it.

8 Check the rest of the options.

There are many more print options than can be shown on the panel. The sample job contains a short description of these options. Scroll to the bottom to review them.

9 Submit the job.

COMMAND ===> SUB

You can also SAVE the JCL for later execution, or CANCEL it completely.

10 Press F3 until you return to the Batch Trace Print dialog.

Other examples

This topic lists alternative examples for printing reports.

- To print an SQL statement summary per thread, sorted by Average CPU usage, followed by average SQL row processing statistics per statement, specify:
  
  LTRAC ===> Y  
  STRAC ===> SQL,SORTSQL=AC,SQLPOPUP

- To print a detail event trace per thread, with pop-up displays per SQL statement, specify:
  
  LTRAC ===> Y  
  DTRAC ===> Y  
  POPUP ===> SQL

- To print SQL statement text and EXPLAIN data for all dynamic SQL executed or BINDs of static SQL, specify:
  
  POPUP ===> (SQL-TEXT,EXPLAIN)

The following formatting options are available:
<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEWPAGE</td>
<td>Controls page breaks</td>
</tr>
<tr>
<td>WIDTH</td>
<td>Specifies wide (133) or narrow (81) output</td>
</tr>
<tr>
<td>LINECNT</td>
<td>Adjusts the number of lines printed per page</td>
</tr>
<tr>
<td>HEADING</td>
<td>Suppresses headings</td>
</tr>
<tr>
<td>MAXPAGES</td>
<td>Limits the amount of output to prevent an unexpectedly high prints volume</td>
</tr>
</tbody>
</table>
Analyzing the DB2 workload

The following scenarios teach you how to gain a quick overview of summary thread history data to identify problem areas and drill down to further detail if needed to pinpoint exception threads. You will also learn to use the trace displays and the sorting and selection features to pinpoint problem areas and exception threads.

In this practice session, you will:

1. Analyze recent workload history through thread interval summary views.
2. Perform detailed analysis of the thread data in a MainView for DB2 TLDS.
3. Perform detailed analysis of the thread data in the MainView for DB2 Data Collector trace data sets.
4. Perform detailed analysis of summary package data in the MainView for DB2 Data Collector trace data sets.
5. Use MainView Explorer charts for graphical workload history analysis.
6. Print workload reports for offline review.

Note

This practice session takes approximately one hour to complete.

Overview of thread history collection and data sources

You can use either of the following methods to collect thread history in MainView for DB2:

- “Capture the complete DB2 workload to analyze total DB2 activity” on page 132
- “Capture selected threads or applications to analyze specific issues” on page 132
Capture the complete DB2 workload to analyze total DB2 activity

The preferred method for capturing a complete DB2 workload, especially in a high-volume production system, is to use the MainView for DB2 Data Collector trace facility, because it is optimized for both data storage and retrieval.

The data is compressed so that a longer time period can be held for online viewing. To simplify and speed up data access, workload summary records per minute and connect type are also created. (This data is also automatically archived for use as input to batch reporting and for populating the performance data into DB2 tables.)

This trace data is identified with a trace name of MVDB2DC. It provides consolidated online access to all active data sets in use for thread collection. Check with your system administrator if the MainView for DB2 Data Collector trace facility is not available at your site.

A default MainView for DB2 summary trace named THRDHIST is also started automatically in the MainView for DB2 Product Address Space (PAS) and runs continuously. The system administrator might choose to log the data to one more wraparound trace log data sets (TLDSs). Each TLDS is viewed separately, and does not hold as large a thread volume as MainView for DB2 Data Collector. The windows mode view interface described in the following sections is only available for active or complete TLDSs, not from online buffer storage. When MainView for DB2 Data Collector is set up to capture the total workload, THRDHIST is often customized to reduce overhead by only capturing short-term history, or only keeping exception threads.

Capture selected threads or applications to analyze specific issues

Thread traces for a specific purpose can be defined in the MainView for DB2 Product Address Space (PAS) to either run continuously, or to cover only a specific time period.

These summary exception traces are inexpensive to run and simplify later analysis by limiting data capture to threads that might need attention, reducing the time needed to find them afterward in the complete DB2 workload. A trace, called BIGELAP, that only captures threads that exceed 10 seconds of total elapsed time might already be available in your system.

Such traces are even more effective when tailored to your workload. For example, you might have a BIGCICS trace qualified to capture only CICS transactions that exceed a much smaller elapsed time, or a BIGBATCH trace with a much larger elapsed time. Other filters allow you to capture threads that encounter a particular
exception condition. Workload qualifiers can be used to select only a particular application, or threads from a specific user.

For most effective use, these exception traces should also be written to a TLDS in addition to online buffers. TLDSs provides additional space for longer-term collection and also allow analysis through the windows mode thread history and thread query facility, and MainView Explorer charts. Traces kept only in online buffers can only be accessed through the full-screen trace displays.

Analyzing recent workload history

Sometimes you might need to analyze recent history of your DB2 workload.

For example:

- To make a quick check of DB2 performance from an application perspective
- To identify system and application exceptions and relate the problems to the threads that caused them
- To analyze the performance of a specific application
- To develop an understanding of the workload profile and spot deviations

The following scenarios describe how to look at thread history data in 3270 mode, which provides the most detailed data. For information about using workload history charts, see “Analyzing workload history with MainView Explorer charts” on page 149.

For more information, view the Quick Course "Retrieving Thread History Details."

Accessing thread history data

Thread history overview data in both the MainView for DB2 TLDSs and MainView for DB2 Data Collector active trace data sets is accessible from the thread interval history views.

These views provide summary performance data and exception analysis of your DB2 workloads. They display summary data by 15-, 5-, and 1-minute time intervals and connection type, and they provide access to the detail thread accounting data.
To access the views for thread interval history analysis

1 Use one of the following methods:
   - On the EZDB2 easy menu, select **Thrd Workload History** and press **Enter**.
   - On EZDBA, select **Thread History / Query** and press **Enter**.

The Thread History Trace Log List view (HTLOGS) is displayed, *(Figure 105 on page 134)*.

**Figure 105: Thread history traces (HTLOGS)**

```
24FEB2011 16:35:33 ------ MainView WINDOW INTERFACE (V6.0.00) ----------------
COMMAND ===> SCROLL ===> CSR
CURR WIN ===> 1 ALT WIN ===>>W1 =HTLOGS============DEFG=====*========24FEB2011==16:35:13====MVDB2==D===65
   - Thread History Traces - Hide Header
   Row Hyperlinks
   Number Records >> Thread Query / Time Drilldown
   Type >> MVDB2DC Package Reports
   Trace ID >> MVDB2DC Thds (MVDB2 9.1 target only)

<table>
<thead>
<tr>
<th>End Date</th>
<th>Time</th>
<th>Trace Id</th>
<th>Type</th>
<th>Trace Title</th>
<th>State</th>
<th>Records Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>07MAR2011</td>
<td>N/A</td>
<td>MVDB2DC</td>
<td>Sum</td>
<td>ROLLUP SUMMARY</td>
<td>Curr</td>
<td>77464 DEFG</td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>BIGELAP</td>
<td>Sum</td>
<td>LARGE ELAPSED TIMES</td>
<td>Curr</td>
<td>DEFG</td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>THRDHIST</td>
<td>Sum</td>
<td>THREAD HISTORY</td>
<td>Curr</td>
<td>DEFG</td>
</tr>
<tr>
<td>10FEB2011</td>
<td>06:43</td>
<td>S00000001</td>
<td>Sum</td>
<td>DB2 APPLICATION TRACE</td>
<td>Hist</td>
<td>DEFG</td>
</tr>
<tr>
<td>07FEB2011</td>
<td>13:57</td>
<td>00000001</td>
<td>Sum</td>
<td>DB2 APPLICATION TRACE</td>
<td>Hist</td>
<td>1 DEFG</td>
</tr>
<tr>
<td>07FEB2011</td>
<td>13:54</td>
<td>00000002</td>
<td>Sum</td>
<td>DB2 APPLICATION TRACE</td>
<td>Hist</td>
<td>DEFG N/</td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>THRDHIST</td>
<td>Sum</td>
<td>THREAD HISTORY</td>
<td>Curr</td>
<td>145735 DEDM</td>
</tr>
</tbody>
</table>
```

This view displays information about all available sources of thread accounting history. It includes each trace log data set (TLDS), and data from the MainView for DB2 - Data Collector active trace data sets. The entries are sorted by end date and time, so typically the MainView for DB2 Data Collector entry is at the top, followed by the most current THRDHIST TLDSs. TLDSs that are currently being updated are displayed in green.

**Note**

Only traces that are being logged and have a valid TLDS that contains records are accessible from the windows mode views and thread query panel discussed in this section.

Active traces that are not being logged are shown in HTLOGS for informational purposes only; however, you can access the data from such traces by using the full-screen displays.

You can use this view to review the sources of thread history data and select one for workload summary analysis by hour, interval, or connection type, or drill down to detail thread accounting data. The **Number Records** column shows how many accounting records have been captured in this data source.
**Analyzing workload interval summaries**

Use the following procedure to analyze workload interval summaries.

(“Analyzing thread history” on page 139 explains how to drill down through interval history views to detail threads, analyze detail thread records, and perform thread queries.)

**To analyze workload interval summaries**

**1** Choose an entry with recent data from the HTLOGS views.

You can choose any earlier TLDS if you want to see past history. In this case, first sort the view by TRACE ID so that you can easily find all THRDHIST entries. (Enter **SORT** on the COMMAND line and place the cursor in the **TRACE ID** column.)

**2** Hyperlink from the **Number Records** column for your selected entry to begin analysis of the selected data source.

View HTIQZ provides a summary of the data in 15-minute intervals, and several navigation options in the header.

