

# Ingres 10.0

---

## Interactive Performance Monitor User Guide

INGRES

ING-10-IPM-01

This Documentation is for the end user's informational purposes only and may be subject to change or withdrawal by Ingres Corporation ("Ingres") at any time. This Documentation is the proprietary information of Ingres and is protected by the copyright laws of the United States and international treaties. It is not distributed under a GPL license. You may make printed or electronic copies of this Documentation provided that such copies are for your own internal use and all Ingres copyright notices and legends are affixed to each reproduced copy.

You may publish or distribute this document, in whole or in part, so long as the document remains unchanged and is disseminated with the applicable Ingres software. Any such publication or distribution must be in the same manner and medium as that used by Ingres, e.g., electronic download via website with the software or on a CD-ROM. Any other use, such as any dissemination of printed copies or use of this documentation, in whole or in part, in another publication, requires the prior written consent from an authorized representative of Ingres.

To the extent permitted by applicable law, INGRES PROVIDES THIS DOCUMENTATION "AS IS" WITHOUT WARRANTY OF ANY KIND, INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NONINFRINGEMENT. IN NO EVENT WILL INGRES BE LIABLE TO THE END USER OR ANY THIRD PARTY FOR ANY LOSS OR DAMAGE, DIRECT OR INDIRECT, FROM THE USER OF THIS DOCUMENTATION, INCLUDING WITHOUT LIMITATION, LOST PROFITS, BUSINESS INTERRUPTION, GOODWILL, OR LOST DATA, EVEN IF INGRES IS EXPRESSLY ADVISED OF SUCH LOSS OR DAMAGE.

The manufacturer of this Documentation is Ingres Corporation.

For government users, the Documentation is delivered with "Restricted Rights" as set forth in 48 C.F.R. Section 12.212, 48 C.F.R. Sections 52.227-19(c)(1) and (2) or DFARS Section 252.227-7013 or applicable successor provisions.

Copyright © 2010 Ingres Corporation. All Rights Reserved.

Ingres, OpenROAD, and EDBC are registered trademarks of Ingres Corporation. All other trademarks, trade names, service marks, and logos referenced herein belong to their respective companies.

# Contents

---

## **Chapter 1: Introducing Ingres Performance Monitoring 7**

Interactive Performance Monitor .....	7
Terms Used in This Guide .....	8
System-specific Text in This Guide .....	9
Syntax Conventions Used in This Guide .....	9

## **Chapter 2: Installation Considerations for IPM 11**

Privileges and IPM .....	11
Requirements for Running IPM .....	12
ipm Command—Start IPM.....	13
Resource Type—Display Specific Resource .....	14
IPM Release Compatibility.....	15

## **Chapter 3: Understanding Forms and Menus 17**

Notes on IPM Display Format .....	17
Main Menu Map .....	18
Server List Menu Map .....	19
Lock Info Menu Map.....	20
Log Info Menu Map .....	21
Main Menu Screen .....	22
Main-Menu Menu Items .....	23
Option Selection Screen .....	24
Change Options on the Options Selection Screen .....	26
Option Selection Menu Items .....	26

## **Chapter 4: Monitoring Server Information 27**

Server Information .....	27
Server List Screen .....	27
Server List Menu Items.....	29
Server Detail Screen (More_Info) .....	30
Server Detail Menu Items.....	31
Session List Screen.....	32
Session List Menu Items .....	34
Session Detail Screen (More_Info) .....	36
Session Detail Menu Items .....	39
Detailed Process Information Screen (VMS Only) .....	39

---

Display Detailed Process Information Screen.....	40
Detailed Process Information Screen Fields.....	41
Detailed Process Information Menu Items.....	42

## Chapter 5: Monitoring Lock Information 43

Lock Information.....	43
Lock Info Menu Screen.....	44
Lock Info Selections .....	45
Lock Info Menu Items.....	45
Locking System Summary Screen.....	46
Locking System Summary Fields .....	47
VMS Cluster Only Fields (VMS Only) .....	49
Locking System Summary Menu Items.....	50
Interval Option (Locking System Summary).....	51
Display Locking System Summary .....	51
Lock List Display Screen.....	52
Find Waiting Locks .....	53
Lock List Display Fields .....	53
Lock List Display Menu Items.....	55
Lock List Display More_Info Screen.....	56
Lock Detail Display Screen.....	57
Lock Detail Display Menu Items .....	58
Lock Detail Display More_Info Screen .....	59
Resource Lock Display Screen .....	60
Mode Values .....	61
Resource Lock Display Menu Items.....	62
Blocking Lock Display Screen .....	62
Look for Concurrency Bottlenecks.....	63
Blocking Lock Display Fields .....	64
Scrolling Area (Blocking Lock Display).....	65
Blocking Lock Display Menu Items .....	65
Resource List Display Screen.....	66
Resource List Display Fields.....	67
Resource List Display Menu Items .....	68
Resource List Display More_Info Screen .....	69
Resource Detail Display Screen .....	70
Resource Detail Display Fields.....	70
Resource Detail Display Menu Items .....	71

