



DB2 Performance Monitor for OS/390

# Using the Workstation Online Monitor

*Version 6*

**Note**

Before using this information and the product it supports, be sure to read the information in “Appendix B. Notices” on page 45.

**First Edition, June 1999**

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

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## About this book

This book helps you install and get started with the DB2 PM Workstation Online Monitor. It is organized as follows:

- Chapter 1. Introduction gives you a brief overview of the Workstation Online Monitor.
- Chapter 2. Installing the Workstation Online Monitor takes you through the installation procedure.
- Chapter 3. Getting started gets you connected to a DB2 (R) subsystem.
- Chapter 4. Monitoring and problem determination shows you how to use the Workstation Online Monitor.

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## Who should use this book

If you are a DB2 user responsible for any of the following activities

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

then this is the book for you.

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## How to Send Your Comments

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

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

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



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## Chapter 1. Introduction

This chapter briefly introduces the DB2 PM Workstation Online Monitor. It tells you how the Workstation Online Monitor can help you get the best out of your DB2 PM subsystems and applications.

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### Overview

The Workstation Online Monitor is made up of two parts, a host server that collects the data that DB2 generates about its own performance and a workstation client that allows you to view this data in an understandable format.

You can use the Online Monitor to:

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

When changes are made to an application or to a DB2 subsystem, the Online Monitor can help you determine whether or not the changes improved the performance.

When DB2 performance is not satisfactory, the Online Monitor can help you identify areas where tuning is required. The Online Monitor can log DB2 activities and events for later viewing.

### Why monitor from the workstation?

The Workstation Online Monitor offers several advantages over monitoring from TSO. Firstly, it improves usability through a simple to use graphic interface. Secondly, monitoring is not done in the TSO environment. This can be very important if you are monitoring a heavily loaded system.

Another advantage is that you can monitor more than one DB2 concurrently.

The following functions are available:

- Thread activity

Lets you examine the current activity of all active threads connected to a DB2 subsystem.

From the Thread Summary window you can view key values for all connected threads. You can select any thread to get a detailed view for further investigation.

- DB2 statistics

Gives you an overview of the DB2 system activity. The statistics windows give you system-wide performance data, helping you check the efficiency of your subsystems.

- Exception Processing

Allows you to monitor DB2 events defined in the data collector. It also lets you define and monitor threshold values for threads and statistics. You can:

- Define threshold values for exception processing
- Start exception processing using the defined threshold values
- View exceptions that occurred both for DB2 events defined in the data collector and for thresholds you have defined at the workstation.

- History

Allows you to monitor the past activity of threads.

- Sort and qualify threads.

- DB2 commands

You can issue any DB2 command for which you are authorized, except —START DB2.



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## Chapter 2. Installing the Workstation Online Monitor

Before installing the Workstation Online Monitor, check that you have installed and configured the software components required for running the Workstation Online Monitor.

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### Hardware requirements

The Workstation Online Monitor is designed to operate with any system unit supported either by IBM OS/2 Warp Version 3, or above or Windows NT Version 4.0. The minimum hardware configuration required to install and run the Workstation Online Monitor is:

- 32 MB memory
- 14 MB disk storage
- A high resolution display unit

**Note:** These are the *minimum* configuration requirements and do not allow for the simultaneous execution of other applications.

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### Software requirements

The following software is required to run the Workstation Online Monitor:

#### For OS/2

- OS/2 Warp Version 4 (Program Number 5622-601) or higher.  
You can download fixes for OS/2 (R) from the internet, point your web browser to <ftp://ftp.software.ibm.com/ps/products/os2/fixes/>
- Communications Manager/2 at Fixpack 1.11, or higher or Personal Communications plus Access Feature.  
You can download fixes for Communications Manager/2 and related products from the internet, point your web browser to <ftp://ftp.software.ibm.com/ps/products/cm2/fixes/>

#### For Windows NT

- Windows NT version 4.0 at Fixpack 3 or higher.  
You can download fixes for Windows NT from the internet, point your web browser to <ftp://198.105.232.37/fixes/>
- TCP/IP installed both at the workstation and the host.

#### At the Host, for both systems

- DB2 PM must be installed using SMP/E on the MVS (TM) host.
- The DB2 PM host server must be installed and customized on the MVS host. For details about installing the host server and customizing it for use with the workstation monitor, refer to the DB2 PM Installation and Customization Guide.

- IBM Personal Communications, or similar 3270 emulator program, is recommended for product installation. See “Download the product” on page 12.

It is also recommended that you have IBM Visual Explain installed on the workstation.

*DB2 PM Installation and Customization* gives details about installing the data collector and the data collector parameters for the Workstation Online Monitor. You should also see the READ.ME file supplied with the product tape for details of any new or changed data collector startup parameters.

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## Install the Workstation Online Monitor

The Workstation Online Monitor code is distributed on the DB2 PM product tape.

When you have successfully installed DB2 PM, you can install the Workstation Online Monitor as follows:

- Set up the host APPC server (for OS/2).
- or
- Set up the host TCP/IP server (for Windows NT).
- Download and install the product.
- Check the **READ.ME** file, downloaded with the product for any late—changing information.
- Set up your workstation.

### Set up the APPC or TCP/IP server

For information on how to do this, refer to *DB2 PM Installation and Customization*.

### Installing the Workstation Online Monitor on OS/2

Read this section if you are installing the Workstation Online Monitor on an OS/2 workstation.

If you want to install Workstation Online Monitor on a Windows NT workstation, you should skip this section and go to “Installing the Workstation Online Monitor on Windows NT” on page 11.

### Download Software Installer

Software Installer creates all the directories, downloads the product files from the host, and configures your workstation. You first need to download Software Installer as follows:

#### On the host

1. Open the host emulator session and log on to the MVS/TSO system.
2. Make the TSO session ready for file transfer (READY mode).

## On the workstation

1. Open an OS/2 window.
2. Create a working directory for Software Installer (this requires 1 MB of free disk space). For example, to create a working directory on your C: drive, change to that drive then type the following command at the OS/2 command prompt:

```
MD \PMINST
```

3. Change to the working directory:  
CD \PMINST
4. Download Software Installer:

```
RECEIVE INSTALL.EXE x:'prefix.SDGOWS01(DGOKIEXE)'  
RECEIVE INSTALL.IN_ x:'prefix.SDGOWS01(DGOKIEXI)'
```

where x: is the short name of the host session and *prefix* is the high-level qualifier of your DB2 PM SMP/E installation; this must match the DB2PMLQ value coded in the DGOJBPARG installation parameter file.

5. Download the installation command file by typing the following command:  
RECEIVE DGOKINST.COMD x:'*prefix*.SDGOWS01(DGOKINST)'  
ASCII CRLF

**Edit the Software Installer command file:** You need the Software Installer command file (DGOKINST.COMD) to pass information about your system to the Software Installer program. Typically, the file looks like this:

```
/* EXEC to start Install of DB2 PM */  
'Install /O:MVS ', /* originating system */  
 '/T:e:\DB2PM', /* install target system */  
 '/S:a:prefix', /* source location */  
 '/C:a:prefix.SDGOWS01(DGOKIICF)' /* Catalog name */  
/* exec end */
```

Edit this file to change the values to your installation as follows:

### 'Install /O:MVS'

This defines the source operating system. Do not change this line.

### '/T:e:\DB2PM'

Target system. Change e:\DB2PM to the drive and directory where you want the Workstation Online Monitor to be installed. If the directory does not exist, it is created by Software Installer.

### '/S:a:*prefix*'

Source location. Where a: to the short identifier of your host MVS session and *prefix* is the high-level qualifier of your DB2 PM SMP/E installation; this must match the DB2PMLQ value coded in the DGOJBPARG installation parameter file.

### '/C:a:*prefix*(DGOKIICF)'

Catalog name. where a: is the short identifier of your host MVS session and *prefix* is the high-level qualifier of your DB2 PM SMP/E installation; this must match the DB2PMLQ value coded in the DGOJBPARG installation parameter file.

Save the changes before closing your editor.

**Run Software Installer:** To run Software Installer, type the following command at the OS/2 command prompt:

```
DGOKINST
```

When the installation is complete, copy the DGOKXTHS.INI file from the Workstation Online Monitor directory:

```
COPY e:\DB2PM\DGOKXTHS.INI C:\
```

You can now shut down and reboot your workstation to activate any new paths added to your CONFIG.SYS and to update your desktop.

When you have successfully installed the Workstation Online Monitor, you can, if you wish, delete the Software Installer working directory.

## Set up your workstation

The Workstation Online Monitor uses APPC to communicate with DB2 PM on the host. You therefore need to configure your Communications Manager settings to set up an APPC connection between your workstation and the host.