**Figure 106: Thread Analysis - Query / Drilldown (HTIQZ)**

---

<table>
<thead>
<tr>
<th>Time</th>
<th>Type</th>
<th>Connect</th>
<th>Thread</th>
<th>Record</th>
<th>15M</th>
<th>Total</th>
<th>Total</th>
<th>Total</th>
<th>Elaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>14:45</td>
<td>03-03</td>
<td>CICS</td>
<td>767</td>
<td>767</td>
<td>*</td>
<td>1690.189</td>
<td>3.172</td>
<td>0.000</td>
<td>33.9</td>
</tr>
<tr>
<td>14:30</td>
<td>03-03</td>
<td>CICS</td>
<td>835</td>
<td>835</td>
<td>*</td>
<td>1790.337</td>
<td>3.364</td>
<td>0.000</td>
<td>29.0</td>
</tr>
<tr>
<td>14:15</td>
<td>03-03</td>
<td>CICS</td>
<td>831</td>
<td>831</td>
<td>*</td>
<td>1800.814</td>
<td>3.347</td>
<td>0.000</td>
<td>32.1</td>
</tr>
<tr>
<td>14:00</td>
<td>03-03</td>
<td>CICS</td>
<td>832</td>
<td>832</td>
<td>*</td>
<td>1801.821</td>
<td>3.409</td>
<td>0.000</td>
<td>29.5</td>
</tr>
<tr>
<td>13:45</td>
<td>03-03</td>
<td>CICS</td>
<td>823</td>
<td>823</td>
<td>*</td>
<td>1798.185</td>
<td>3.431</td>
<td>0.000</td>
<td>37.0</td>
</tr>
<tr>
<td>13:30</td>
<td>03-03</td>
<td>CICS</td>
<td>821</td>
<td>821</td>
<td>*</td>
<td>1798.729</td>
<td>3.369</td>
<td>0.000</td>
<td>40.2</td>
</tr>
<tr>
<td>13:15</td>
<td>03-03</td>
<td>CICS</td>
<td>817</td>
<td>817</td>
<td>*</td>
<td>1800.306</td>
<td>3.161</td>
<td>0.000</td>
<td>42.6</td>
</tr>
<tr>
<td>13:00</td>
<td>03-03</td>
<td>CICS</td>
<td>808</td>
<td>808</td>
<td>*</td>
<td>1800.283</td>
<td>3.275</td>
<td>0.000</td>
<td>43.7</td>
</tr>
<tr>
<td>12:45</td>
<td>03-03</td>
<td>CICS</td>
<td>817</td>
<td>817</td>
<td>*</td>
<td>1806.015</td>
<td>3.402</td>
<td>0.000</td>
<td>37.4</td>
</tr>
<tr>
<td>12:30</td>
<td>03-03</td>
<td>CICS</td>
<td>817</td>
<td>817</td>
<td>*</td>
<td>1792.930</td>
<td>3.399</td>
<td>0.000</td>
<td>36.4</td>
</tr>
</tbody>
</table>
3 Hyperlink on **Trace Details** to begin your analysis of the selected data source in a detailed summary view HTDTLZ of all thread data, (Figure 107 on page 136 and Figure 108 on page 137).

**Figure 107: Thread interval summary, top portion (HTDTLZ)**

<table>
<thead>
<tr>
<th>Date.....................</th>
<th>2011-02-••</th>
<th>Thread Summary by Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start Time / End Time....</td>
<td>00:00 - 23:45</td>
<td>Thread Summary - 15Min</td>
</tr>
<tr>
<td>Connect Type.............</td>
<td>*******</td>
<td>Thread Summary - Connect</td>
</tr>
<tr>
<td>Number of Records........</td>
<td>387300</td>
<td>Interval/Connect Records</td>
</tr>
<tr>
<td>Number of Threads........</td>
<td>387294</td>
<td></td>
</tr>
<tr>
<td>DBAT Records...........</td>
<td>34042</td>
<td></td>
</tr>
<tr>
<td>Parallelism.............</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Nested Functions.........</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>LOB Access..............</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>XML Access..............</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Abnormal Terminations..</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Rollbacks................</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Exceptions...............</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>Times....................</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Elapsed...............</td>
<td>771408.487</td>
<td>Max/Thd 81940.250 Avg/Thd 1.991 Average 100.0 50..10</td>
</tr>
<tr>
<td>Total CPU ................</td>
<td>4290.531</td>
<td>210.332 0.011 0.6</td>
</tr>
<tr>
<td>Total zIIP ...............</td>
<td>177.159</td>
<td>0.147 0.000 0.0</td>
</tr>
<tr>
<td>In DB2 Elapsed...........</td>
<td>102576.594</td>
<td>713.381 0.264 13.3</td>
</tr>
<tr>
<td>In DB2 CPU ..............</td>
<td>3697.490</td>
<td>2.469 0.009 0.5</td>
</tr>
</tbody>
</table>

You can use this detailed summary data to understand the characteristics of your DB2 workload for the time frame covered by that trace.

The top portion shows a thread summary with elapsed and CPU time analysis. You can immediately see the number of threads, any unusual number of exceptions, the impact on the system (CPU usage), and whether the percentage of class 3 wait time, as either an average or a maximum, is out of normal guidelines.
For more detail, scroll down to the bottom portion of the view, (Figure 108 on page 137).

**Figure 108: Thread interval summary, bottom portion (HTDTLZ)**

<table>
<thead>
<tr>
<th>Event</th>
<th>Total</th>
<th>Max/Thd</th>
<th>Avg/Thd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commits</td>
<td>387406</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>Lock Suspends</td>
<td>157</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Getpages</td>
<td>846455890</td>
<td>10340</td>
<td>2185</td>
</tr>
<tr>
<td>Sync Read I/O</td>
<td>7203757</td>
<td>265</td>
<td>18</td>
</tr>
<tr>
<td>Async Page I/Os</td>
<td>209825356</td>
<td>10257</td>
<td>541</td>
</tr>
<tr>
<td>DDL &amp; DCL SQL</td>
<td>198687</td>
<td>109</td>
<td>1</td>
</tr>
<tr>
<td>DML SQL</td>
<td>1337649</td>
<td>271</td>
<td>3</td>
</tr>
<tr>
<td>Insert/Update/Delete SQL</td>
<td>23</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Records with Exceptions...</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deadlocks</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timeouts</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lock Escalations-Share</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lock Escalations-Excl</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Claim failures</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drain failures</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incremental Bind Failures</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RID Failures - Storage</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RID Failures - Limit</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stored Procedure Failures</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Function Failures</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trigger Failures</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parallel Fallbacks</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambiguous Cursor</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No ESA Sort</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Buffers</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Storage</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RLF Limited</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Enclave</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sysplex-No Coordinator</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sysplex-RR/RS Isolation</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parallel Reduced</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buffer Shortage</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sysplex Skip-No Buffers</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sysplex Declare TempTbl</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sysplex Reform.-Config</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sysplex Reform.-No Buff</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Here you can see key activity indicators (as totals, averages, and maximums) and a detailed breakdown of what kind of thread exceptions have occurred.
Scroll back to the top of the view to access hyperlinks for further analysis by hour, interval, or connection type. Hyperlink from the Date field to see a summary of thread processing by hour, (Figure 109 on page 138).

Figure 109: Thread history by hour (HTHOURZ)

You can use this information to identify when workload processing problems or thread exceptions have occurred. You can sort it by any of the columns to look for particular problems like high class 3 wait times or too many exceptions. Type SORT A or SORT D on the COMMAND line and place the cursor in the column that you want to sort by.

Hyperlink from the Hour column to see thread data for the selected time period by interval and connection type, (Figure 110 on page 138).

Figure 110: Thread interval by connection types (HTINTCZ)

You can use this information to determine which connection types were experiencing problems during a selected interval.

Hyperlink on the End Time field to see detailed information for the selected interval and connection type in 1-minute intervals in the HTINTVLC view.

Hyperlink on the End Time field to see detailed information for the selected connection type and 1-minute interval in the HTINTVLD view.
HTINTVLD looks the same as the HTDTLZ view that you saw earlier, except that HTINTVLD shows only the information of interest to help you analyze why the workload from this connection type was experiencing problems or an unusual pattern of activity.

9 Press F3 until you return to HTDTLZ.

10 Hyperlink on Start Time/End Time to see a summary of thread history data by interval in HTINTVLD.

This view is similar to HTHOURZ, but the data is summarized by 15-minute intervals.

You can drill down on End Time to see the data for an interval broken down by connect type, if needed.

11 Press F3 until you return to HTDTLZ.

12 Hyperlink on Connect Type to see a summary of thread processing by connection type in HTCTYPZ.

From here, you can drill down on one Connect Type to see the breakdown by interval.

13 Press F3 until you return to HTLOGS.

**Analyzing thread history**

The HTLOGS view provides access to detailed thread accounting data in any of the trace data sources.

Accessing and analyzing a large number of detail records can be very time consuming, but HTLOGS provides two methods for choosing only the threads you need to analyze. This feature is especially useful when working with a large MainView for DB2 Data Collector active trace data set.

You can use either of the following methods, or a combination of them, based on what you need to analyze:

- A thread history drill down of interval summary data—from 15 to 5 to 1 minute intervals of data—can help you identify problem threads in a particular time period, or detect a time period with problems.

- A thread query with extensive filtering options can help you find specific conditions or workload qualifiers in threads that might be distributed throughout all of the records traced.
You will use both of these methods in the following sections.

**Analyzing detailed thread history**

Use the following procedure to analyze detailed thread history information.

1. Access the HTLOGS view in target mode (not SSI mode) by setting the context to the desired DB2 subsystem. To do this, type the following on the COMMAND line:

   `CON ssid`

2. In HTLOGS, find a history trace entry and hyperlink on the **Number Records** field to access the HTIQZ view, *(Figure 111 on page 140)*.

   HTIQZ provides summarized thread history data by 15-minute intervals. The header section provides additional navigation options. Scroll right to examine all of the data available for analysis, including totals, averages and exceptions. When you are done, scroll left.

   The **Thread Count** field is the number of threads processed. The **Record Count** field indicates the number of accounting records. These counts differ for DDF/RRSAF rollup (multiple threads per accounting record) and parallelism rollup (one rollup record that does not represent a thread).

   ![Figure 111: Thread analysis query and drill down (HTIQZ)](image)

3. Review the hyperlinks on the left side of the header section. They provide options that pertain to the entire trace:

   - **THREAD QUERY** hyperlinks to the *Select threads to display* panel, see “Analyzing by thread query” on page 144.
■ **Trace Details** hyperlinks to a detail summary view of the entire trace (the HTDTLZ view shown in “Analyzing workload interval summaries” on page 135.)

■ **BB12 LTRAC-MV** hyperlinks to the full-screen LTRAC display for a TLDS and is used primarily to analyze the events per thread in a detail trace.

■ **TLDS All Recs** is valid only for TLDSs and hyperlinks to the TRLTRAC view to show all of the thread accounting records from the selected TLDS. This data is especially useful for exception traces, where only occasional threads are captured and might be in widely spaced, 15-minute intervals.

4 Review the Row Hyperlinks that are available for thread history drill down. Find an interval with a fairly high record count, and hyperlink on the End Time field to drill down to a 5-minute summary in the HTI5Z view.

5 Hyperlink again on End Time to display 1-minute intervals in the HTI1Z view.

6 Press F3 until you return to HTIQZ.

7 Find an entry that has asterisks in the **Connect Type** field (indicating multiple connect types) and hyperlink on it.