## Chapter 6: Monitoring Log Information 73

Log Information .....	73
-----------------------	----

---

Log Info Menu Screen .....	73
Log Info Menu Items .....	75
Logging System Summary Screen.....	75
Logging System Summary Fields.....	77
Logging System Summary Menu Items .....	80
Interval Option (Logging System Summary) .....	81
Logging System Header Screen .....	82
Logging System Header Fields .....	83
Logging System Header Screen—Status Field Values.....	85
Logging System Header Menu Items.....	87
Logging System Header More_Info Screen.....	88
Logging System Header Screen with Transaction Display .....	89
Transaction Display Menu Items.....	91
More_Info Screen (Transaction Display) .....	92
Log Process Display Screen.....	92
Log Process Display Menu Items .....	94
Log Database Display Screen .....	95
Log Database Display Menu Items .....	97
Log Database Display More_Info Screen.....	97
Log Transaction Display Screen .....	98
Log Transaction Display Fields .....	100
Log Transaction Display Menu Items.....	102
Log Transaction Display More_Info Screen.....	103

## **Chapter 7: Using IPM to Monitor and Troubleshoot** **105**

View Running Servers .....	105
View Sessions.....	106
Monitor Resource Usage .....	106
Operate With an Unresponsive Server .....	107
Check for Logging Delays .....	108
Locate Concurrency Problems.....	109
Determine Group Commit Efficiency .....	110
Check Log File Capacity .....	110
Locate a Problem Transaction.....	111
IPM as a Troubleshooting Tool .....	112

## **Index** **113**



# Chapter 1: Introducing Ingres Performance Monitoring

---

This section contains the following topics:

[Interactive Performance Monitor](#) (see page 7)

[Terms Used in This Guide](#) (see page 8)

[System-specific Text in This Guide](#) (see page 9)

[Syntax Conventions Used in This Guide](#) (see page 9)

The *Interactive Performance Monitor User Guide* provides a comprehensive look at the performance monitoring capabilities of Ingres®.

## Interactive Performance Monitor

The Interactive Performance Monitor (IPM) monitors a running Ingres installation. It displays information about servers, sessions, and locking and logging activity.

IPM is an interactive, forms-based interface with the functionality of the following tools:

- iimonitor
- lockstat
- logstat
- iinamu

IPM can be used for multiple purposes, as follows:

- Monitoring

IPM monitors the state of the different processes, the logging and locking systems, the database servers, the log file, and the user sessions.

- Performance analysis

IPM can be used to analyze performance problems. It displays in real time which tables and pages are locked, whether the locks are shared or exclusive, and which transactions are blocking or possibly deadlocked with other transactions. It displays user sessions and whether each is active or waiting for user input, and displays log file and logging system statistics.

- System management

IPM provides information useful for maintaining and tuning the Ingres configuration. For example, it displays in real time how much of the log file is in use and by whom. IPM can also be used to spot user behaviors that interfere with other users, such as transactions that are neither committed nor rolled back over a long time.

## Terms Used in This Guide

You should be familiar with the following terms and definitions. Some of these terms will assist you in interpreting the monitoring data displayed by IPM.

A *blocking lock* is a lock granted on a resource in such a way as to prevent another lock from being granted on that same resource. For example, an exclusive lock on a table prevents another shared or exclusive lock from being granted on that table. A blocking lock serializes access to a resource, table, page, or database. For example, an exclusive lock on a table blocks all other access to that table. Until the transaction holding the lock completes (commits or rolls back), all other transactions must wait.

**Note:** A blocking lock is not a deadlock.

A *deadlock* is a condition that occurs when one transaction is waiting for a lock held by another transaction *at the same time* that the other transaction is waiting for a lock held by the first. Both transactions block each other from completing.

A *lock list* is a list of one or more locks on resources in a given database or servers. Each session has at least one lock list. When a session is in a transaction, that session has an additional lock list containing all the locks acquired during the transaction.