This section lists the settings you have to make or alter in the Communications Manager setup panels. If you want to know more about APPC/MVS communications with OS/2, refer to the *APPC/MVS Handbook for the OS/2 System Administrator*.

**Copy your Communications Manager setup:** If you do not want to change your existing Communications Manager/2 setup, make a copy of your setup before you configure your system for the Workstation Online Monitor.

**Change Communications Manager setup:** From Communications Manager Setup, configure each of the panels listed in Table 1.

**Note:** The values given in this table are *sample* values, which will vary according to your site installation.

Conventions used in the following table:

Values marked with an asterisk (\*) in the Notes column should be already defined to Communications Manager.

Y means you should check a check box (✓) or activate a radio button (●).

N means you should uncheck a check box (□) or deactivate a radio button (○).

Entries are case sensitive.

**Note:** Depending on your version of Communications Manager, some panels described may vary from those on your workstation.

“Appendix A. Connection definitions for APPC” on page 43 shows the relationship and dependencies of the definitions between Communications Manager, Workstation Online Monitor, DB2 and DB2 PM, VTAM (R), and MVS.

*Table 1. Communications Manager setup for the Workstation Online Monitor*

Panel	Parameters / Options	Sample Values	Notes
Communications Setup	Setup		Select the Setup pushbutton to change an existing configuration
Open configuration	Configuration	AWS2LAUF	Select a configuration from the Configuration list

Click on OK to continue, then Yes on the dialog box to confirm that the definition will be used on your workstation.

Configuration Definition			
Options:			From the menu bar
Change Workstation Information	Translation Table	ACSGTAB.DAT	Use this translation table
	Services loaded automatically	SNA / APPN	Check box. You can select other services, depending on your installation.

Select OK to close the Workstation Information window.

Options:	Use advanced configuration	On	From the menu bar
Configuration definition	Additional definitions	Y	Radio button
	Workstation Connection Type	Token-ring or other LAN types	
	Feature or application	APPC APIs	

Select Configure to continue.  
On the Profile list panel, select SNA local node characteristics and Configure.

SNA Local Node Characteristics	Network ID	DEIBMD1	*
	Local node name	X732C5	*

	End node—no network node server	Y	*
	Local node ID (hex)	05D FE3C5	*

Select Options.

Local Node options	Local node alias	X732C5	*
	Maximum compression level	NONE	*
	Maximum compression tokens	0	*
	Activate Attach Manager Startup	Y	*

Select OK.  
 Select OK to close the Local Node Characteristics window.  
 Select SNA Connections and Configure.

Connections list	Partner type	To host	Radio button
	Link name / adapter	HOST0001	Select a link from the list.

Select Change.

Adapter list	Adapter type	Token-ring or other LAN types	You may need to select a different adapter type, depending on your installation.
	Adapter number	0	*

Select Continue.

Connection to a host	LINK Name	HOST0001	*
	Node ID (hex)	05D FE3C5	*
	LAN destination address	400010000007	*
	Address format	Token-ring	*(If you selected Token-ring as your adapter type.)

	Remote SAP (hex)	04	*
	Activate at start up	Y	
	APPN support	Y	
	Partner Network ID	DEIBMD1	
	Node Name	X72	
	Use this host connection	Y	

Select Define Partner LUs.

Partner LUs	Network ID	DEIBMIPS	VTAM local LU definition. This corresponds to LU definitions in the DB2 PM data collector.
	LU name	IPSARAPN	This matches the Partner LU alias defined in the DB2 workstation.
	Alias	D521	This field is user-definable. You will use this value when you define the DB2 subsystem to the workstation.
	Partner dependent	N	

Select Add. On this panel you must define each additional DB2 subsystem that you wish to monitor.  
 Select OK.  
 Select OK to return to the Connections list.  
 Select Close.  
 Select SNA features and Configure.

SNA features: List	Features		
--------------------	----------	--	--

Select Local LUs.  
 If a definition already exists, select it then select Change, otherwise select Create.

SNA features: Local LU	LU name	X732C50A	This is the identifier of your APPC-enabled VTAM session.
------------------------	---------	----------	---

	Alias	MYPC	This must match the Local LU alias defined in the DB2 PM workstation Connection setup.
	Independent LU	Y	
	Use this local LU as your default LU alias	Y	

Select OK to return to SNA feature list.

SNA feature list	Features		
------------------	----------	--	--

Select Partner LUs.  
 Select one of the definitions listed.  
 Select Change.

SNA Features: Partner LU	Fully qualified LU name	DEIBMIPS.IPSARAPN	*
	Alias	D521	*
	Conversation security verification	Y	
	Partner LU is dependent	N	

Select OK. On the dialog box, select Change to return to the SNA features list.  
 Repeat this step for each Partner LU that you have defined.  
 Select Modes, #INTER from the definitions list and Change.

Mode definition	Mode name	#INTER	This corresponds to the MODETAB parameter in your VTAM local LU definition and to the Modename parameter in the DB2 subsystem setup.	
	Class of service	#INTER		*
	Mode session limit	8		*
	Minimum contention winner	4		*
	Receive pacing window	7		*
	Compression			



	Compression need	PROHIBITED	*
	PLU->SLU compression level	None	*
	SLU->PLU compression level	None	*
	Default RU size	Y	*

Select OK.  
 Select Close.  
 Select Close.  
 Select Close.  
 Select Yes, if you are prompted to update the Communications Manager files.  
 Select Close to exit Communications Manager Setup.

When you have completed your configuration, you need to stop and restart Communications Manager.

**Does it work?:** You can check that your APPC communications have been successfully installed using Communications Subsystem Management:

- From the Subsystem Management main panel, select SNA subsystem
- Select LU 6.2 sessions.  
 If no sessions are listed, select Establish from the tool bar and try to start a session from the Establish sessions panel.  
 If the session does not start, you must recheck your Communications Manager configuration.

Figure 10 on page 43 shows the relationship of your Communications Manager settings to those on the MVS host.

## Installing the Workstation Online Monitor on Windows NT

Read this section if you are installing the Workstation Online Monitor on a Windows NT workstation.

### Download and install the product

The Workstation Online Monitor for Windows NT is supplied on your DB2 PM product tape.

When DB2 PM is installed, the Workstation Online Monitor for Windows NT is contained in the host dataset '*prefix*.SDGOWS01(DGOKWSNT)', where *prefix* is the high-level qualifier of your DB2 PM SMP/E installation; this must match the DB2PMHLQ value coded in the DGOJBPAP installation parameter file.

**Download the product:** This section assumes that you have IBM Personal Communications installed on your workstation. If you have a different 3270 emulator, the interface may differ, refer to your 3270 emulator documentation. If you have no 3270 terminal emulator, you can use FTP to download DGOKWSNT.EXE from the '*prefix*.SDGOWS01(DGOKWSNT)' host dataset, refer to your TCP/IP documentation.

1. **Create an installation directory**

From Windows Explorer File list, select your C: drive then select *New* then *Folder*. A new folder icon appears on your contents list. Overtyping the highlighted default text with the name of your new folder, for example, PMINST.

2. **Download**

- a. Ensure that you are logged on to your MVS session and that your MVS terminal is in **READY** mode.
- b. From the Personal Communications session, click on the *Receive* button
- c. Type '*prefix*.SDGOWS01(DGOKWSNT)' in the Host file entry field. **Tip:** Don't forget the quotes.
- d. Type C:\PMINST\DGOKWSNT.EXE in the PC file entry field, where C:\PMINST is the drive and directory name of your installation directory.
- e. Select Transfer type BINARY
- f. Click *Receive*

**Install:** From the Windows Explorer

1. Select your new directory.
2. Double click on DGOKWSNT to populate the directory. If you are prompted for a directory, overtype the default with the drive and name of your installation directory. For example, C:\PMINST
3. Double click on the Disk 1 folder and locate the SETUP application icon in this folder.
4. Double click on the SETUP application icon.
5. Follow the installation instructions in each window.
6. View the READ.ME file before setting up your workstation or using the Workstation Online Monitor.

## Set up your workstation

The Workstation Online Monitor uses TCP/IP to communicate with DB2 PM on the host.

You can use the definitions specified in your site name server, or you can define your own aliases (nicknames) for your DB2 subsystems.

**Using alias defined to your nameserver:** If you want to use the aliases defined to your site nameserver, you need to specify the TCP/IP address of the nameserver on the DNS page of the *Properties of Microsoft TCP/IP* notebook. You also need to activate DNS for Windows resolution on the WINS page of this notebook.

**Using your own aliases:** This section explains how to define TCP/IP aliases, if you do not want to use your own aliases, skip this section and go to “Chapter 3. Getting started” on page 15.