A 15-minute summary by connect type within the interval is displayed.

In each of the 15-, 5-, and 1-minute interval views, the **Date** field hyperlinks to a detail summary of the selected row. The format is similar to HTDTTLZ, but the data is limited to a specific set of threads. You can easily determine whether the conditions you are looking for occurred during the selected time period. Alternatively, you can scroll right in the tabular views to compare multiple time periods more easily.

8 Press F3 to return to HTIQZ.

**Analyzing individual thread records**

Use the following procedure to analyze individual thread records.

1 In the HTIQZ view, find a row with a high record count (hundreds of records will provide a good set of threads to examine). Scroll right to see if that row also has any abnormal terminations, rollbacks, or other exceptions. Scroll left when you are done.

2 Hyperlink on **Record Count**.
A list of threads and a navigation header in the TRLTRAC view is displayed, Figure 112 on page 142.

Figure 112: Trace thread list (TRLTRAC)

Scroll right to review the additional elements in the view. (The TRLTRAC view provides much more information than the full-screen LTRAC display).

Because DB2 workloads vary so much, many additional identifiers are available as hidden fields. You can customize the view to show the identifiers that are most important in your environment. For example, you might want to display any of the following data: the full correlation ID, connect name, connect type, or DDF requesting location. The distributed workstation end user identifiers are available for DBAT or RRSAF threads.

3 To find threads with high or exception values quickly, sort the rows in the view by time or a measurement column. To find exceptions, scroll right to display the Except. Flag field. This flag identifies abnormal terminations, rollbacks, and processing exceptions such as a timeout, RID failure, or parallelism fallback. For more detail on exceptions, scroll further right, or hyperlink on the Auth ID field or Except. Flag field.

4 You can also filter the data in the view by using a filter mask. Put the cursor on the INC MASK field and press Enter. Notice that the second row of the column header becomes blank for input. Type one or more filter values in the blank row. For example, you might type ABC in the Plan column. Press Enter to convert the filter values to a new WHERE filter. When you are done, remove your filter values and use the EXC MASK field to remove the blank row.
In the header, the **Thread Summaries** area lists the types of summary views available. Hyperlink on **Plan** to display a summary view of the thread list by plan name, (Figure 113 on page 143).

**Figure 113: Plan summary (TRPLANZ)**

25JAN2011 14:19:18 ----- MainView WINDOW INTERFACE (V6.0.00) ---------------
COMMAND ===> SCROLL ===> CSR
CURR WIN ====> 1 ALT WIN ===> >>
>W1 =TRPLANZ=(ALL==========DEFG====)=0 25JAN2011==14:19:14====MVDB2==0==0==1
- Plan Summary S0000004.140 - Hide Header
  Row Hyperlinks
  Plan Name >> TRPLANZ (Plan Filter)
  Exception Count >> TRPLANZ (Plan/Exception Filters)
  Plan Name Count Record Thread Cls1 Elap Cls1 CPU Stmts Getpage Cls2 Elap
  DSNTEP2 27 27 36.275 1.852 1728 109394 35.406

The summary views provide both totals and averages in a row for each plan (scroll right to see more data). In this example, there was only one plan.

Hyperlink on the **Plan Name** field to return to TRLTRAC to display only the threads that used this plan.

Hyperlink on the **Plan** field in the **Thread Summaries** area again. You can also hyperlink on the **Except. Count** field if it contains a value greater than zero, to redisplay TRLTRAC with only the exception threads for this plan. (These filters are in effect only for these hyperlinks. If you choose any other hyperlink, such as a different summary by Auth ID, the filter by plan is not retained. To retain one or more filters, use filter masks as described in Step 4 on page 142).

Hyperlink on the **End Time** field to display the hybrid free-form view TRSTRAC, which displays DB2 accounting details provided by the full-screen service STRAC (Figure 113 on page 143).

**Figure 114: Summary trace view (TRSTRAC)**

25JAN2011 14:20:26 ----- MainView WINDOW INTERFACE (V6.0.00) ---------------
COMMAND ===> SCROLL ===> CSR
CURR WIN ====> 1 ALT WIN ===> >>
>W1 =TRSTRAC=0 25JAN2011==14:20:25====MVDB2==127
- Summary Trace Entry TRACE ID: S0000004 - Hide Header
  Hyperlinks SEQ#..... 203 Section Locates
  . Monitors (WKLD) BASE SOLCNTS RTN
  * Dynamic SQL Trace ENV BFRPOOL DDF
  MVDB2/DC Reports ELAPSED LOCKS PKG
  * Dynamic SQL Trace PRL

** Scrollable View Lines **
STOP.....17JAN 10.52.57.97 PLAN..............DSNTEP2 TYPE...........ALLIED
START....17JAN 10.52.56.92 AUTHID...........BOLDJW1 CONNECT........BATCH/TSO
ELAPSED........1,043 ms ORIG PRIM AUTH....BOLDJW1 CORR ID.....BOLDJW1G
TERM........NORMAL/DEALLOC COMMITS..................1 ROLLBACKS..............0
------------------------------------------------------------------------------
RUNTIME ANALYSIS IN DB2 IN APPL. TOTAL %IN DB2(*) TOTAL(*)
---------- ---------- ---------- -------------------------- ---------
ELAPSED TIME 1,043 ms 13 ms 1,043 ms | ==
CPU TIME 58 ms 5,385 us 63 ms |
DB2 WAIT TIME 979 ms |
- Specialty Engine CPU times -
  - In DB2 CPU 0 us 0 us |
  - STORED PROC 0 us |
  - UDF 0 us |
You can scroll this view vertically, or use the Section Locates fields to display a particular section at the top of the scrollable area of the view. Put the cursor on a section and press Enter.

9 To display Help for a section, put the cursor on the section and press F1.

10 Press F3 until you return to HTIQTZ.

**Analyzing by thread query**

Use the following procedure to analyze by thread query.

The HTIQTZ view provides two ways to access the thread query panel:

- The THREAD QUERY hyperlink in the header section lets you specify any time period in the trace. The trace start time is filled in as the start time of the query. The default duration is set to 15 minutes.

- The 15M QRY hyperlink for a particular interval sets the start time of the query to the start time of that interval. The default duration is set to 15 minutes. (There is also a 5M QRY hyperlink in the view HTI5Z, which sets the default duration to 5 minutes.)

**To analyze by thread query**

1 Select a 15M QRY hyperlink on HTIQTZ to access the thread query panel, (Figure 115 on page 145).
This panel is called a multiplatform dialog (MPD) because it can be used in both 3270 mode and in the MainView Explorer product.

Figure 115: Thread query panel - top portion (qualifiers, exceptions, and conditions)

2 Verify the time in the Required Query Criteria section. You can override both the Start Time and the Duration.

3 In the Optional Qualifiers section, specify one or more qualifiers, such as one or more plans, or a generic plan such as ABC*.

Multiple qualifiers of one type are ORed. Multiple qualifiers of different types are ANDed, so that all conditions must be met.

4 In the Exception and Condition Filters section, specify at least one exception or condition filter that you know exists in your trace data.

The Exception and Condition Filters include critical thread failures that are good indicators of potentially poor performance. Only threads that meet at least one of the filter criteria will be retrieved.

Note

Specifying additional filters and qualifiers is highly recommended. If too many records meet your search criteria, only a subset of those records might be returned, along with a message that suggests specifying additional filters.
5 Scroll down to display the next screen of the panel, (Figure 116 on page 146).

Figure 116: Thread query panel - bottom portion (value filters)

| Select threads to display | SCROLL ===> CSR 
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND ====&gt;</td>
<td>MORE:++</td>
</tr>
<tr>
<td>Value Filters - all sources:</td>
<td>Oper Value</td>
</tr>
<tr>
<td>Get Pages - any/all BP</td>
<td></td>
</tr>
<tr>
<td>Synchronous Read I/O - any/all BP</td>
<td></td>
</tr>
<tr>
<td>Asynchronous Pages Read - any/all BP</td>
<td></td>
</tr>
<tr>
<td>Commits</td>
<td></td>
</tr>
<tr>
<td>In DB2 Elapsed</td>
<td>(hh:mm:ss)</td>
</tr>
<tr>
<td>In DB2 CPU</td>
<td>(hh:mm:ss)</td>
</tr>
<tr>
<td>zIIP Total CPU</td>
<td>(hh:mm:ss)</td>
</tr>
<tr>
<td>zIIP-eligible CPU on CP</td>
<td>(hh:mm:ss)</td>
</tr>
<tr>
<td>Value Filters - MVDB2DC only:</td>
<td>Oper Value</td>
</tr>
<tr>
<td>Lock Suspends - Local</td>
<td></td>
</tr>
<tr>
<td>Lock(Latch) Contention Wait</td>
<td>(hh:mm:ss)</td>
</tr>
<tr>
<td>Latch Contention Wait (&gt; 10.1)</td>
<td>(hh:mm:ss)</td>
</tr>
<tr>
<td>I/O Elapsed Wait</td>
<td>(hh:mm:ss)</td>
</tr>
<tr>
<td>Other Read I/O Wait</td>
<td>(hh:mm:ss)</td>
</tr>
<tr>
<td>Other Write I/O Wait</td>
<td>(hh:mm:ss)</td>
</tr>
<tr>
<td>Page Latch Contention Wait</td>
<td>(hh:mm:ss)</td>
</tr>
<tr>
<td>Global Contention L-lock Wait</td>
<td>(hh:mm:ss)</td>
</tr>
<tr>
<td>Value Filters - TLDS only:</td>
<td>Oper Value</td>
</tr>
<tr>
<td>Lock Suspends - Local and Global</td>
<td></td>
</tr>
<tr>
<td>DML SQL Statements</td>
<td></td>
</tr>
<tr>
<td>DDL SQL Statements</td>
<td></td>
</tr>
<tr>
<td>Insr/Upd/Del/Mrg/Trunc SQL Statements</td>
<td></td>
</tr>
<tr>
<td>Total Elapsed</td>
<td>(hh:mm:ss)</td>
</tr>
<tr>
<td>Total CPU</td>
<td>(hh:mm:ss)</td>
</tr>
<tr>
<td>Total Class 3 Wait</td>
<td>(hh:mm:ss)</td>
</tr>
<tr>
<td>zIIP in-DB2 CPU</td>
<td>(hh:mm:ss)</td>
</tr>
</tbody>
</table>

END to exit saving changes
CANCEL to exit without saving changes
HELP to view related help
RESET to reset to initial data

For any of the value filters, you can specify the value of your choice and a logical operator, such as GT (greater than) or EQ (equal). For example, you might want to retrieve only the records that exceed 10 seconds of In-DB2 elapsed time.