A *logical lock* is a lock that is usually acquired during a transaction and released during a transaction or at commit time. A page lock is a logical lock.

A *physical lock* is a lock that can span multiple transactions in any given session. In most cases, table and database locks are held from the point that they are acquired until the end of the session.

A *resource* is any object in a database on which a lock can be held. A table, a page in a table, or even a database is a resource.



A *command* is an operation that you execute at the operating system level. An extended operation invoked by a command is often referred to as a *utility*.

A *statement* is an operation that you embed within a program or execute interactively from a terminal monitor. A statement can be written in Ingres 4GL, a host programming language (such as C), or a database query language (SQL or QUEL).

## System-specific Text in This Guide

This guide provides information that is specific to your operating system, as in these examples:

**Windows:** This information is specific to the Windows operation system.

**UNIX:** This information is specific to the UNIX operation system.

**VMS:** This information is specific to VMS operating system.

When necessary for clarity, the symbol ■ is used to indicate the end of the system-specific text.

For sections that pertain to one system only, the system is indicated in the section title.

## Syntax Conventions Used in This Guide

This guide uses the following conventions to describe syntax:

Convention	Usage
Monospace	Indicates key words, symbols, or punctuation that you must enter as shown
Italics	Represent a variable name for which you must supply an actual value
[ ] (brackets)	Indicate an optional item
{ } (braces)	Indicate an optional item that you can repeat as many times as appropriate
(vertical bar)	Separates items in a list and indicates that you must choose one item



# Chapter 2: Installation Considerations for IPM

---

This section contains the following topics:

[Privileges and IPM](#) (see page 11)

[Requirements for Running IPM](#) (see page 12)

[ipm Command—Start IPM](#) (see page 13)

[IPM Release Compatibility](#) (see page 15)

## Privileges and IPM

IPM provides powerful abilities to view information about any user session and the Ingres installation as a whole. It requires restricted system privileges to run.

You can install IPM so that less privileged users can use it. However, this type of installation permits any user to display large quantities of system and other user information. Users can display, for example, what other user sessions are running, what tables other users are accessing, whether a given user session is currently active, how much log file space any transaction is taking up, which user sessions are holding locks blocking which other sessions, and so on.

**Note:** Do not select this type of IPM installation unless you intend ordinary users to have the capability to display system and other user information.

Privileges are required to view queries or remove sessions or servers.

**UNIX:** By default, IPM can be run only by the Ingres system administrator. This is the account used for performing installations.

If needed, you can permit IPM to be run by less privileged users with the following command entered at the operating system prompt:

```
chmod 4711 ipm
```

**VMS:** By default, IPM can be run only with operating system privileges that requires SYSPRV CMKRNL and WORLD privileges.

If needed, you can permit IPM to be run by less privileged users by installing it with enhanced privileges. To do this, type the following at the operating system prompt:

```
INSTALL := $INSTALL/COMMAND
```

```
INSTALL REPLACE full_dir_spec:IPM.EXE -
```

```
$_ /OPEN/PRIV=(SYSPRV,CMKRNL,WORLD) █
```

## Requirements for Running IPM

IPM must be run on the same machine as the Ingres installation that is to be monitored and must be pointed at the desired installation just as any application or embedded user program.

Because IPM opens the master database (iiddb) to get a list of databases and opens other databases to get table names, the installation must be in a state to allow database connections.

An exception is the stand-alone mode (the **-s** option). In stand-alone mode, IPM does not require DBMS servers to accept connections, but can show logging and locking information only, not server and session information.

## ipm Command—Start IPM

The ipm command invokes IPM. If the ipm command is invoked with no options, IPM displays databases, open databases, relation and page resources, active transactions, and user lock lists for all databases in the current installation.

Some ipm command options are incompatible with other options. If you select options that are incompatible at start-up, a message is displayed that indicates the incompatibility.

Most options can be changed while running IPM from the Option Selection Screen (see page 24).

The ipm command has the following format:

```
ipm [options]
```

where *options* are:

**-ddbname**

Reports on resources for database *dbname* only.

**-e**

Displays system (NONPROTECT) lock lists as well as user lock lists. The -e option is the only option that affects the Lock List Display.

**-i**

Displays inactive in addition to active transactions. The -i option affects the Log Transaction Display.

**-l[*resourcetype*]**

Reports on a specific resource type (page, table, database, and so on). If a resource type is not specified, all resource types are reported. For a list of valid resource types, see Resource Type (see page 14).

**-n**

Prints resources granted in null mode.