To set up your workstation for TCP/IP aliases, you must add entries to your HOSTS and SERVICES files. These files are usually located in the ETC subdirectory.

To locate the HOSTS and SERVICES files:

1. From the Windows Explorer Tools list, select *Find*
2. Type HOSTS in the Name entry box.
3. Select *All local drives* from the drives list.
4. Click Start.

**HOSTS file:** For each MVS system with DB2 subsystems that you wish to monitor, you need to enter the (decimal dotted) TCP/IP address of the MVS machine and an alias by which you can call it.

Your MVS system programmer should be able to give you the TCP/IP address of each machine. **Tip:** If you do not know the TCP/IP address of your MVS host, you can find out by logging on to the MVS system, ensure that you are in READY mode and type **NETSTAT HOME**.

Entries in the HOSTS file take the form

```
Address      Alias      # comment
```

Use a text editor to edit the HOSTS file. Add an entry for each of your subsystems as in the following example:

```
102.54.94.99   MVS1      # Number one MVS system
102.54.98.42   MVS2      # Number two MVS system
102.54.87.124  TESTMVS1  # Test MVS system
```

When you have made your entries, Save and Close the HOSTS file.

**Note:** The HOSTS file has no file extension. Some text editors add a default file extension (for example .TXT), in this instance you need to use the *Save As* option.

**Does it work?:** You can test the connection to your host with the TCP/IP PING command.

As an example, from the DOS Command shell, type PING MVS2

If the response looks something like

```
64 bytes from 102.54.98.42: icmp_seq=0. time=32. ms
64 bytes from 102.54.98.42: icmp_seq=1. time=28. ms
```

you have a working connection. Use the Ctr1 C key combination to end the PING.

*SERVICES file*: Use this file to specify the TCP/IP port for the data collector of each DB2 subsystem that you wish to monitor.

The port number is defined by a DB2 data collector startup parameter.

Entries in the SERVICES file take the form

```
Alias      port/protocol  # comment
```

Use a text editor to add your data collectors as in the following example:

```
D511      6118/tcp      # DB2 511 subsystem data collector on MVS1
D521      6122/tcp      # DB2 521 subsystem data collector on MVS2
```

When you have made your entries, Save and Close the SERVICES file.

**Note:** The SERVICES file has no file extension. Some text editors add a default file extension (for example .TXT), in this instance you need to use the *Save As* option.

Your configuration for TCP/IP is now complete.

---

## Chapter 3. Getting started

Now that you have installed the Workstation Online Monitor, you are ready to:

- Start the Workstation Online Monitor
- Define your subsystems
- Establish links to your subsystems.

---

### Before you start

Before you start the Workstation Online Monitor, ensure that:

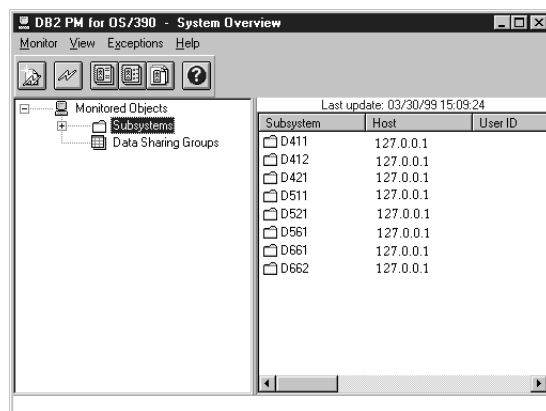
- You have access to the subsystems you want to monitor and the authority to monitor them. You need DB2 privileges MONITOR1 and MONITOR2 to use all the Workstation Online Monitor functions. You also need DB2 authority for any DB2 commands you issue.
- The DB2 PM host server is started on each DB2 subsystem you want to monitor.

---

### Start the Workstation Online Monitor

Open the Workstation Online Monitor folder on your desktop and double-click on the DB2 PM icon.

The Workstation Online Monitor system overview panel is displayed:



*Figure 1. The Workstation Online Monitor main panel*

This panel presents a tree view of the functions available in the Workstation Online Monitor. You can now define the DB2 subsystems that you want to monitor.

**Note:** Depending on the product level, panels and screens shown in this book can differ slightly from those you actually have.

---

## Define DB2 subsystems

To define DB2 subsystems to your workstation, go to the Workstation Online Monitor system overview panel. On the Tool Bar, click on *Monitor* and select New Connection. Alternatively, you can click on the New Connection icon (leftmost) on the main panel, or click with your right mouse button on an empty section of the System Overview section of the main panel and select New Connection.

A New Connection pop-up window is displayed:

### On OS/2

The screenshot shows a 'New Connection' dialog box with the following fields and values:

- Partner LU alias: D521
- Local LU alias: MYPC
- Transaction program: DGOVAM
- DB2 Subsystem section:
  - Name: D521
  - MVS system: MVS2
  - Data Sharing: (empty)
  - Group: (empty)
  - Member: (empty)

A 'Retrieve...' button is located to the right of the 'Name' field. At the bottom of the dialog are buttons for 'OK', 'Apply', 'Cancel', and 'Help'.

Figure 2. New Connection pop-up for OS/2

Type in the values for the fields in this window as follows:

**Partner LU alias**

Partner LU alias defined in your Communications Manager setup.

**Local LU alias**

Local LU alias defined in your Communication Manager setup.

**Transaction program**

The TPNAME defined for your DB2 subsystem data collector. See Figure 10 on page 43.

**Name** The name of your DB2 subsystem.

You can use **Retrieve...** to get the values defined at the host for this and the MVS system field.

**MVS system**

The name of the MVS system. This is an optional field and can be left blank.

**Description**

Use this field for a description of the subsystem you are monitoring. This is an optional field and can be left blank.

**Group** If your subsystem is part of a data-sharing group, enter the group name here.

**Member**

If your subsystem is part of a data-sharing group, enter the member name here.

You can use **Retrieve...** to get the values defined at the host for this and the group name.

Select OK. The new connection is now listed under Subsystems on the main panel.

Repeat the New Connections definition for each of your DB2 subsystems.

## On Windows NT

The screenshot shows a 'New Connection' dialog box. At the top, the title bar reads 'New Connection'. Below it, there are two text input fields: 'Host' containing 'MVS2' and 'Port' containing 'D521'. A section titled 'DB2 Subsystem' contains several fields: 'Name' (D521), 'MVS system' (MVS2), and a 'Data Sharing' section with 'Group' and 'Member' fields. To the right of these fields is a 'Retrieve...' button with a mouse cursor over it. Below the 'DB2 Subsystem' section is a 'Description' text area. At the bottom of the dialog are four buttons: 'OK', 'Apply', 'Cancel', and 'Help'.

Figure 3. New Connection pop-up for Windows NT

Type in the values for the fields in this window as follows:

**Host** This can be:

- The alias of your MVS host machine, as defined in your HOSTS file, for example, MVS2.
- The full TCP/IP address of your MVS host machine, for example, 102.54.98.42 or mvs2.myfirm.com
- The name of your MVS host machine as defined in your site's TCP/IP names server.

**Port** This can be:

- The alias of your DB2 subsystem, as defined in your SERVICES file, for example, D521.
- The real port address, for example 6122

**Name** The name of your DB2 subsystem.

You can use **Retrieve...** to get the values defined at the host for this and the MVS system field.



**MVS system**

The name of the MVS system. This is an optional field and can be left blank.

**Description**

Use this field for a description of the subsystem you are monitoring. This is an optional field and can be left blank.

**Group** If your subsystem is part of a data-sharing group, enter the group name here.

**Member**

If your subsystem is part of a data-sharing group, enter the member name here.

You can use **Retrieve...** to get the values defined at the host for this and the group name.

Select and click on OK. The subsystem is now displayed on the System Overview panel.

Repeat the New Connections definition for each of your DB2 subsystems.

## Changing the settings

Once you have defined a subsystem, you can, if you want, modify the settings. To do this, right-click on subsystem icon and select **Properties**. The Change window is opened. This window is the same in appearance and function as the New Connection window.

---

## Establish a session

Click on the + next to the Subsystems icon to expand the tree. You now have an icon for each of your subsystems.