The filters are different for TLDSs and MainView for DB2 Data Collector trace data sets; these differences will be addressed in future releases of MainView for DB2.

For more information about the filters, see the online Help.

6 Specify a value filter in the In DB2 Elapsed field.

7 Review the values that you specified and then press F3 to submit the query.

The thread records that meet your criteria are displayed in the TRLTRAC view. You can then use any of the thread analysis options discussed previously in this section.

8 After you complete your analysis of these threads, press F3 until you return to the HTLOGS view.
The previous scenarios described methods to analyze even very large thread volumes and drill down to detail data. However, to simplify access to specific threads or applications of interest, you might want to consider running one or more summary exception traces with TLDSs. These trace requests are fairly inexpensive to run, and you can filter the threads and store only those threads needed for later analysis, which will save storage, processing time to retrieve the records, and analysis time. For more information, see “Overview of thread history collection and data sources” on page 131.

Analyzing packages from MainView for DB2 traces

Trace Package views provide detailed and summary formatting of the Package Accounting (IFCID 239) data found in DB2 Data Collector active trace datasets and History (TLDS) traces. Extensive totaling is provided, including averages, minimums and maximums, and totals on a per event, per execution, and per thread basis.

These views can be accessed at various points when analyzing the data in a trace selected from list of traces in the HTLOGS view. You cannot directly access these views from the COMMAND line.

To analyze packages for a selected time interval

1. From HTLOGS, select a trace entry by hyperlinking in that row on the Number Records field.

The HTIQZ view showing the 15-minute time intervals available in that trace is displayed.

<table>
<thead>
<tr>
<th>Time MM-DD</th>
<th>Connect</th>
<th>Thread Count</th>
<th>Record Count</th>
<th>15M QRY</th>
<th>End</th>
<th>Total QRY</th>
<th>Elapsed</th>
<th>CPU</th>
<th>zIIP</th>
<th>Elaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>15:45 06-03 CICS</td>
<td>207</td>
<td>207</td>
<td>*</td>
<td>1064.908</td>
<td>1.859</td>
<td>0.000</td>
<td>270.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:30 06-03 CICS</td>
<td>139</td>
<td>139</td>
<td>*</td>
<td>20500.144</td>
<td>6.568</td>
<td>0.000</td>
<td>683.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:15 06-03 CICS</td>
<td>142</td>
<td>142</td>
<td>*</td>
<td>2739.289</td>
<td>1.708</td>
<td>0.000</td>
<td>666.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:00 06-03 CICS</td>
<td>142</td>
<td>142</td>
<td>*</td>
<td>2004.343</td>
<td>3.681</td>
<td>0.000</td>
<td>490.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14:45 06-03 CICS</td>
<td>334</td>
<td>334</td>
<td></td>
<td>1712.190</td>
<td>1.643</td>
<td>0.000</td>
<td>672.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14:30 06-03 CICS</td>
<td>147</td>
<td>147</td>
<td></td>
<td>1772.052</td>
<td>1.701</td>
<td>0.000</td>
<td>684.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14:15 06-03 CICS</td>
<td>158</td>
<td>158</td>
<td></td>
<td>2001.813</td>
<td>1.701</td>
<td>0.000</td>
<td>644.9</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2 Hyperlink on the **Thread Count** field to provide access to all packages executed in the threads of the selected 15-minute interval.

**Note**
A similar hyperlink is available in HTI5Z (for 5-minute intervals) and HTI1Z (for 1-minute intervals).
For TLDS traces only, there is an additional option on HTIQZ to view all packages traced from the **TLDS All Pkgs** hyperlink.

A summary package view (PKGZ) is displayed.

3 Hyperlink on the listed options for further information, such as summaries by package name, program name, activity name or activity type.

For example, hyperlink on **Pkg Count** to see a complete list of packages. It also provides a hyperlink to drilldown to package detail data.

4 Alternatively, you can access the PKGZ view through Thread Query. In HTIQZ, hyperlink on either the **Thread Query** option in the header, or in the 15M QRY column for an interval.

The Thread Query panel now allows retrieval of package data. Enter any character in the Package Query field to select package processing. Specify thread
filters and any optional package qualifiers to limit the amount of data to be returned in the PKGZ view.

```
Select threads to display

COMMAND ===> SCROLL ===> CSR

Trace ID     MVDB2DC,36  Trace Date 2013/05/27
Record Count 16886  Trace Time 14:16:59.572
Required Query Criteria:
Start Date    2013/05/27  (Local yyyy/mm/dd, default CURRENT)
Start Time    14:16:59    (Local hh:mm:ss, default 00:00:00)
Duration                  (hh:mm:ss, default 00:15:00)
Package Query             (Select for Package Summary)
Optional Package Qualifiers (Package Query only):
Collection ID
Program Name
Activity Name
Activity Type    (1=StorProc, 2=UDF, 3=Trigger, 4=NatvSQL, 5=Non-inln UDF)
Optional Qualifiers:
Authorization ID
Plan
Connection Name
Correlation ID
Role
Remote Location
End User Name
```

5 You can also access the PKGZ view when you are viewing detailed thread data in the TRSTRAC view by hyperlinking on the Packages field.

```
03JUN2013 15:47:56 ------ MAINVIEW WINDOW INTERFACE (V6.1.00) ----------------
COMMAND ===> SCROLL ===> CSR
CURR WIN ===> 1        ALT WIN ===>
>W1 =TRSTRAC===========JXODEFG==*========03JUN2013==15:47:55====MVDB2====D==130
- Summary Trace Entry TRACE ID: MVDB2DC  Hide Header
  Hyperlinks          SEQ#..... N/A       Section Locates
    Monitors (WKLD)                       (Section Field Help)
    MVDB2/DC Reports                      BASE       SQLCNTS      RTN
    Dynamic SQL Trace                     ENV        BFRPOOL      DDF
  Packages                                         PRLL         ACC
** Scrollable View Lines **
STOP.....03JUN 15.45.11.82 PLAN..............TSMCOM1N TYPE..............ALLIED
START.....03JUN 15.45.09.61 AUTHID............BOLWTN1  CONNECT....CICS68E1/CICS
ELAPSED...........2,218 ms ORIG PRIM AUTH....BOLWTN1  CORR ID.....ENTRTSN10003
TERM......NORMAL/RESIGN-ON COMMITS..................1 ROLLBACKS..............0
RUNTIME ANALYSIS   IN DB2     IN APPL.      TOTAL      %IN DB2(=)     TOTAL(*)
----------------   --------   --------   --------     0 ...25...50...75..100%
ELAPSED TIME       1,046 ms   1,172 ms   2,218 ms     | =========*********** |
CPU TIME              12 ms     129 us      12 ms     | <                    |
DB2 WAIT TIME        743 ms                           | ======               |

--- Table: Summary Trace Entry TRACE ID: MVDB2DC
```

Analyzing workload history with MainView Explorer charts

The previous sections described how to use the thread history views and thread query dialog to analyze a DB2 workload, detect problems, and investigate problem threads.
Those views provide access to extensive performance data over time, which can be summarized, sorted, and filtered. That large volume of data is useful for analyzing a specific problem, such as:

- An end user complaint about performance at a particular time in the past
- A specific application that was recently changed
- Threads with high CPU usage

However, that volume of data can make more general analysis very time consuming. The MainView Explorer charts can greatly simplify general analysis tasks, such as gaining a historical perspective of the total workload; detecting problems that you were not aware of; and correlating different measurements and indicators over time. By using the charts, even less experienced users can easily spot anomalies in normal workload patterns and quickly drill down to additional information for that time period.

The charts that are described in the following sections focus on recent historical workload analysis.

For more detailed information about MainView Explorer, see “Using MainView Explorer and the DB2 Health Navigator” on page 85, the online Help, or the MainView User Guide.

**Viewing workload configurations**

Use the following procedure to view workload configurations.

1. To access the charts, expand the Configurations node in EZEXPLORER to see the three groups of configurations. These configurations combine charts and views or containers together, preserving properties such as chosen items or sort order.

The first configuration group is for the DB2 Health Navigator as described in “Using MainView Explorer and the DB2 Health Navigator” on page 85.
The second and third groups focus on historical DB2 workload analysis. There are two sources of information about workload history for charting:

- Workload objectives monitor data for defined workloads
- Thread history interval data

### Viewing workload objective monitor charts

Workload objectives monitors charts show monitor data for all defined workloads for the previous four hours in 15 minute intervals. They show average response time, the percentage of threads that meet response goals per workload, and thread rate per second.

1. Under the **Configurations** node, right-click to fully expand the **Monitor Workloads by Interval** node.

![Product: MVDB2 @ DEFG](image)

2. Under the **Values per Workload** node, double-click the **All 3 Values** chart.
The container of charts shows all three monitor values per workload together for easy comparison. These charts help you see the bigger picture, for example, whether a response time spike in one workload could be related to an increased thread rate, either for that workload or another workload.

The charts show data from the individual workload objectives monitors that are automatically activated per defined workload. MainView for DB2 distributes definitions based on DB2 connect types for workloads that are mostly likely to have consistent processing characteristics, including the transaction type workloads that typically must meet service level agreements, such as CICS, IMS MPPS, and distributed DBAT workloads. Response time targets are set based on the In-DB2 elapsed time.

To make this information even more valuable for your systems, you can easily modify the default response times to use total elapsed time, or set different response time goals for these general workloads. You can also add new workloads for your site's critical applications, defined by various DB2 thread qualifiers. (For more information about workload setup, see the DWKLDDEF view.)

The three-chart layout is good for comparisons, but you might want to see one chart in a larger format.

3 To maximize a chart, do one of the following actions:

- Click the standard maximize or minimize icons in the upper right corner of each chart.
- Use the cycling icons at the top of the container tab. Click the forward or backward arrow icon to maximize a chart. To redisplay the three-chart layout, click the circle icon.

- Open the individual chart in the navigation tree.

4 Right-click any data point in the chart and select the **Hyperlink** option to see the 90-second monitor samples within the selected 15-minute interval in the related plot view.

The view opens in a separate tab. Close this tab after you have viewed it.

5 To show the same data across multiple DB2 subsystems, return to the context tree to set the context to a predefined SSI context.

6 Right-click on any defined SSI context and select **Set context**.
When you change the context, the product tree collapses.

7 Open the **Configurations** node, fully expand the **Monitor Workloads** node and scroll down to the SSI Context part of this node.

8 Under **Grand Totals per DB2 (ALLWORK)** select **Thread Rate/Sec**.

The resulting chart shows thread rate per second for each DB2 in the SSI context. In this example, the DJ context shown below includes two DB2 subsystems.