**-rseconds**

Sets refresh time for various screens. Specify a given number of seconds.

**-s**

Runs IPM in stand-alone mode, in which it operates even if the DBMS server is down or not accepting connections.

**-t**

Reports on a particular table. The -d option must also be used with this option.

## Resource Type—Display Specific Resource

The following resource types can be specified on the **-l** flag on the ipm command. These options affect only the Resource List Display:

### **buffermgr**

Displays buffer manager locks. Each multiserver data buffer holds a buffer manager lock.

### **bufmgrddb**

Displays a buffer manager database lock. This lock is used to determine the validity of cache contents. When a server opens a database, the value in this lock is used to determine if the cached information for the database is valid; therefore, it does not actually lock any resources.

### **bufmgrtable**

Displays a buffer manager table lock. This lock type is the same as the buffer manager database lock, but operates on tables rather than databases.

### **checkpoint**

Displays checkpoint resource locks. Each database that has online backup running holds a checkpoint resource lock on it.

### **ckpcluster**

Displays checkpoint resource locks for an Ingres cluster installation.

### **config**

Displays configuration locks. This lock type is used when accessing a database config file. The config file holds database configuration information.

### **control**

Displays a table control lock. It is requested to perform modify, modify to relocate, create index, create table, and drop SQL commands. This lock is also held by sessions reading a table with readlock=nolock set.

### **createtable**

Displays createtable locks. Any user creating a table holds a createtable lock on that table.

### **database**

Displays database locks. Any user connected to database holds a database lock on that database.

### **dbtblid**

Displays locks of the type used to manage temporary table IDs. The lock value is used to store the next table id to use for temporary tables and does not actually lock any resource.

**event**

Displays event locks. This lock type is used by processes that use the locking system as a means to signal events. It does not actually lock any resource.

**extend**

Displays extend locks. This lock type is used while extending (adding a new page to) a file. It prevents two processes from trying to add pages to the same file at the same time.

**journal**

Displays journal locks. This lock type is used when accessing database journal files. It is held only by RCP (recovery process) and ACP (archiver process).

**opendb**

Displays open database resource locks. Each open database in a server holds this type of lock.

**page**

Displays page locks. Any user accessing a page in a table holds a page lock on that page.

**svdatabase**

Displays server database locks. Each database opened by a server holds a server database lock on it.

**svpage**

Displays server page locks. Each page touched by a server on behalf of a session in that server holds a server page lock.

**svtable**

Displays server table resource locks. Each table touched by a session in a server holds this type of lock.

**syscontrol**

Displays locks of the type used in conjunction with user defined abstract data types.

**table**

Displays table locks. Any user in a table holds a table lock on that table.

## IPM Release Compatibility

The release of IPM supplied with your current release package works only with that release. You *cannot* use the current release with any previous releases.





# Chapter 3: Understanding Forms and Menus

---

This section contains the following topics:

[Notes on IPM Display Format](#) (see page 17)

[Main Menu Map](#) (see page 18)

[Server List Menu Map](#) (see page 19)

[Lock Info Menu Map](#) (see page 20)

[Log Info Menu Map](#) (see page 21)

[Main Menu Screen](#) (see page 22)

[Option Selection Screen](#) (see page 24)