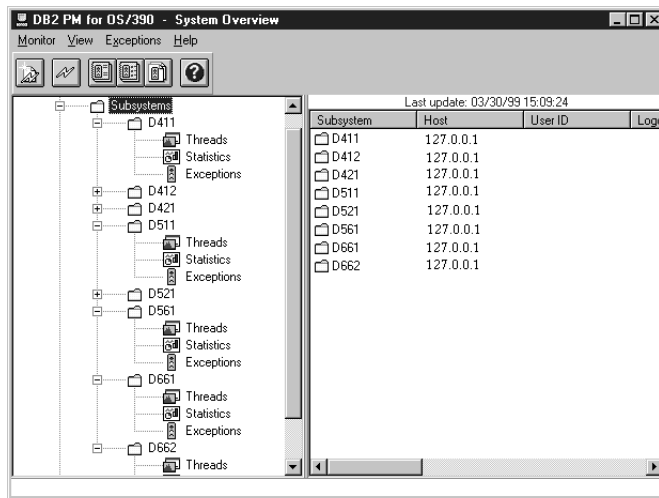


Figure 4. Defined subsystems

You can now expand the subsystem tree to show icons for:

- Threads
- Statistics
- Exceptions

---

## Getting help

Three kinds of online help are available to you:

- General Help
- Field Help
- Tuning tips

### General help

You can get general help from any Workstation Online Monitor window by clicking on the **Help** icon in the tool bar or the **Help** menu item. General help gives you information about the panel you are currently looking at.

### Field help

To get field help, click in the data area of the field and press **F1**.

If the mouse pointer points to a tool-bar icon, a brief explanation is displayed as a hover help.

## Tuning tips

Where appropriate, field helps are expanded to supply you with conceptual information and tips about tuning your DB2 subsystems.

---

## Issuing DB2 commands

You can issue any DB2 command for which you have authority from the DB2 Command Interface window, except —START DB2, which can only be issued from an MVS terminal.

To access this window, select the icon for the DB2 subsystem that you want to address and click with the right mouse button. Select **DB2 Commands**. Alternatively, from the system overview panel click **Monitor — > DB2 commands**.

The Command interface window is divided into two portions:

- Command input field
- DB2 response field

You can type your command without the recognition character (—) and press the **Enter** key or push the Send button to send the command to your DB2 subsystem. The recognition character is prefixed to your command. When the command completes successfully, it is stored in the command list.

If you enter a command with the recognition character, the last command of that type stored in the command list is displayed.

You can view the command list by clicking on the dropdown button on the right hand edge of this field.

From the command list you can select a command with your pointer or by scrolling with the up and down arrow keys.

The DB2 response to your command is displayed in the response window.

---

## Leaving the online monitor

To exit from the Workstation Online Monitor, from the System Overview panel do one of the following:

- Close the application window
- Press **F3**
- Click **Monitor — > Exit**
- With the right mouse key, click on the Monitored objects icon and select Exit.

Whichever method you choose, if you are monitoring any DB2 subsystems, the DB2 PM exit dialogue is displayed.

Use this panel to select the DB2 subsystems from which you want to log off. When you leave the online monitor, you will be disconnected from all subsystems that you have left unselected. When you log off a DB2 subsystem, any exception processing you have running will be terminated. Any collect report data jobs you have active will also terminate. If you have collect report data active or you are monitoring exceptions, disconnect from the subsystem to allow these processes to continue.

---

## Chapter 4. Monitoring and problem determination

This chapter shows you how to use the Workstation Online Monitor to monitor a DB2 subsystem. It explains some of the concepts about monitoring and problem determination and then gives you an overview of the main panels and how you can use them to determine performance problems.

---

### The DB2 environment

A DB2 query or transaction is dependent on the performance of the DB2 system, the transaction manager (CICS (R) or IMS (TM), for example), and OS/390 (R). Transaction throughput is unlikely to be improved by tuning DB2 on an overloaded OS/390 until the operating system's workload is reduced or balanced. You should, therefore, ensure that the environment in which DB2 operates is optimized before you start tuning DB2.

See the *IBM Database 2 Server for OS/390 Administration Guide* for more information.

---

### Concepts

The Workstation Online Monitor allows you to see what is happening on an active DB2 as well as to view events that happened in the recent past. If you want to examine performance problems in the more distant past or to examine trends, you can use it to collect data to create host batch reports.

DB2 generates a vast quantity of performance data, so you need to limit the data to show only potential problem areas. The best way to do this is to use exception processing. With exception processing, you can focus on possible performance problems by highlighting data which is outside limits you have specified or when certain events occur. You can also qualify and sort DB2 thread data.

When an exception occurs, you can examine it in detail and try to resolve it by examining the comprehensive data shown in the thread and statistics panels. If you think the problem is SQL related, you can invoke Visual Explain function to analyze the access paths used.

If the exception occurred in the recent past, you can use history to view the events surrounding the problem, without having to recreate it.

If you cannot get enough information to solve your problem, you can use the Workstation Online Monitor to start a DB2 trace when an exception occurs; this allows you to minimize the time high-volume, high-cost traces are active and ensure that data is collected at the appropriate time. The data collected can then be used to produce DB2 PM reports and traces.

---

## Using the Workstation Online Monitor

This section takes you on a quick guided tour around the Workstation Online Monitor and briefly describes the principal panels and how to use them.

If you need detailed information about any panel, go to that panel and click **Help** or press the **F1** key. To get help about any DB2 field shown in the panels, position your cursor on the value of the field, click with your left mouse key and press the **F1** key.

The Workstation Online Monitor offers you several ways to monitor DB2:

- Thread summary
- Thread details
- Statistics overview through the System Health panel
- Statistics details
- Periodic exception monitoring
- Event exception monitoring.

### Start monitoring

You can start monitoring a DB2 subsystem by double-clicking on the subsystem icon with the left mouse key, clicking with the left mouse key on one of the icons for Threads, Statistics, or Exceptions, or clicking with the right mouse key on an icon and selecting from the pop-up menu.

If the host connection is not yet established, the logon to DB2 window comes up. On this window type in your host MVS user ID and password and, if necessary, your TSO Group ID, then click **OK** or press **Enter**. When your password has been checked, a connection is established with the host server and you are ready to start monitoring your DB2 subsystem.

### Viewing thread activity

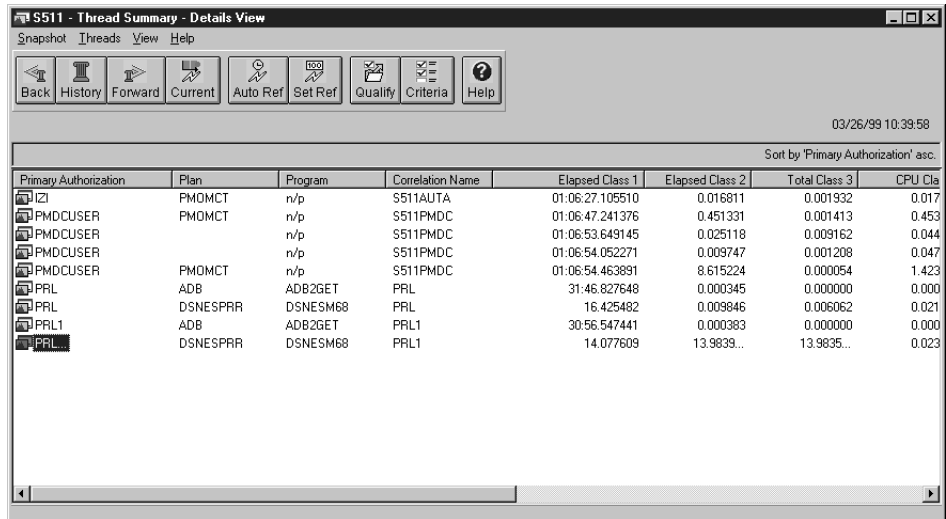
The thread activity panels allow you to examine information about the current or recent activity of all active threads connected to a DB2 subsystem.

To open the thread summary window, from the System overview panel, double-click on the **Threads** icon of the subsystem you want to monitor. If you are not connected to the subsystem, you will be prompted to log on first.

From the thread summary panel, you can view key values for all connected threads (qualified and sorted as you require). You can select any thread listed on the thread summary panel to display the thread details notebook for further investigation of the thread. To do this, double-click on the thread you want to examine.

## Thread summary panel

The Thread Summary panel shows a summary of all connected DB2 threads qualified and sorted as defined by the Qualify and Sort criteria.