You could also view total thread rate, summarized for all DB2s, under **Grand Totals SSI (ALLWORK)**. The ALLWORK monitor captures all thread activity.

---

**Tip**

Charts that show values per workload, summarized for all DB2s in the context, can be especially valuable for workload analysis in a data sharing group.
Viewing thread history interval charts

Several charts show thread history data, summarized per 1-minute intervals and connect type—the same data that is shown in the thread history views and thread query results from MainView for DB2 Data Collector data.

In the thread history views the fields are also available for charting. Thread processing times, CPU and zIIP usage, exceptions, or activity rates for SQL and I/O can be quickly compared in multiple charts that simplify analysis of workload activity over time. Thread history is available in target mode only, so first ensure that your context is set to a single DB2.

To view thread history interval charts

1. Under the Configurations node, expand the Thread History by Minute node. You can expand the node fully, or you can expand only those nodes for connect type information that you are interested in, such as Total Workload, CICS Workload, or Batch Workload.

Because transaction type workloads typically have a more consistent thread profile, with more measurements that are comparable when analyzing those workloads over time, several charts are provided.

Other workloads, such as batch or utility jobs, often run only at specific time periods and vary more in their processing characteristics.

2. Under the Total Workload node, double-click Thread Rate per Connect Type.
This chart is similar to the objectives monitor thread rate chart, except:

- The monitor data is per 15 minute intervals over the last four hours and includes only threads from defined workloads.

- The thread history charts include data for all processed threads that are still in the MainView for DB2 Data Collector data sets. The charts show threads by connect type, that are active at that time period. One minute intervals without any thread activity are not shown (such intervals might occur in a development system).

Use the scroll bar on the right to scroll back and forth in time; you might see different workloads appear and disappear as you scroll.

3 DBAT processing can provide more details. Expand the DBATDRDA Workload node and double-click Thread Processing Times. (Use CICS or IMSMPP instead, if they might be more useful in your environment.)
You can use this 9-chart container to analyze the following information:

<table>
<thead>
<tr>
<th>Row in the chart</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top</td>
<td>Elapsed times (class 1, In-DB2, and class 3 waits)</td>
</tr>
<tr>
<td>Middle</td>
<td>CPU times (class 1 and In-DB2)</td>
</tr>
<tr>
<td>Bottom</td>
<td>zIIP usage</td>
</tr>
</tbody>
</table>

**Note**

The charts shown here are for a DB2 Version 10 system, so zIIP eligible is not applicable and always zero.
You can maximize any chart, or cycle through all of them. The maximized chart above (scrolled back in time) shows a spike in class 3 wait time.

Move your pointer over any data point in the chart to see a Tool Tip about the data point; for example, the exact value charted, the date and time, and the thread count.

**Tip**
If an outlier value skews the graph Y-axis, right-click in the chart, select **Properties**, then select the **Items** tab, and set the **Data Range for Y-Axis** options to modify the range.

You can hyperlink on any 1-minute interval data point. In this example, you can display information about the spike in wait time that occurred at 16:23.

4 Right-click on a point and select the **Hyperlink** option, which shows you exactly what text is used for the hyperlink.
This analysis capability is very powerful. You can compare interval data over time in the charts and drill down to see the list of threads of this connection type that were completed in any selected 1-minute interval. In this sample test system, the list contains only 13 threads. The row count is displayed in the bottom right corner of the chart.

5 Look for anomalies in the threads. Use the scroll bar at the bottom of the chart to see additional fields and compare the values. Sort the list by clicking on one of the columns.

In this example, the last thread in the list shows a very large elapsed time.

6 In this view (TRLTRAC), hyperlink on the first column, **End Time**.

The detail thread view (TRSTRAC) showing all accounting information is displayed.
There is a very high wait time in this thread that obviously caused the spike shown in the chart. To see a breakdown of the class 3 waits, scroll down through the view, or hyperlink on ELAPSED in the upper right corner of the view.

The Elapsed Time Analysis section shows an unusual spike in latch waits. That spike could be investigated later by using the STLATCH and STLATCHD views.

7 Close the TRSTRAC tab and look again at the TRLTRAC view.

This example shows a short list of threads, but in a production system, you could easily retrieve a list of thousands of threads.

You can use the many summarization options in the TRLTRAC view header to qualify the workload and select a subset for further analysis. You can also use the column filter masks or column sorting to further narrow your analysis. You might also want to look at the other sets of charts, SQL and I/O Rates and Thread Exceptions.

Now that you have seen the charts available for a transaction-type workload, you can look at the other workloads.

8 Expand the Batch Workload node and double-click Thread Activity.
The container provides six charts of data relevant to the chosen workload. For example, utility activity charts would also include zIIP measurements.

This container provides different chart types—a bar chart and 2D area charts—to better demonstrate the correlation between class 1 and class 2 times.

**Miscellaneous tips**

Before you close your MainView Explorer session, try some of the following tips:

- Review the icons that are available for the charts, including the nine chart type icons. To display a description of the icon, move the pointer over the icon.
- Click the question mark icon to display online Help.
- Click the refresh icon to update the data in a view or chart. You can also set up auto-refresh if desired. (For the 1-minute interval charts, do not choose a refresh interval less than 60 seconds.)
- Right-click in a tab and select **Properties** to review the available chart settings.

To save a customized individual chart, open it in a tab (close all other tabs except for the standard PLEX, PRODUCTS and SYSTEMS tabs) and change the chart properties as needed. Use the File menu Save Configuration option to save the chart in your BBCDEF data set (the distributed chart under the **EZExplorer** node will not be modified). Use the File menu Open Configuration option to access your customized chart.
Printing workload reports

Use the following procedure to print workload reports.

Printing workload reports is usually done from the DB2 tables of performance data supported by Performance Reporter. This method gives you long-term history and trending, and the full flexibility of SQL for defining your own reports in addition to the predefined set. For more information, see the section on reports from DB2 tables in the *MainView for DB2 Performance Reporter User Guide*.

Selective or total accounting reports, in either a short or a long format, can also be printed from DB2 accounting records that are extracted from Data Collector archive files or one or more SMF files. For example, you can select from a specific time period or by plan, authorization ID, and so on. The reports also can be summarized by various criteria. For more information, see the section on data collector reporting facilities in the *MainView for DB2 Performance Reporter User Guide*. For a summary of batch printing capabilities, see “Printing views and reports” on page 165.

However, this data is often not available to answer questions about the workload until the next day. The batch trace print facility is designed to fill the need for quick reports. All trace summary report formats are available, in any combination.

There are different types of input:

- One or more trace log data sets; for example, of the Thread History trace
- Archived trace logs (TLDSs) (without reloading to VSAM); for example, thread history from two weeks ago
- Data Collector archive files of accounting data output groups
- SMF history file containing DB2 Accounting records
- Live SMF data sets
- GTF trace data set

If you are writing accounting data to the Data Collector trace data sets, you can also run the Data Collector reports against any of the archived files, or against the active trace data sets. For more information, see the section on data collector reporting facilities in the *MainView for DB2 Performance Reporter User Guide*.

The examples in this dialog are made with THRDHIST.
To print a workload report

1 On the HT view, type P (Print) in the CM field for an entry with a TRACEID of THRDHIST.

The Batch Trace Print dialog is displayed. On this dialog you can specify options to print one batch report.

You can also use the sample JCL DZTBPRNT to tailor and submit a set of reports. This JCL is set up so that it can invoke several sample report members that explain many of the available print options.

2 (optional) If you are using this option for the first time, you might want to update your job statements first. Specify Update Job => Y.

a Fill in the options for a report.

<table>
<thead>
<tr>
<th>Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>REPORT ==&gt; traceid</td>
<td>Specify any name. Used as the output DD.</td>
</tr>
<tr>
<td>DDNAME ==&gt;</td>
<td>(Optional)</td>
</tr>
<tr>
<td>TITLE1 ==&gt; any title</td>
<td>(Optional). Centered in first report header.</td>
</tr>
<tr>
<td>TITLE2 ==&gt; any title</td>
<td>(Optional). Centered in second report header.</td>
</tr>
</tbody>
</table>

Data Selection is optional, but can be used to reduce the amount printed. The date and time fields are primed from the trace log data set.

<table>
<thead>
<tr>
<th>REPORT SELECTION:</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTRAC ==&gt; N</td>
</tr>
<tr>
<td>STRAC ==&gt; N</td>
</tr>
<tr>
<td>DTRAC ==&gt; N</td>
</tr>
<tr>
<td>POPUP ==&gt; N</td>
</tr>
<tr>
<td>TSUM ==&gt; T</td>
</tr>
<tr>
<td>SORT ==&gt;</td>
</tr>
<tr>
<td>TSTAT ==&gt; SUMMARY</td>
</tr>
<tr>
<td>INTERVAL ==&gt; 30M</td>
</tr>
</tbody>
</table>

b Press Enter to validate your specifications.

These options are saved in your profile and used to initialize the fields the next time this panel is requested.

3 Press F3 to review the generated JCL in edit mode.

The options you specified are inserted into a pattern job DZJPTRAC in BBPROF. You might want to copy this JCL into your own UBBPROF data set and modify it.

4 Check the other options and add if desired; for example:
TSUM=T, I=30M, GRAPH=TOT

Add the option to graph the totals instead of printing values. There are many other options that cannot be shown on the panel. Refer to the section on printing a Trace in the *MainView for DB2 User Guide*.

5 Submit the job.

COMMAND ===> SUB

If you prefer, you can SAVE or CANCEL the JCL.

6 Press F3 to return to the Batch Trace Print panel.

You can make another request now if desired.

When the job is complete, review the output. This output gives you a graphic summary of total DB2 activity for the selected time period in 30-minute intervals, followed by a summary of the activity.

Here is another example:

LTRAC ===> Y

STRAC ===> SUMMARY (Add ,DDF if DDF is active)

This command provides the complete DB2 Accounting information per thread. You might want to use the data selection options to limit the output.

All other summarization options of AUTHID, connect, buffer pool, location, and time, are also available.
Printing views and reports

These scenarios teach you how to print your online and offline reports.

In this practice session, you will:

1. Export an online windows mode view and print an online history trace for offline review
2. Print offline traces from a trace log data set or SMF records
3. Print offline Performance Reporter reports from SMF data, MainView for DB2 Data Collector archive data sets, and DB2 tables

This practice session takes approximately one hour to complete.

Printing online views

Use the following procedure to print online views.

There are several ways to export and print any windows mode view to a data set or file. The exported view can be used to supplement performance reports or can be downloaded to a workstation for use with a spreadsheet application.