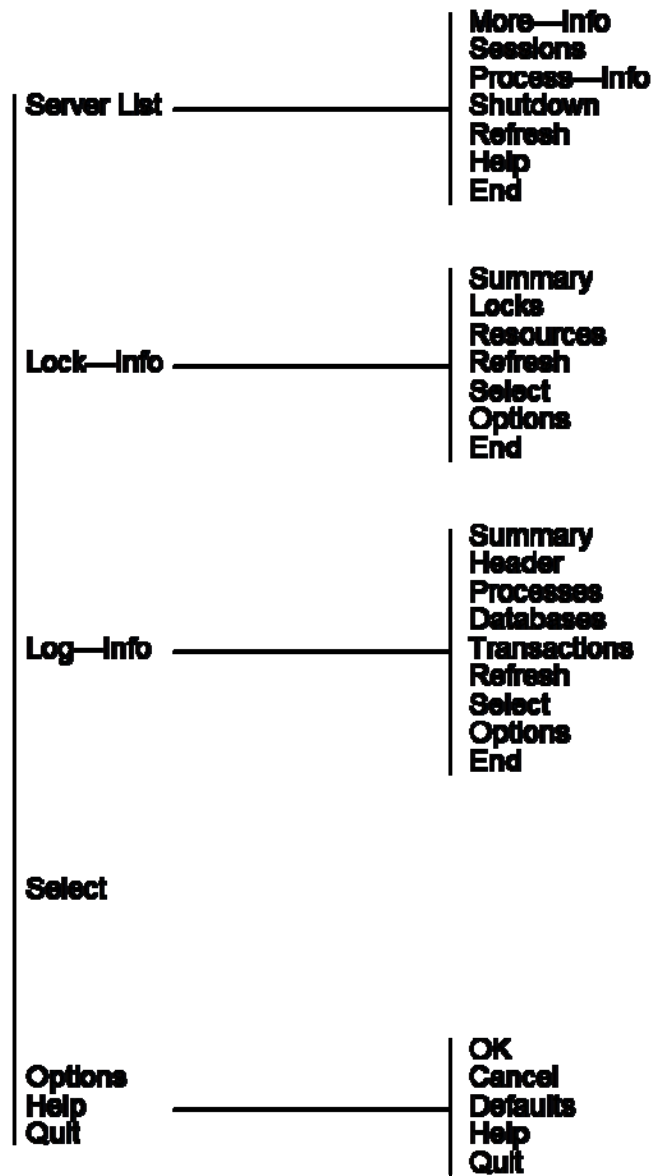
## Notes on IPM Display Format

Note the following about IPM displays:

- IPM uses pop-up screens where possible to allow the context on the previous screens to be preserved without obscuring the currently displayed data.
- IPM displays all lock, transaction, and process IDs in hexadecimal format.
- On the menu map summaries, items selected from the boxed screen areas are shown in bold. Menu items selected from the menu list at the bottom of the screen are shown in regular typeface. The boxed 1s and 2s represent replicated sets of menu items.