The screenshot shows a window titled "S511 - Thread Summary - Details View". The window has a menu bar with "Snapshot", "Threads", "View", and "Help". Below the menu bar is a toolbar with buttons for "Back", "History", "Forward", "Current", "Auto Ref", "Set Ref", "Qualify", "Criteria", and "Help". The main area displays a table of thread data, sorted by "Primary Authorization" in ascending order. The table has the following columns: Primary Authorization, Plan, Program, Correlation Name, Elapsed Class 1, Elapsed Class 2, Total Class 3, and CPU Cla. The data rows are as follows:

Primary Authorization	Plan	Program	Correlation Name	Elapsed Class 1	Elapsed Class 2	Total Class 3	CPU Cla
IZI	PMOMCT	n/p	S511AJTA	01:06:27.105510	0.016811	0.001932	0.017
PMDCUSER	PMOMCT	n/p	S511PMDC	01:06:47.241376	0.451331	0.001413	0.453
PMDCUSER		n/p	S511PMDC	01:06:53.649145	0.025118	0.009162	0.044
PMDCUSER		n/p	S511PMDC	01:06:54.052271	0.009747	0.001208	0.047
PMDCUSER	PMOMCT	n/p	S511PMDC	01:06:54.463891	8.615224	0.000054	1.423
PRL	ADB	ADB2GET	PRL	31:46:827648	0.000345	0.000000	0.000
PRL	DSNESPRR	DSNESM68	PRL	16.425482	0.009846	0.006062	0.021
PRL1	ADB	ADB2GET	PRL1	30:56:547441	0.000383	0.000000	0.000
PRL	DSNESPRR	DSNESM68	PRL1	14.077609	13.9839...	13.9835...	0.023

Figure 5. Thread Summary — Details View

Data displayed on the current panel is refreshed whenever you click **Current** or a refresh occurs.

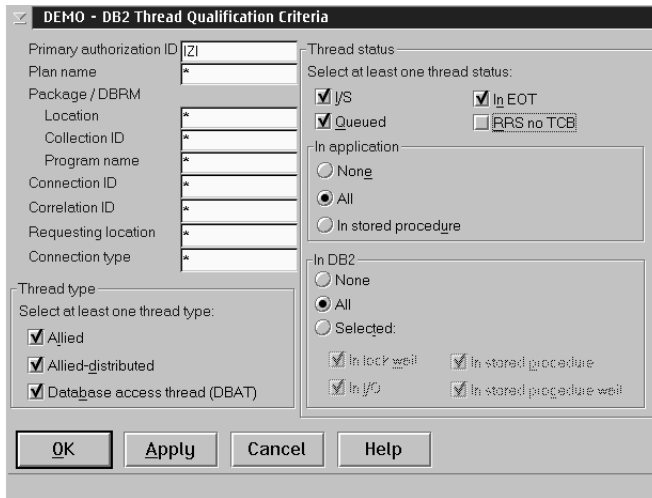
You can activate automatic refresh. To do this, click the **Auto Ref** button on the tool bar. Values are then updated automatically at the interval you specified. Use the **SetRef** button to set the refresh interval.

## Qualifying threads

You can filter the threads that you want to view by qualifying them. When you qualify threads, only those threads matching the DB2 PM identifiers selected are displayed on the thread summary window.



To qualify threads, you need first to define those threads that you want to have shown. To do this click on the **Criteria** toolbar button. The Qualify Criteria dialog is displayed.



Add your criteria to this panel. For example, if you suspect that applications from a certain primary authorization ID are causing problems, use that as a filter.

You can use a wild card character (\*) to filter strings that begin with a certain sequence. For example, use ABC\* to filter for anything beginning ABC. Characters following the wild card are ignored, ABC\*EFG returns ABC\*.

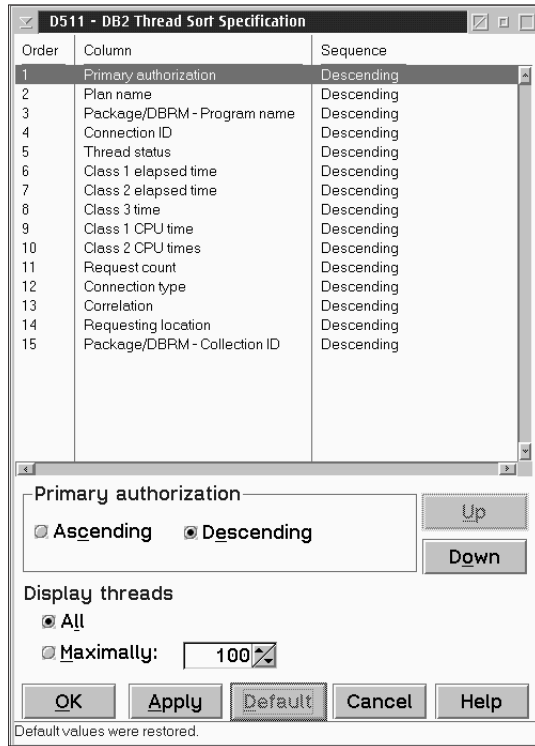
Click **Qualify** to filter the threads according to your criteria.

## Sorting threads

You can sort threads so that those with certain characteristics are shown first. For example, if you are interested in threads that are high Class 3 time consumers, you might want to order those first.



To sort threads, click on the **Sort** button. The Sort definition dialog is displayed.



## Thread details notebook

The Thread Details notebook allows you to view detailed information on a selected thread. You can select any aspect about the thread for viewing in greater detail simply by clicking on the page tabs.

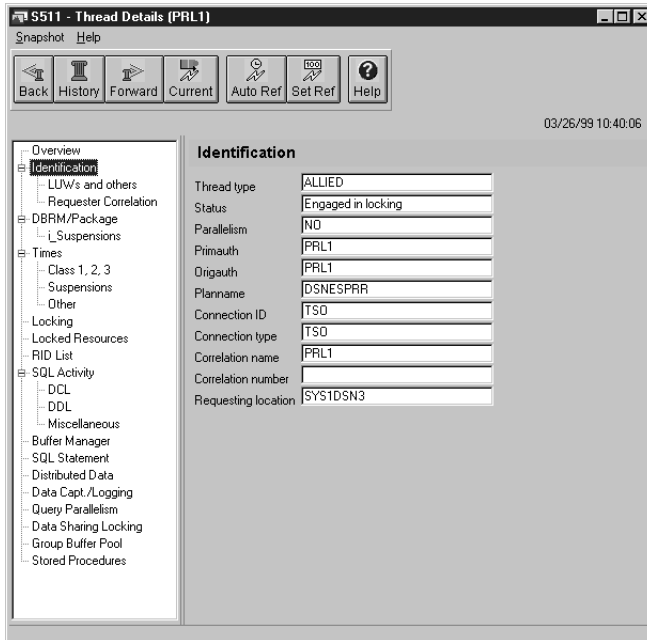


Figure 6. Thread Details

To display the Thread Detail panel, double-click on an active thread listed on the Thread Summary panel.

## Viewing DB2 statistics

The Workstation Online Monitor shows DB2 statistics as an overview in the System Health panel and in detail in the Statistics detail notebook.

### The system health panel

The system health panel shows vital statistics of your DB2 subsystem as snapshots in graphical format. You can think of it as a fever chart, recording the pulse and temperature of DB2.

The counter sets shown are a selection of important DB2 performance indicators, they are:

- EDM pool
- Buffer pool
- SQL activity
- Locking activity
- Log activity

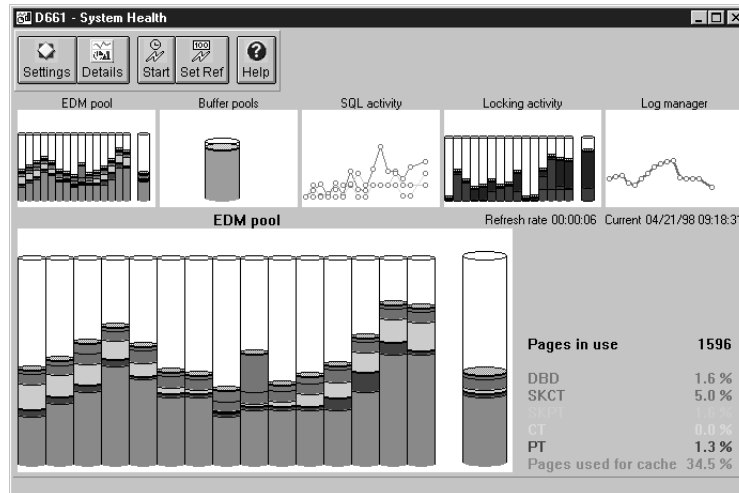


Figure 7. System Health Panel

The upper portion of the screen shows a graph for each of these counter sets. The lower portion of the screen shows the graph for one set in detail with the values for the current snapshot shown on the right. Snapshots progress from right to left.

When the system health panel is first opened, the EDM pool counters are shown. If you want to view another set of counters, for example SQL activity, move your pointer to the SQL activity graph on the upper portion of the screen and click once with the left mouse key.

Some of the counters shown are delta values, that is values accumulated between snapshots. Others show values accumulated since DB2 was started.

To view the values of a previous snapshot, position your pointer on the snapshot point for a line graph or on the snapshot bar for a bar graph and press and hold the left mouse key.