To print online views

1. Use one of the following methods:
- **Windows mode**

  From any windows mode view, use the EXPort command to access a panel that requests an existing data set name (or SYSOUT class) and formatting options, *(Figure 117 on page 166)*.

  **Figure 117: View export panel**

  ![Export Open Data Set panel](image)

  The output of the EXPort command includes all rows of data associated with the view, even data that requires scrolling to be seen online. However, if the logical record length (LRECL) of the data set is less than the width of the view, the view data is truncated on the right.

  You can change the **Output format** to CSV to write the data rows to a data set in comma-separated format to download for use in a spreadsheet program.

- **MainView Explorer**

  In MainView Explorer, use the **Export** icon to write a data snapshot file directly to your computer. You can then print the file by using a spreadsheet or text processing program. The file is also accessible later from the MainView Explorer Viewer. See the MainView Explorer online Help for more information about exporting data.

- **MVBATCH utility**

  Use the MVBATCH utility to print any view that can be invoked directly from the **COMMAND** line. For more information about MVBATCH, see the *MainView User Guide*.

---

**Printing online history traces (thread data)**

You can print online history traces and export online windows mode views for offline review.

In previous exercises, you learned how to run a trace and view it online. However, depending on the results, you might want to have a hardcopy for further analysis. Batch reports can also be valuable tools during an application review meeting.
**Note**
This section describes printing a trace, but you might also want to look at the accounting reports produced from DB2 trace records written to SMF, from MVDB2/DC archive data sets, or from DB2 tables loaded from one of these sources. See “Performance Reporter reports” on page 177 and the MainView for DB2 Performance Reporter User Guide for more information.

### To print online history traces

1. Enter the History traces (HT) view by typing **HT** on the **COMMAND** line.

   From the HT view you can view online trace data, and manage the trace log data sets.

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>Show the options used for this trace.</td>
</tr>
<tr>
<td>P</td>
<td>Generate the JCL to print a batch report.</td>
</tr>
<tr>
<td>D</td>
<td>Delete this data set from the trace directory.</td>
</tr>
<tr>
<td>E</td>
<td>Reset the log data set for reuse.</td>
</tr>
<tr>
<td>V</td>
<td>Verify that the directory entry matches the data set contents.</td>
</tr>
<tr>
<td>N</td>
<td>Add a new data set to the directory (moved from another system).</td>
</tr>
<tr>
<td>A</td>
<td>Archive the data set (only if an archive started task was specified).</td>
</tr>
<tr>
<td>F</td>
<td>Free a data set currently being read.</td>
</tr>
</tbody>
</table>

Usually you will need only W(SHOW), D(DELETE), and P(PRINT). You are going to concentrate now on P.

### Printing all data per traced thread

Use the following procedure to print a trace report showing all data per traced thread.

The history traces display shows the most recent traces at the top, but you can sort on any column and use the locate command to help you find other trace logs. For example, you can sort on **USERID** to group all your own trace logs together.

**To print a trace report showing all data per traced thread**

1. On the HT view, type **P** in the **CMD** column next to the trace log data set that you want to print.
The Batch Trace Print dialog, where you can specify options to print a batch report, is displayed (Figure 118 on page 168).

**Figure 118: Batch Trace Print dialog**

<table>
<thead>
<tr>
<th>Option</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Update Job</td>
<td>N (Y/N - update job statement)</td>
</tr>
<tr>
<td>Title line 1</td>
<td></td>
</tr>
<tr>
<td>Title line 2</td>
<td></td>
</tr>
<tr>
<td>Data Selection</td>
<td>From date ==&gt; 16SEP2003 Time ==&gt; 1125 To date ==&gt; 17SEP2003 Time ==&gt; 1412</td>
</tr>
<tr>
<td></td>
<td>PLAN ==&gt;</td>
</tr>
<tr>
<td></td>
<td>AUTHID ==&gt;</td>
</tr>
<tr>
<td></td>
<td>CONNECT ==&gt;</td>
</tr>
<tr>
<td></td>
<td>CORR ==&gt;</td>
</tr>
<tr>
<td></td>
<td>LOC ==&gt;</td>
</tr>
<tr>
<td></td>
<td>DB2PKG ==&gt;</td>
</tr>
<tr>
<td>REPORT SELECTION:</td>
<td></td>
</tr>
<tr>
<td>LTRAC ==&gt; NO</td>
<td>(YES/NO)</td>
</tr>
<tr>
<td>STRAC ==&gt; NO</td>
<td>(NO,ALL,SUMMARY,section1,section2..)</td>
</tr>
<tr>
<td>DTRAC ==&gt; NO</td>
<td>(YES/NO)</td>
</tr>
<tr>
<td>POPUP ==&gt; NO</td>
<td>(NO/ALL/SQL/event1.event2...)</td>
</tr>
<tr>
<td>TSUM ==&gt;</td>
<td>(A/C/L/P/T)</td>
</tr>
<tr>
<td>TSTAT ==&gt; NO</td>
<td>(SUMMARY/ALL/NO)</td>
</tr>
<tr>
<td>INTERVAL ==&gt;</td>
<td>1H</td>
</tr>
</tbody>
</table>

2 If you are using this option for the first time, you must update your job statements.

   a Specify:

       Update Job ==> Y

   b Press Enter.

   c On the job statement data entry panel, fill in the required information.

   d Press F3 to return to the HT view.

3 Specify:

   Update Job ==> N

4 Fill in the options for a report.

   Title line 1 ==> *any title* (Optional) Centered in first report header.

   Title line 2 ==> *any title* (Optional) Centered in second report header.

Data Selection is optional. The selection fields can be used to reduce the amount printed from a long trace.

Data Selection:
From date ==> \textit{ddmmyyyy}\ Time ==> \textit{hhmmm} \\
To date ==> \textit{ddmmyyyy}\ Time ==> \textit{hhmmm} \\

The date and time fields are primed with the start and end date-time of the trace. You can modify them to select a shorter time period.

\textbf{PLAN} ==> \textit{plan name} \\
\textbf{AUTHID} ==> \textit{authorization id} \\
\textbf{CONNECT} ==> \textit{connection name} \\
\textbf{CORR} ==> \textit{correlation id} \\
\textbf{LOC} ==> \textit{location name} \\
\textbf{DB2PKG} ==> \textit{db2 package name} \\

The Data Selection identifiers allow you to select only a subset of threads that you need to analyze further, such as one particular plan from a Thread History (THRDHIST) trace.

In this example, all data per thread traced from STRAC is printed:

\textbf{REPORT SELECTION:} \\
\textbf{LTRAC} ==> \textbf{N} \\
\textbf{STRAC} ==> \textbf{ALL} \\
\textbf{DTRAC} ==> \textbf{N} \\
\textbf{POPUP} ==> \textbf{N} \\
\textbf{TSTAT} ==> \textbf{N}

There are many different reports that can be generated, either singly or combined. See “Batch trace print” on page 172 for some examples. For a full explanation of the options and to see sample reports, see the printing a trace section in \textit{MainView for DB2 User Guide}. 

The reports are based on printouts of the online displays, so the options are selected by using the names of these displays, like LTRAC, STRAC, DTRAC. In this tutorial you have chosen \textbf{STRAC=ALL} as the most useful report for application tuning. It shows the following information for each thread traced:
Basic DB2 accounting record data
- Environmental Indicators section
- Elapsed Time Analysis section
- SQL Statement Execution Counts section
- Buffer Pool Usage Analysis section, including Global Buffer Pools
- Lock Activity section, including Global Locks
- I/O Parallelism section
- Routines section (stored procedures and user-defined functions)
- DDF Summary section (if distributed work was done)
- Package/DBRM Overview section (if accounting trace 7 is active)

These sections are included for detail traces that captured the relevant events:

- SQL Summary section with summary statistics per SQL statement (SQL events)
- Database Summary section with scans per page set (SCAN events)
- Database Lock and I/O section with locks and I/O data per page set (I/O or lock events)
- Sort Summary section (if any sorts were performed) (any detail trace)

5 Press **Enter** to validate your specifications.

These options are saved in your profile and are used to initialize the fields the next time this panel is requested.

---

**WARNING**

Be careful! Select only the data that you want to print. This report is per thread execution (like an accounting trace report from DB2PM) and can generate a large amount of output.

---

6 Press **F3** to review the generated JCL in edit mode.

The options you specified are inserted into a pattern job DZJPTRAC in BBPROF. You may want to copy this JCL into your own UBBPROF profile data set and modify it.

7 Review the remaining options.

There are many more print options than can be shown on the panel, such as lines per page or maximum pages to print. The sample job contains a short description of these options. Scroll to the bottom to review them.

8 Submit the job.

    COMMAND ===> SUB
You can also SAVE the JCL for later execution, or CANCEL it completely.

9  When the job is complete, review the output.

10 Press F3 to return to the Batch Trace Print dialog. You can issue another request now if desired.

**Other accounting report examples**

Here are a few examples of workload-oriented reports based on the DB2 accounting record.

For quick reports submitted online through the trace print panel, you will generally select one of the trace logs created by the Thread History (THRDHIST) trace for the time period you are interested in. However, these same accounting reports can be produced from any other summary or detail trace log. See “Reference of offline reports” on page 172 for more complete batch reporting options.

<table>
<thead>
<tr>
<th>What do you want to do?</th>
<th>Steps</th>
</tr>
</thead>
</table>
| For a summary of total DB2 activity for the selected time period, you can first select an overview summary by time (broken into 30 minute intervals in this example), followed by a summary of all accounting data with useful averages, totals, and maximums for the complete period. | Specify the following:  
  TSUM => T  
  TSTAT => SUMMARY  
  INTERVAL => 30M |
| To change the summary to a graphic format, edit the generated selection statements in the JCL before submitting the job. | Specify the following:  
  TSUM=T, I=30M, GRAPH=> TOT (or AVG ) |
| For a summary by plan (or other identifier)                                              | Specify the following:  
  TSUM= P (or A for authorization ID, and so on )  
  All other summarization options of AUTHID, connect, buffer pool, location, and time are also available. |
| For a quick list of each thread                                                          | Specify the following:  
  LTRAC => Y |
| To generate a report of activity in each individual buffer pool per thread               | Specify the following:  
  STRAC => BPOOL |

For a summary of this information per individual buffer pool for all selected threads, look at this same section in the TSTAT SUMMARY report mentioned above.
Other detail trace report examples

You might want to try other report combinations too. See the following examples from detail traces.