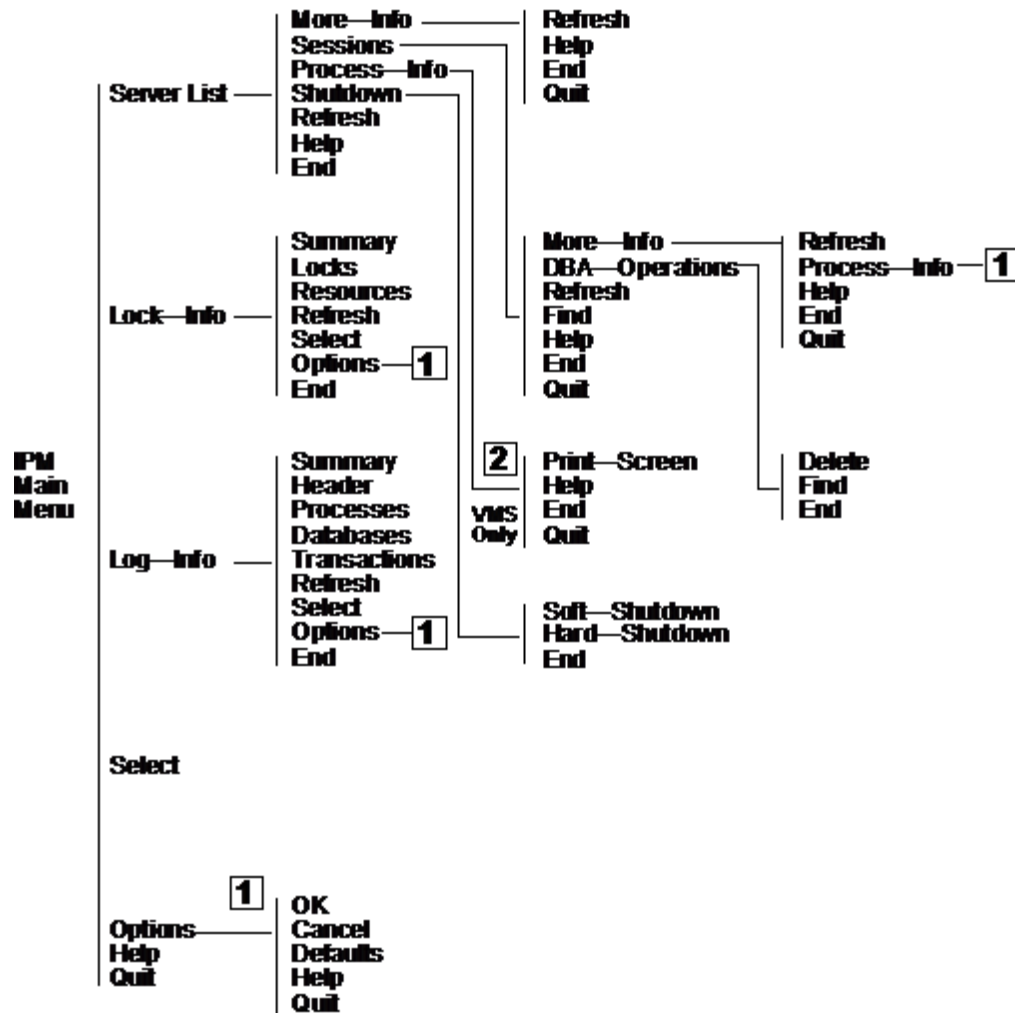
## Main Menu Map

The following figure illustrates each selection that is accessible from the IPM Main Menu:



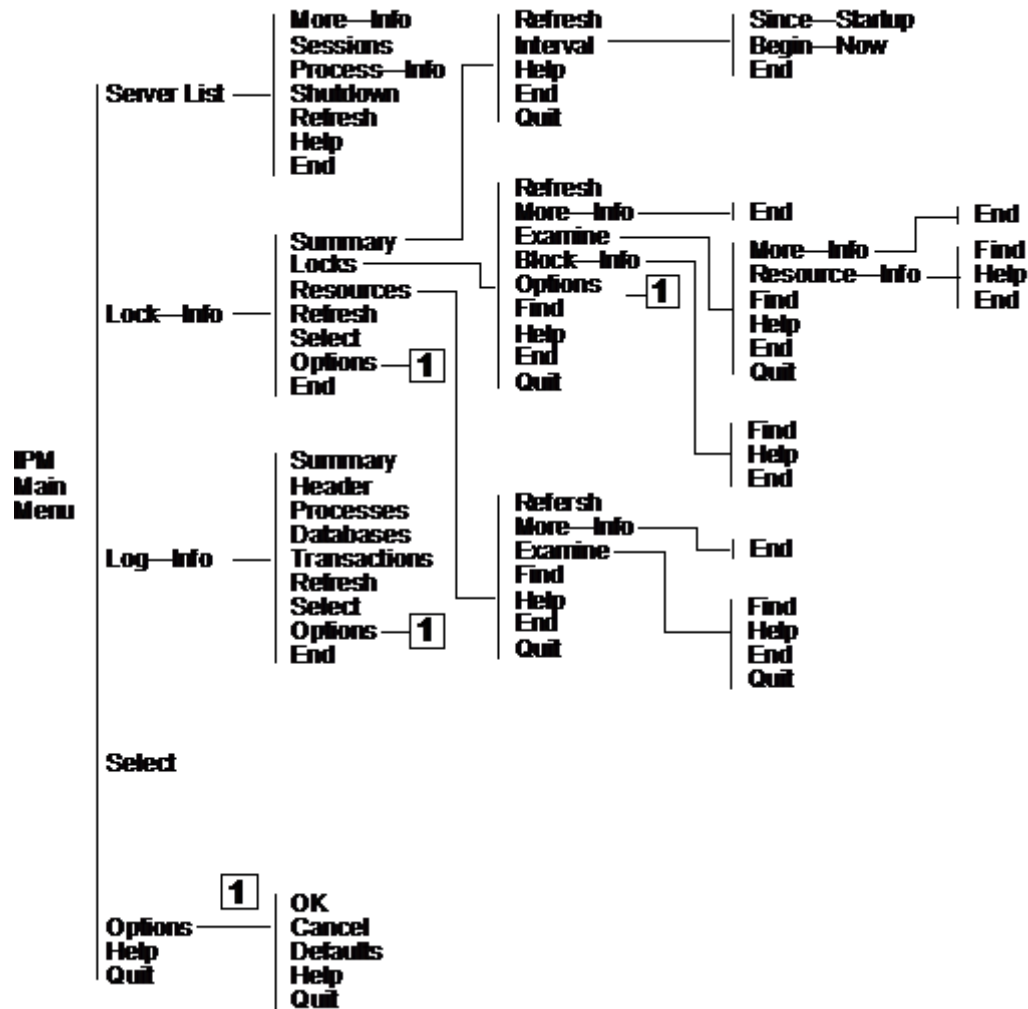
## Server List Menu Map

The following figure illustrates each selection that is accessible from the Server\_List menus:



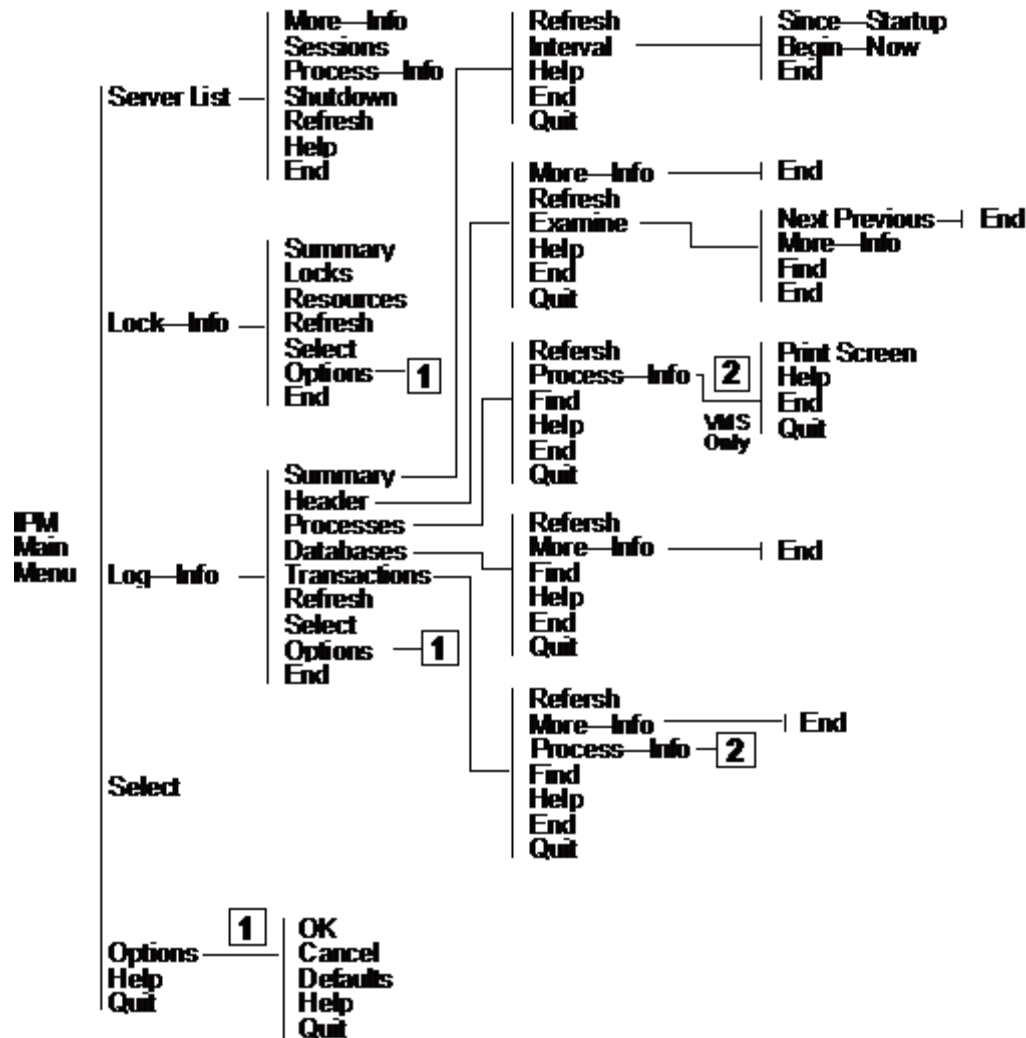
## Lock Info Menu Map

The following figure illustrates each selection that is available from the Lock\_Info portion:



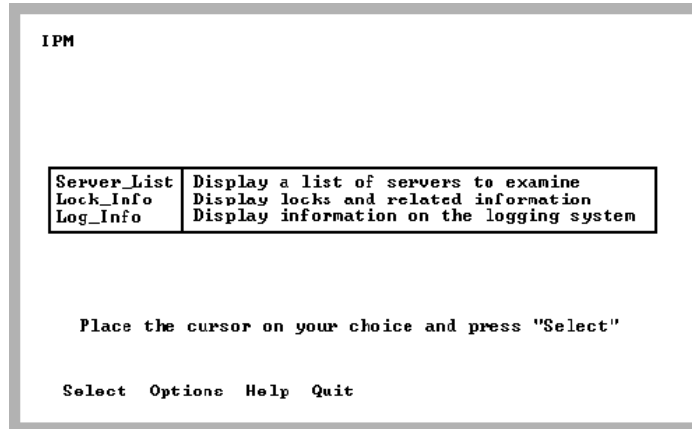
## Log Info Menu Map

The following figure illustrates each selection that is available from the Log\_Info portion:



## Main Menu Screen

When IPM is started, the Main Menu screen is displayed, as shown here:



You select a given category in the Main Menu by using the up and down arrow keys.