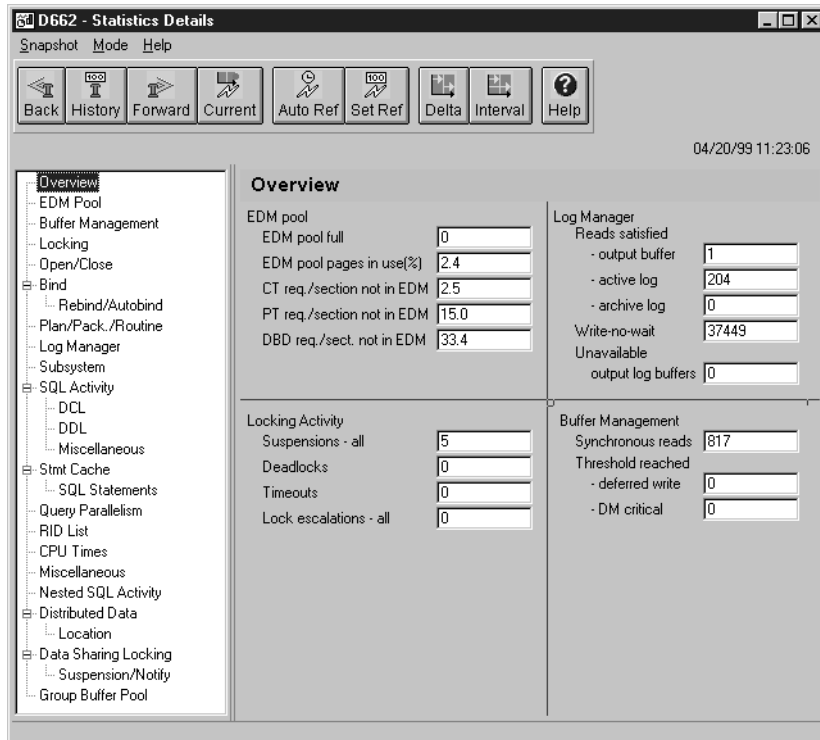
You can view statistics in detail by double-clicking on a graph in the upper portion of the panel or by clicking on the **Details** button.

***Tailoring the system health panel:*** You can customize this panel using the **Settings** button. This allows you to change the type of graph displayed as well as the scale of the graphs.

You can also change the interval between snapshots. The default interval is 20 seconds. You can alter this to anything from six seconds through 9 hours 59 minutes and 59 seconds using the **Set Ref** button.

## The statistics details notebook

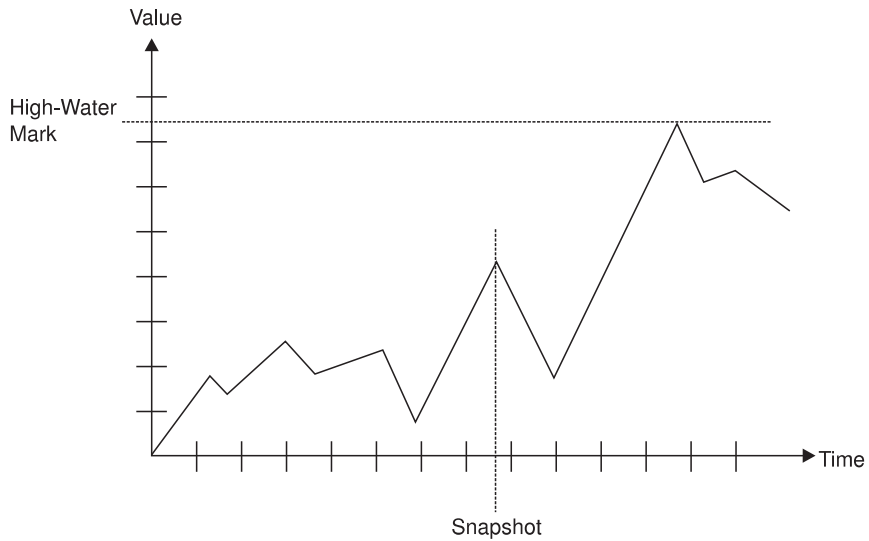
The Workstation Online Monitor statistics details notebook is organized into pages, each showing the DB2 statistics and ratios of a particular aspect of the subsystem.



To open the statistics notebook, click on the **Details** button of the System Health panel.

Most DB2 statistics field values accumulate while the DB2 subsystem is active. When the DB2 host server is started, the accumulation process begins and continues until the DB2 subsystem is stopped. There are, however, certain fields that are not cumulative. Some are reported as *snapshot* values, and some are reported as *high-water mark* values. A snapshot value is a current value, and is updated each time the statistics values are displayed. A high-water mark is a highest value reached since startup, and is

updated each time the statistics values are displayed.



Fields that are not snapshot or high-water mark values are known as delta values. They are derived differently for each of the statistics processing modes. They are calculated by the statistics display. For further details, see “Interval processing” on page 33 and “Delta processing” on page 34.

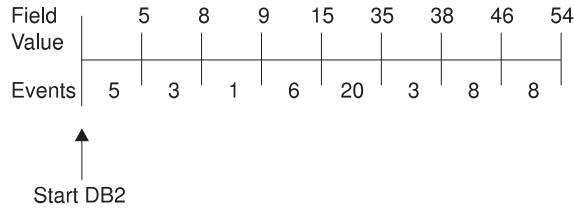
### **Statistics processing modes**

There are three different modes of display available for the statistics panels: regular, interval, and delta mode. Interval and delta modes determine the time period over which delta values are accumulated.

Statistics values are updated when a refresh occurs.

**Regular processing:** This is the default whenever you open the Statistics notebook. The values displayed are accumulated since DB2 PM host server startup.

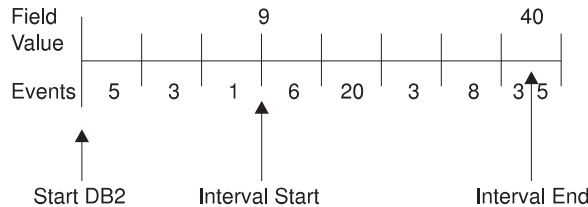
**Regular Mode**



No calculations are performed on the statistics values in this mode.

**Interval processing:** Interval mode allows you to isolate DB2 statistics activity beginning at a specified time.

**Interval Mode**



To activate interval processing, move your pointer to the **Interval** button on the tool bar and click once with the left mouse button.

In interval processing, the delta values displayed are accumulated since the last time a refresh occurred. When interval mode is activated while viewing past data, the values are accumulated between the history time shown when interval mode was selected and the current history time.

Interval processing can help solve a problem when running with exception processing. When you select interval processing mode, all statistics field values (with the exception of the high-water mark and snapshot fields) are cleared and begin the accumulation process from the start. The first values displayed after interval processing begins represent the values from the newly-established base point to the first statistics record pair (IFCID 1 and IFCID 2) encountered. Thereafter, the values are updated each time you click the **Current** button or a refresh occurs.

You can activate automatic refresh. To do this, press the **Auto Ref** button on the tool bar. Statistics values are then updated automatically at the interval you specified. A new base point can be established by clicking the **Current** button.

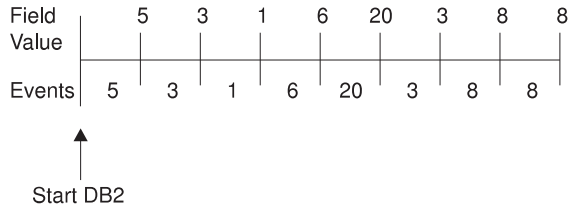
When interval processing mode is activated, *all* statistics panels operate in interval mode.

Interval processing remains active until either it is deactivated by clicking the **Interval** button again or you select **Delta**.

**Delta processing:** Delta processing allows you to isolate DB2 statistics activity taking place between two DB2 intervals. The interval is set at DB2 startup.

To activate delta processing, click the **Delta** button.

#### Delta Mode



When delta mode is activated while viewing past data, delta processing uses the currently shown history time and the next available history snapshot to accumulate the values.

When you initiate delta mode, DB2 statistics field values are reported in time slices. A new base point is established each time the displayed values are updated. With the exception of the high-water mark and snapshot fields, all statistics field values reflect the activity that has occurred since the previous display update.

After delta is activated, *all* statistics panels operate in delta mode.

Delta mode remains active until you deactivate it by clicking the **Delta** button again or by clicking **Interval**.



## Exception processing

Exception processing is an efficient way of monitoring your subsystems for performance problems. With exception processing, you are informed when certain counters reach problem levels that you have identified and defined or when certain events occur.

The Workstation Online Monitor gives you two types of exception processing:

- Event exceptions
- Periodic exceptions.

Exceptions are checked by the DB2 PM host server. This means that once you have started exception processing on a DB2 subsystem, exceptions continue to be monitored even when you disconnect from the subsystem or shut down the Workstation Online Monitor.