<table>
<thead>
<tr>
<th>What do you want to do?</th>
<th>Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>For an SQL statement summary per thread, sorted by Average CPU usage, followed by average SQL row processing statistics per statement.</td>
<td>LTRAC ==&gt; Y</td>
</tr>
<tr>
<td></td>
<td>STRAC ==&gt; SQL,SORTSQL=AC,SQLPOPUP</td>
</tr>
<tr>
<td>For a detail event trace per thread, with pop-up displays per SQL statement</td>
<td>LTRAC ==&gt; Y</td>
</tr>
<tr>
<td></td>
<td>DTRAC ==&gt; Y</td>
</tr>
<tr>
<td></td>
<td>POPUP ==&gt; SQL</td>
</tr>
<tr>
<td>For SQL statement text and EXPLAIN data for all dynamic SQL executed or BINDs of static SQL</td>
<td>POPUP ==&gt; (SQL-TEXT,EXPLAIN)</td>
</tr>
</tbody>
</table>

Reference of offline reports

You can print the following offline reports.

- Offline traces from a trace log data set or SMF records
- Offline Performance Reporter reports from both SMF data and DB2 tables

Batch trace print

Most scheduled batch reporting is done with the Performance Reporter reports either directly from SMF data or from that same data loaded (often summarized) in DB2 tables.

However, this data is often not available to answer questions about the DB2 workload until the next day. The batch trace print facility is designed to fill the need for quick reports. All trace summary accounting report formats are available, in any combination.

There are different types of input:

- One or more trace log data sets
  For example, a trace log data set of the Thread History trace.
- Archived trace logs (without reloading to VSAM)
  For example, thread history from two weeks ago.

- Data Collector archive files

- SMF history file containing DB2 Accounting records or I/O trace IFCIDs

- Live SMF data sets

- GTF trace data set

A batch utility job, DZTBTRAC, is provided in your BBSAMP data set to print these reports. There is also a sample JCL member DZTBPRNT you can use when you want to generate multiple reports or print accounting reports from SMF data. The control statements for several sample reports are provided in BBSAMP member DZJPnnnn, with comments to point out some of the most useful variations.

The trace data shown in the batch reports is in the same format and content as the online displays. This includes LTRAC, STRAC, DTRAC, DTRAC pop-ups, TSTAT, and the TSUMx series of displays. Many of these displays can also be combined into one report. For example, a report can consist of both LTRAC and DTRAC data. Selection options, such as plan, authorization ID, or date can be used to narrow the scope of a report. In addition, you can focus in on one area of interest, such as buffer pool activity by individual pool.

All of the report options described in “Reference of offline reports” on page 172 are also available by directly editing and submitting the batch trace print job, first specifying the input file and the reports to be printed.
Trace print from a TLDS

You can print a trace log data set by using the JCL provided in BBSAMP members DZTBTRAC. Specify the DSN of the log with the TLDS parameter. Multiple TLDSs can be concatenated.

**Figure 119: JCL to print a trace (DZTBTRAC)**

```plaintext
// JOB (ACCT), 'NAME'
//DZTBPRNT PROC TLDS=NULLFILE, INPUT TRACE DATA SET
// TDIR=NULLFILE, INPUT TRACE DIRECTOY
// SMF=NULLFILE, INPUT UNLOADED SMF FILE
// GTF=NULLFILE, INPUT GTF FILE
// ARC=NULLFILE, INPUT ARCHIVED TRACE DATA SET
// PFX='HILVL.RUN.LIB' DSN PREFIX OF BBLINK
// PRINT EXEC PGM=DZTBPRNT,REGION=4M,PARM='GMWK=128K'
// INCREASE GMWK FOR LARGE TRACES
//STEPLIB DD DISP=SHR,DSN=&PFX..BBLINK
//SYSPRINT DD SYSOUT=* INPUT LIST AND DIAGNOSTICS
//SYSUDUMP DD SYSOUT=* ABEND DUMPS
//STD1 DD SYSOUT=* DEFAULT REPORT OUTPUT
//* ONLY ONE OF THE FOLLOWING INPUT DD'S MAY BE SPECIFIED
//* IF NONE IS SPECIFIED, DEFAULT INPUT IS LIVE SMF DATASET
//TRACIN01 DD DISP=SHR,DSN=&TLDS TLDS INPUT
//TRACEDIR DD DISP=SHR,DSN=&TDIR TLDS INPUT THRU TRACE DIR
//SMFIN DD DISP=SHR,DSN=&SMF SMF INPUT
//GTFIN DD DISP=SHR,DSN=&GTF GTF INPUT
//ARCIN DD DISP=SHR,DSN=&ARC ARCHIVED TLDS INPUT
// PEND
//* SPECIFY INPUT FILE *
//PRINT EXEC DZTBPRNT,TLDS='SYS5.DB2P.THRDHIST.JUL01.T0001.V01'
//REPTDD1 DD SYSOUT=* USER-DEFINED OUTPUT DD
//RPTSUM DD SYSOUT= SAMPLE REPORT OUTPUT DD
//RPTWKLD DD SYSOUT= SAMPLE REPORT OUTPUT DD
//RPTACCL DD SYSOUT= SAMPLE REPORT OUTPUT DD
//RPTACCS DD SYSOUT= SAMPLE REPORT OUTPUT DD
//RPTSQL DD SYSOUT= SAMPLE REPORT OUTPUT DD
//RPTEVNT DD SYSOUT= SAMPLE REPORT OUTPUT DD
//RPTEXPL DD SYSOUT= SAMPLE REPORT OUTPUT DD
//RPTFAIL DD SYSOUT= SAMPLE REPORT OUTPUT DD
//* FOR IN-STREAM REPORT STMTS
//SYSIN DD * DEFAULT SUMMARY RPT (SUM)
// DD DSN=&PFX.BBSAMP(DZJPSUM) WORKLOAD SUMMARY-TIME(SUM)
// DD DSN=&PFX.BBSAMP(DZJPACCL) ACCGT DETAIL-LONG (SUM)
// DD DSN=&PFX.BBSAMP(DZJPACCS) ACCGT DETAIL-SHORT (SUM)
// DD DSN=&PFX.BBSAMP(DZJPBSQL) SQL STATEMENT SUMMARY(D-SQL)
// DD DSN=&PFX.BBSAMP(DZJPEVNT) THREAD DETAIL EVENTS (D-ANY)
// DD DSN=&PFX.BBSAMP(DZJPEXPL) SQL TEXT/EXPLAIN (D-SQL)
// DD DSN=&PFX.BBSAMP(DZJPFAIL) LOCK/EDM FAILURES (D-BASE)
```

For detailed information about all control statements in DZTBTRAC, see the section on printing a trace in the *MainView for DB2 User Guide*. 

Reference of offline reports

174  MainView for DB2 Getting Started Guide
An example of the Accounting Summary Report that is produced when you submit this JCL is shown in Figure 120 on page 175 and Figure 121 on page 176. It shows accounting totals, followed by a trace summary by plan.

**Figure 120: Accounting Summary Report (part 1)**

<table>
<thead>
<tr>
<th>Category</th>
<th>#EVENTS</th>
<th>AVG/EVENT</th>
<th>ELAPSED</th>
<th>%TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ELAPSED TIME</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IN DB2</td>
<td>7</td>
<td>7,554 ms</td>
<td>59.01</td>
<td>*</td>
</tr>
<tr>
<td>IN APPLICATION</td>
<td>5</td>
<td>5,246 ms</td>
<td>40.98</td>
<td></td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>100.00</td>
<td>100.00</td>
<td></td>
</tr>
<tr>
<td><strong>WAITS IN DB2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOCK/LATCH</td>
<td>7</td>
<td>100 ms</td>
<td>703 ms</td>
<td>5.49</td>
</tr>
<tr>
<td>I/O WAIT</td>
<td>320</td>
<td>12 ms</td>
<td>3,927 ms</td>
<td>0.67</td>
</tr>
<tr>
<td>LOG WRITE I/O</td>
<td>5</td>
<td>4,083 us</td>
<td>20 ms</td>
<td>0.15</td>
</tr>
<tr>
<td>OTHER READ I/O</td>
<td>4</td>
<td>40 ms</td>
<td>159 ms</td>
<td>1.24</td>
</tr>
<tr>
<td>OTHER WRITE I/O</td>
<td>0</td>
<td>0 us</td>
<td>0 us</td>
<td>0.00</td>
</tr>
<tr>
<td>UNIT SWITCH EVENTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.COMMIT/ROLLBK</td>
<td>4</td>
<td>16 ms</td>
<td>63 ms</td>
<td>0.49</td>
</tr>
<tr>
<td>.OPEN/CLOSE</td>
<td>8</td>
<td>159 ms</td>
<td>1,269 ms</td>
<td>9.91</td>
</tr>
<tr>
<td>.SYSLGRNG</td>
<td>16</td>
<td>13 ms</td>
<td>208 ms</td>
<td>1.62</td>
</tr>
<tr>
<td>.DATASPACE MGR</td>
<td>2</td>
<td>27 ms</td>
<td>53 ms</td>
<td>0.41</td>
</tr>
<tr>
<td>.OTHER</td>
<td>7</td>
<td>7,638 us</td>
<td>53 ms</td>
<td>0.41</td>
</tr>
</tbody>
</table>

Reference of offline reports

Chapter 7 Printing views and reports 175
Figure 121: Accounting Summary Report (part 2)

<table>
<thead>
<tr>
<th>ARCH. LOG(QIS)</th>
<th>0</th>
<th>0 us</th>
<th>0 us</th>
<th>0.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH.READ(TAPE)</td>
<td>0</td>
<td>0 us</td>
<td>0 us</td>
<td>0.00</td>
</tr>
<tr>
<td>DRAIN LOCK</td>
<td>0</td>
<td>0 us</td>
<td>0 us</td>
<td>0.00</td>
</tr>
<tr>
<td>CLAIM RELEASE</td>
<td>0</td>
<td>0 us</td>
<td>0 us</td>
<td>0.00</td>
</tr>
<tr>
<td>PAGELATCH CONT.</td>
<td>0</td>
<td>0 us</td>
<td>0 us</td>
<td>0.00</td>
</tr>
<tr>
<td>SPAS SERVER TCB</td>
<td>0</td>
<td>0 us</td>
<td>0 us</td>
<td>0.00</td>
</tr>
<tr>
<td>Force-at-commit</td>
<td>0</td>
<td>0 us</td>
<td>0 us</td>
<td>0.00</td>
</tr>
<tr>
<td>LOCKS</td>
<td>15</td>
<td>2,903 us</td>
<td>44 ms</td>
<td>0.34</td>
</tr>
<tr>
<td>MSG. PROCESSING</td>
<td>0</td>
<td>0 us</td>
<td>0 us</td>
<td>0.00</td>
</tr>
<tr>
<td>---TOTAL WAITS---</td>
<td>383</td>
<td>17 ms</td>
<td>6,480 ms</td>
<td>50.62</td>
</tr>
<tr>
<td>*NOT ACCOUNTED</td>
<td>289 us</td>
<td>0.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- - - - - - - - - - - - - - BUFFER POOL ACTIVITY - - - - - - - - - - - - - - -