Exception processing continues until you stop it, the host server is stopped, or DB2 is stopped, or you log off from the subsystem.

### Periodic exception processing

With periodic exception processing you can check both DB2 thread activity and statistics fields for potential problems against thresholds and at intervals defined by you. The data in selected fields is tested against your thresholds and if a value does not conform to the limits you have specified, an exception is logged.

Before you can begin periodic exception processing, you must define a threshold set.

**Establishing thresholds:** DB2 PM provides a comprehensive set of exception fields, which can make it difficult to decide which ones to choose for your site. As a rule, you only need to define a limited number of thresholds. Long response times are a good indicator of a performance problem, so start by defining exception thresholds for time fields.

You can, for example set thresholds, appropriate to your environment for class 1 and class 2 elapsed times.

Decide which are the most important applications or transactions in your system. Always define exception thresholds for critical business applications. Frequently executed applications are also good candidates for exception thresholds.

Some thresholds can be determined from your own performance objectives. Others need to be calculated and tailored specifically to your system environment. The best way of doing this is to use exception profiling.

**Exception Profiling:** Exception profiling automatically produces an exception threshold set using input from one or more DB2 traces. A report is also produced, showing details of the distribution and the expected number of exceptions for each.

Exception profiling is done on the host machine as a batch job. You can download and import the threshold set produced for use on your workstation.

For detailed information about exception profiling, refer to the *DB2 PM Report Reference*.

**Creating or changing an exception threshold set:** A threshold set is a selection of DB2 counters that you want to monitor together with limits, upper or lower, that you want to be informed about.

To create a new set, from the System Overview panel, select the **Thresholds** toolbar button.

If you already have one or more threshold sets defined, these are listed. You can select one of these by double-clicking with the left mouse key. Otherwise, select the **New** toolbar button.

If you are creating a new threshold set, you are prompted to name it before the edit threshold set panel is opened.

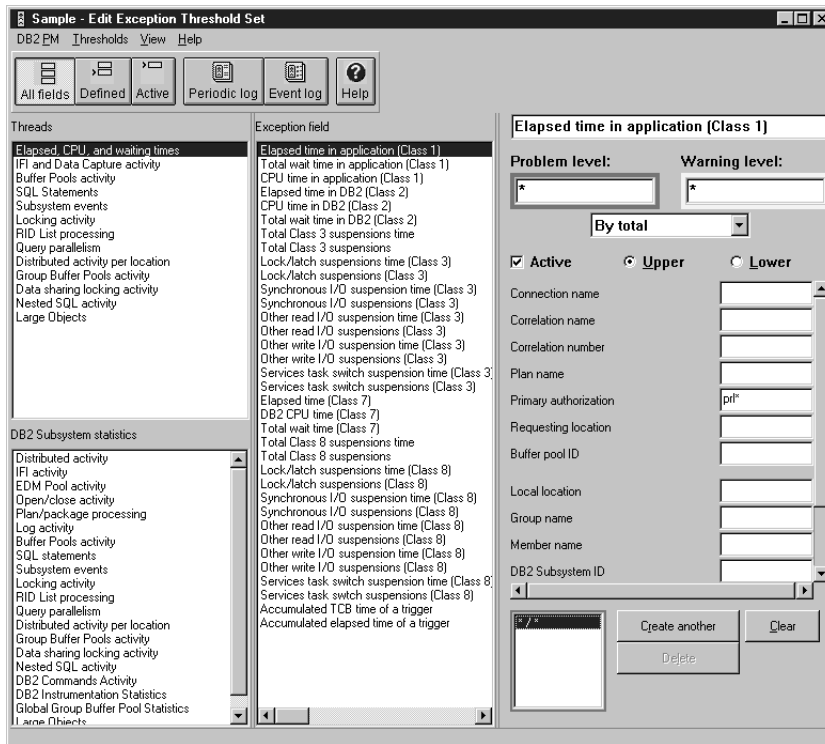


Figure 8. Exception Threshold Set Panel

This panel is divided into four main sections. The leftmost part of the screen shows the field categories for threads and statistics. When you select a category, the exception fields for that category are shown in the center portion.

As an example, suppose that you notice from the System Health panel that the buffer pool hit ratio is dropping significantly at certain times of the day. You suspect that the buffer pool is too small for the workload. You could, in this instance, monitor the percentage of buffer pool pages in use.

To do this, select Buffer Pools activity in the DB2 Statistics portion and Percentage buffer pages in use in the Exception field portion of the screen.

Now assume that 90% usage could cause a problem and you want to be alerted when 85% of the pages are in use. In the red-bordered Problem box, type 90 and in the yellow Warning box, type 85.

You can create thresholds for as many counters as you want. You can also create multiple thresholds for the same counter, using the **Create another** button, when you want to monitor the activity of different primary authorization IDs, for example.

Close the panel to save the threshold set. You are now ready to start periodic exception monitoring.

**Sharing threshold sets:** You can use exception threshold sets defined on the host machine or threshold sets defined by colleagues. You can also export your threshold sets to a location where they can be picked up and used by others, or be exported to the host machine.

**Importing a threshold set:** Say, for example, you want to use the sample threshold set supplied with DB2 PM. The sample threshold set is DGOETV61 in SDGODATA. To use this sample on the workstation:

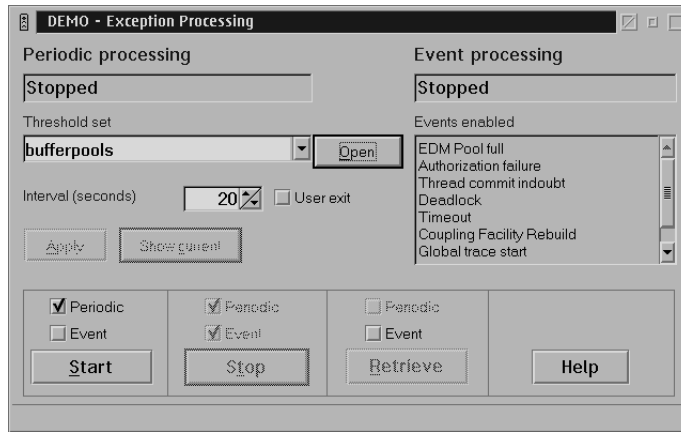
1. Download the sample file to your workstation in ASCII CRLF format.
2. From the Threshold Sets panel, click **Thresholds** → **Import** from the menu bar.

You are prompted for the file name that you want to import. When you click **OK** the imported threshold is added to the list.

**Export a threshold set:** To export a threshold set to a location from where others can access and import it, select the set that you want to export. Click **Selected** → **Export** from the menu bar. You are prompted for a path and file name. When you click **OK**, the threshold set is stored at that location. If you want to use the exported threshold on the host, upload it in ASCII CRLF format.

**Start periodic exception monitoring:** From the System Overview panel, select the Exceptions icon for the subsystem that you are monitoring to open the Exception

Processing dialog.



In this dialog, ensure that your threshold set is displayed in the threshold set field. Set the interval that you want, the default is that exception fields are sampled every 20 seconds.

Ensure that there is a check mark against Periodic and click on the **Start** button.

Exception processing continues until you stop it, the host server is stopped, or DB2 is stopped.