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>TOTAL</th>
<th>BP1</th>
<th>BP2</th>
<th>BP5</th>
<th>BP6</th>
<th>BP10</th>
</tr>
</thead>
<tbody>
<tr>
<td>GETPAGES</td>
<td>2,545</td>
<td>14</td>
<td>592</td>
<td>1</td>
<td>6</td>
<td>38</td>
</tr>
<tr>
<td>SYNC READS</td>
<td>320</td>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>GETPAGES/READIO</td>
<td>8.0</td>
<td>1.3</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>COND. GP FAILURES</td>
<td>22</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>SEQ. PREFETCH REQS.</td>
<td>22</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>LIST PREFETCH REQS.</td>
<td>22</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>DYNAMIC PREFETCHES</td>
<td>22</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>ASYNC PAGES READ...</td>
<td>22</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>PAGES/PREFETCH REQ.</td>
<td>7.3</td>
<td>15.7</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

BMC SOFTWARE               ACCOUNTING SUMMARY REPORT               PAGE:       4
REPORT:SUM                 DATE: 17SEP02
I/O SYSTEM TRACE
ENTRY    AVG      AVG     AVG    AVG    TOTAL    TOTAL   TOTAL  TOTAL
PLAN      COUNT  ELAPSED    CPU   #STMTS GETPGS  ELAPSED    CPU   #STMTS GETPGS
-------- ------ -------- -------- ------ ------ -------- -------- ------ ------
DSNTIA41     11   483 ms   172 ms   11.3  162.3 5,309 ms 1,889 ms    124  1,785
DSNTIB41      1    18 s  5,954 ms    1.0   20.0    18 s  5,954 ms      1     20
DSN8CC0       2 00:01:07    19 ms   12.0    7.0 00:02:13    38 ms     24     14
RXDB2         1 6,086 ms 2,633 ms  245.0  1,160 6,086 ms 2,633 ms    245  1,160
*************************** END OF SUMMARY ENTRIES ***************************

All control of the input and formatting is done through a series of keywords in the input job stream (or in a PDS member) under ddname SYSIN. Keywords that apply to all requested reports can be specified following a label of GLOBAL. Keywords that apply to a specific report must be specified following the REPORT label. An example of two report requests is shown in Figure 122 on page 176.

Figure 122: Sample report requests

GLOBAL  TIME=1300-1500
*   *   SQL-TEXT and EXPLAIN FROM TSO
*   *
REPORT REPORTID=DAILY1,LTRAC=YES,NEWPAGE=TRAN,
POPUP=(SQL-TEXT,EXPLAIN,OPEN),
CONNECT=TSO,
TITLE1='DETAILS OF BIND AND EXPLAIN',
TITLE2='WITH STATS FROM OPEN',
DDN=OUTPUT1 WIDTH=WIDE       COMMENTS ABOUT THE REPORT
*   *   FULL EXAMINATION OF CERTAIN SPECIAL TRANSACTIONS
*   *
REPORT REPORTID=SPECIALS,LTRAC=YES,STRAC=SUMMARY,DTRAC=YES,POPUP=ALL,
NEWPAGE=(TRAN,FIRSTEVENT),LEVEL=3,
PLAN=(PAY+++++,ACCT1+++),CONNECT=IMSP,
AUTHID=(USR1,USR5)
The GLOBAL keyword TIME limits the trace output to 1:00 P.M. to 3:00 P.M. for both reports.

The first report prints the one-line LTRAC entry on a new page for each transaction of the selected TSO threads and the pop-ups for SQL-TEXT, EXPLAIN, and OPEN after that one-line entry for each transaction. The report is written on ddname OUTPUT1.

The second report prints the one-line LTRAC entry, the STRAC accounting summary, and all DTRAC events and pop-ups for selected plans from two specific IMS users. The report is written on ddname SPECIALS.

For detailed information about each of the request keywords you can use, see the section on printing a trace in the MainView for DB2 User Guide.

**Trace print from SMF records**

This same batch utility (DZTBTRAC) can be used to print summary trace reports from DB2 accounting records written to GTF or SMF, either from an SMF history tape or from the live SMF data sets.

*Note*

No detail trace events are extracted from SMF or GTF. In addition, you cannot process SMF or GTF files in the same run with TLDSs.

**Performance Reporter reports**

Performance Reporter is an offline analysis system that produces reports that can be used to evaluate DB2 system and application performance.

These evaluations can be used for DB2 planning, forecasting, and performance management.

Several reports can be produced from Data Collector archive data sets or SMF extract files without loading the data into DB2 tables. For longer term storage and trend reporting, summarized data can be loaded to the performance data tables.

Also, the accounting data supports several levels of summarization. You can print any number of reports produced from the summary and detailed accounting tables, or statistics, buffer statistics per pool, and audit tables. Additional reports are available from the Data Collector, such as a storage report from IFCID 225.

When you want reports produced directly from the input data, and only the reports are needed, it is recommended that you use the Data Collector reports.


**Data Collector reports**

These reports can cover one day, several days, or a short recent interval, depending on the number of archive files used as input.

For immediate reporting, you can produce reports from the active Data Collector trace data sets.

You can review the available archive trace data sets from the MainView for DB2-DC MAIN MENU, Option D, Archive Directory. Access the MainView for DB2-DC MAIN MENU by hyperlinking on MVDB2/DC Admin/Archive from EZDB2.

Reports on accounting, statistics and audit data are available, and a DBM1 storage usage report (IFCID 225) and utility processing (IFCIDs 23-25).

The accounting reports can be defined with different summarization qualifiers.

**Reports from DB2 tables**

Printing workload reports is usually done from the DB2 tables of performance data that is supported by Performance Reporter.

This data gives you long-term history and trending, and the full flexibility of SQL for defining your own reports in addition to the predefined set. For more information, see the section on reports from DB2 tables in the MainView for DB2 Performance Reporter User Guide.

Performance Reporter provides predefined reports using SQL statements, which can be run through a batch reporting facility (DPRREPT).

**Predefined reports**

The prepared reports included with Performance Reporter show DB2 system workload to help the DB2 performance analyst, capacity planner, or service manager solve specific DB2 problems.

These reports are generated from accounting, statistics, and audit data.

With these reports, standard reporting can be run on a daily or weekly basis or both.
Daily run

The queries processed by the batch reporting program, DPRREPT, from the detail statistics (queries STxxx) and detail accounting (queries ACxxxx) tables are set up to produce a set of daily reports on the data loaded from the previous day (current date minus one). The sample JCL in BBSAMP named DPRRPT includes all distributed reports. Run these reports once, select those ACxxxx and STxxx reports you want to review daily, and create a job for this daily run.

Note: Generally, you will not want to load detail accounting records into table DMRACDTL, but only data summarized by hour or day into table DMRACSUM. In this case, delete the ACxxxx reports from the job and modify the date selection on the SAxxxx reports to produce your daily reports. The report results will be the same. Only the detailed exceptions report cannot be produced.

Weekly run

The queries processed by the batch reporting program, DPRREPT, from the summary accounting table (queries SAxxxx) are set up to produce a set of weekly reports on the data from the previous week (current date to current date minus seven). Select the SAxxx reports you want to review weekly and create a job for this weekly run.

Note: You can also summarize the daily table to other tables at a higher level, such as weekly or monthly. The SAxxx reports can also be used with these tables.

Any of the distributed SQL queries can be modified or used as a model to produce queries to satisfy ad hoc reporting needs.

**Customizing your own reports**

After you have used the Performance Reporter facilities to load data into DB2 tables, you might want to use your own reporting tools to create customized reports.

However, because Performance Reporter uses a generalized report generator to provide reporting and charting facilities, the entire report is defined by the SQL select statement used to read the data tables. Thus, it is very easy to create customized reports for a specific requirement. The SQL select statements used to produce the distributed reports and charts are available, within the DPRREPT environment, as models in tailoring new reports or charts.

The JXREPT program is designed to run any SQL SELECT statement against the Performance Reporter tables and report the results.

For more information, see the section on customizing reports in the *MainView for DB2 Performance Reporter User Guide*.

One example of a custom report you might want to create is to change the time interval for reporting statistics data.

The default statistics reports show statistics by the DATETIME stamp in each record. To provide a historical view, you might want to modify the distributed reports to show statistics grouped by a longer time interval. To simplify this type of reporting, the statistics tables include columns for several other date and time values, such as DATE, MONTH, DAY, TIME, and HOUR.
Data is not spread across intervals.

An example of a report by DATE and HOUR is in BBPARM member STOVERH, is shown (Figure 123 on page 180). See the section on reporting statistics data by time interval in the *MainView for DB2 Performance Reporter User Guide*.

### Figure 123: Statistics Overview Report by DATE and HOUR

<table>
<thead>
<tr>
<th>DATE / HOUR</th>
<th>CREATE PHASE</th>
<th>THREADS</th>
<th>COMMITS</th>
<th>SYNC</th>
<th>COMMITS</th>
<th>COMITS</th>
<th>ABORTS</th>
<th>SQL MANIP</th>
<th>SQL CONTROL</th>
<th>SQL DEFINIT</th>
<th>SQL UPDATE</th>
<th>REGS</th>
<th>UPDATES</th>
<th>I/O</th>
<th>LOCK</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002-09-01 00</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6.0</td>
<td>0.0</td>
<td>1.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>2002-09-01 01</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>2002-09-01 02</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>367.7</td>
<td>176.7</td>
<td>15.7</td>
<td>1.3</td>
<td>3.3</td>
<td>4.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>2002-09-01 03</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>64.6</td>
<td>30.6</td>
<td>1.6</td>
<td>4.0</td>
<td>0.0</td>
<td>2.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>2002-09-01 04</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>10.0</td>
<td>0.0</td>
<td>8.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>2002-09-01 05</td>
<td>14</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>173.3</td>
<td>0.0</td>
<td>4.8</td>
<td>0.0</td>
<td>0.2</td>
<td>0.0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td>2002-09-01 06</td>
<td>10</td>
<td>0.6</td>
<td>0.7</td>
<td>1.4</td>
<td>1.5</td>
<td>0</td>
<td>0</td>
<td>304.6</td>
<td>168.1</td>
<td>4.7</td>
<td>2.4</td>
<td>0.0</td>
<td>3.4</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>
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