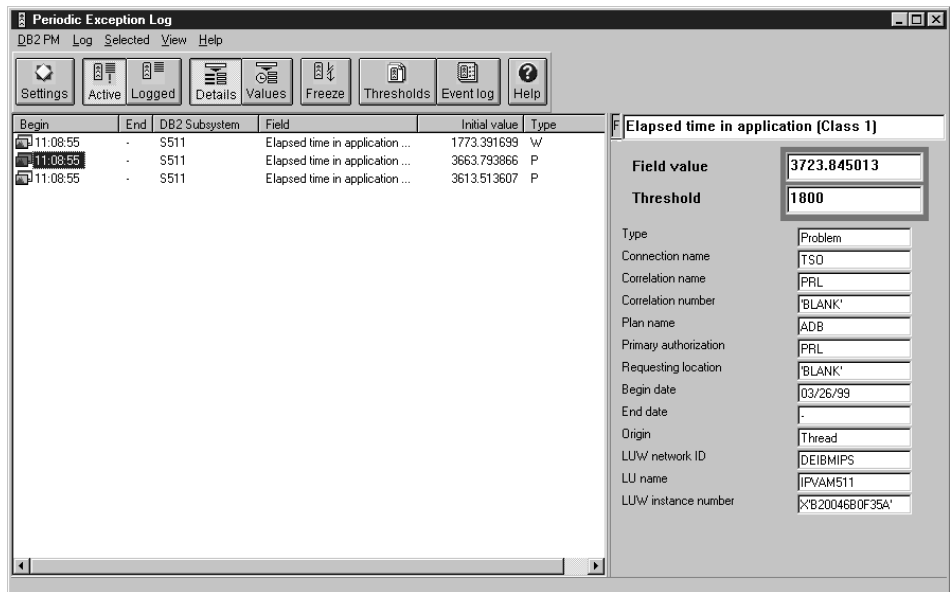


Figure 9. Periodic Exception Log

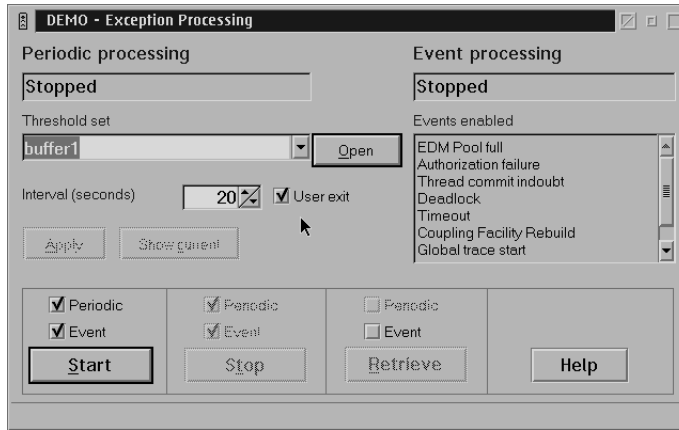
## Event exceptions

When you use event exception monitoring you are informed whenever one of the following events occur:

- Deadlock
- Timeout
- EDM pool full
- Authorization failure
- Thread commit in doubt
- Coupling facility rebuild/alter start
- Coupling facility rebuild/alter end
- Global trace started.

**Note:** These events must be enabled on the host data collector.

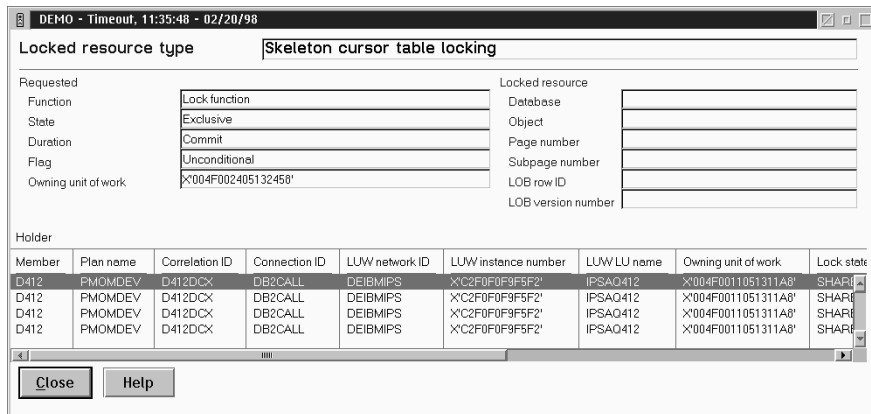
To start monitoring for exception events, from the system overview window, double-click on the exceptions icon. The exceptions processing dialog box appears.



This dialog gives you information about the status of both event and periodic exception processing. In the lower left portion of the dialog, ensure that the Event box is checked, then position your pointer over the **Start** button and click with the left mouse button.

When an exception event occurs, it is logged in the event exception panel. Normally, this panel is displayed whenever an exception event occurs. You can alter the behavior of this window using the **Settings** button.

To get more information about the exception, select it and double-click with the left mouse button.



## Working with the user exit

With periodic exception processing you can elect to call a host-based user exit when an exception occurs. The exception user exit is a predefined exit point in DB2 PM where a user-written routine can be given control. When the routine finishes, control is returned to DB2 PM.

The name of the exception processing user exit is DGOUPXT. A sample of this user exit is provided in SDGODATA.

You could use this exit, for example, to automatically issue an ALTER BUFFERPOOL command to increase the size of the buffer pool in response to a **Buffer Pool Full** full exception.

Refer to the *DB2 PM Batch User's Guide* for information about customizing this user exit.

**Activating the user exit:** To activate your user exit, from the Exceptions panel, ensure that the **User Exit** box is selected before you start exception processing.

## Viewing past data

You can view past data for both threads and statistics using the **History** toolbar button. Historical data is stored as a series of snapshots, taken at predetermined intervals, by the DB2 PM host server.

History is useful when, for example, you want to examine events leading to and following an exception without having to recreate the situation.

Before you can use history, you must ensure that the DB2 PM host server is enabled for history capture.

When you select history, a dialog box is opened for you to specify the date and time of the stored snapshot you want to examine. Close this dialog by clicking **Apply**. You will see "History" with the date and time of the snapshot displayed at the top right of the panel.

You can move back or forward, one snapshot at a time, using the **Back** and **Forward** toolbar buttons. The interval between snapshots is specified at the host server.





## Appendix A. Connection definitions for APPC

This diagram shows the relationship and dependencies of the definitions used in Communications Manager, Workstation Online Monitor, DB2 and DB2 PM, VTAM, and MVS.

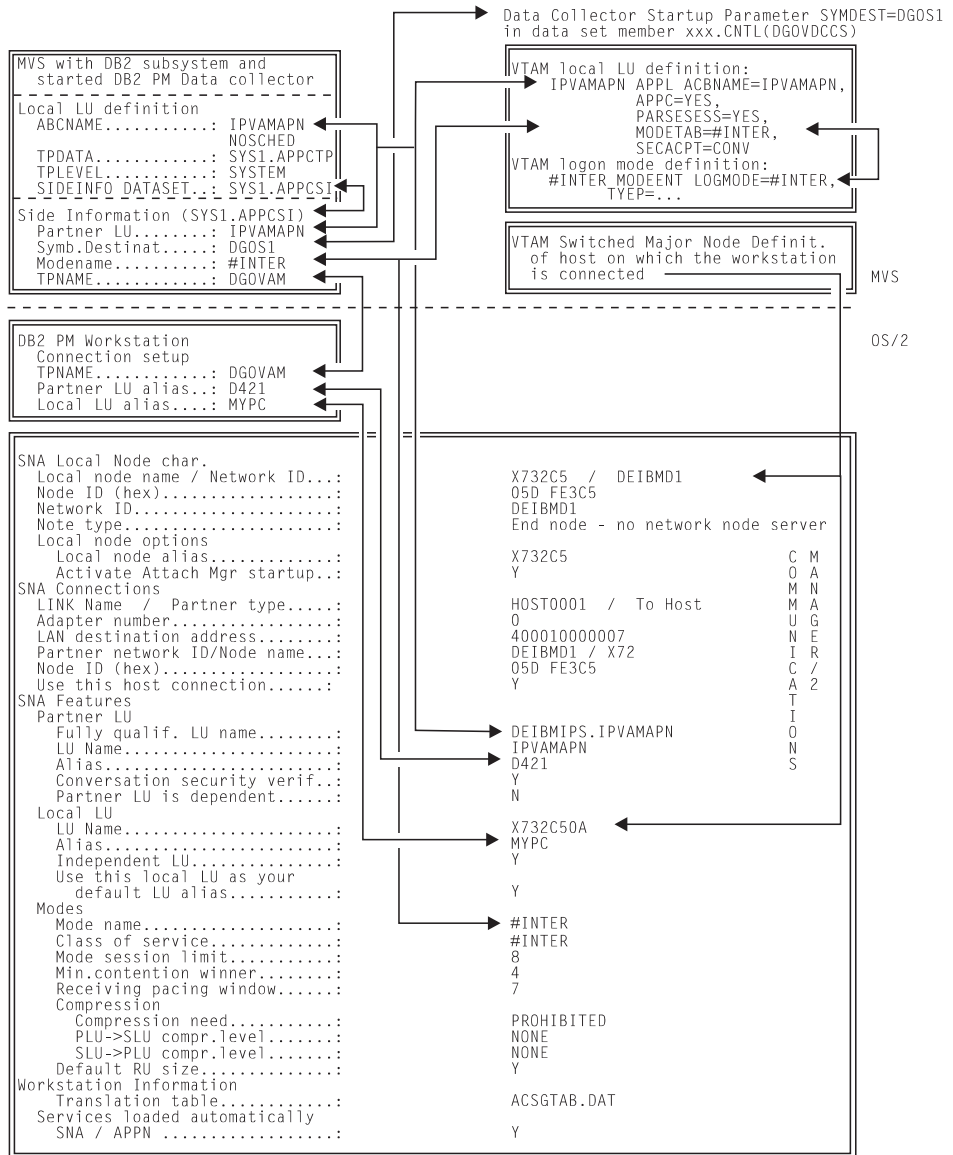


Figure 10. Host DB2 PM Data collector definitions on the OS/2 workstation



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