The command line options specified at startup can be changed by selecting the Options menu item.

The Main Menu has the following options:

### Server List

Displays the Server Information screens. This area displays a list of servers (that are registered with the Name Server). You can view session information, remove sessions, and shut down servers (provided you are a privileged user). Note that this area contains iinamu and iimonitor functionality. The server list is not available in IPM stand-alone mode (-s start-up option).

For more information on server monitoring information, see the chapter "Monitoring Server Information."

### Lock\_Info

Displays a new set of menu items and choices to display information pertaining to the locking system. Locking system summaries, lock lists, and resources can be viewed. This area is where concurrency analysis and locking activity viewing is done.

For details on locking information, see the chapter "Monitoring Lock Information."

**Log\_Info**

Displays a new set of menu items and choices to display information pertaining to the logging system. Logging system summaries, transaction lists, process, and database lists can be viewed. This area can be used to monitor transaction rates, log file activity, processes, and databases in the logging system.

For details on logging information, see the chapter "Monitoring Log Information."

## Main-Menu Menu Items

The Main Menu has the following menu items:

**Options**

Lets you view or set options that determine what resources are displayed on the Resource Display screen. Options include displaying resources:

- For a specific database
- Of specified types
- Of all types
- For a specific table

IPM provides pop-up help for each option listing available choices.

For more information on the Option menu item, see Option Selection Screen (see page 24).

**Help**

Displays help screens

**Quit**

Exits IPM

## Option Selection Screen

The Option Selection screen allows the runtime options to be viewed and changed while IPM is running. This screen can be selected from the Main Menu, Lock List Display, or Resource Display screens.

These options can also be specified on the command line when IPM is invoked with the ipm command.

The screenshot shows a window titled "INGRES IPM Option Selection - Currently set options." with a list of options and their current values:

Display null resources?	n	Display all resource types?	n
Display specified resource type?	n		
Display locks for one DB?	n		
Display locks for one table?	n		
Display Refresh (seconds)	0	Display systems locklists?	n
Display inactive transactions?	n		

At the bottom, there are buttons: OK, Cancel, Defaults, Help, and Quit.

Some options determine which resources are displayed when the Resource Display screen is refreshed. By specifying appropriate options, you can display detailed resource locking information down to the page level or a summary display of what databases are currently open.

The Option Selection screen has the following options:

### Display null resources?

By default, IPM suppresses display of granted null resources. (Granted null relation locks show what tables were referenced during the database session, that is, a granted null lock on a table indicates that a query was run against that table. Granted null locks do not block any access to the resource they are granted on.)

N is the default unless a resource type is specified.

If this option is set to Y, IPM displays any resources that are granted null and that qualify, based on other specified options.

### Display all resource types?

By default, IPM displays only database, table, and page resources. If this option is set to Y, all resource types are displayed.



**Display specified resource type?**

By default, IPM displays database, open database, table, and page resources. If this option is set to Y, enter the resource you are searching in the Type to display field. Resource types of interest include:

- Database
- Table
- Age
- Createtable

Other resource types exist. For a full list of resource types, see Resource Type (see page 14). To display a pop-up list, enter a (?) in the Type to Display field and press Return.

**Display locks for one DB?**

By default, IPM displays locks for all databases in the current installation. If this option is set to Y, enter the database in the Specify database field. To display a pop-up list, enter a (?) in the Specify database field and press Return.

**Display locks for one table?**

By default, IPM displays locks for all tables. If this option is set to Y, enter the table name in the Specify a table name field. You must also set the Display resources for one DB field to Y.

**Display Refresh (seconds)**

By default, IPM displays snapshots of your installation. If this option is set to a number greater than zero, IPM automatically refreshes the display. Select a number n between 1 and 999 to specify autorefresh (auto update) every n seconds on the Locking System Summary, Logging System Summary, and Logging System Header Display screens.

On autorefreshable screens, the state is displayed in the upper right-hand corner as one of the two following states:

- Autorefresh: Disabled
- Autorefresh: Enabled, n seconds

**Display system locklists?**

By default, IPM displays user lock lists only. A lock list with a status of NONPROTECT is usually a system lock list. If this option is set to Y, IPM also displays system lock lists.

**Display inactive transactions?**

By default, IPM displays active transactions only. A transaction with a status of INACTIVE is usually a system transaction and not displayed. User transactions that have issued only selects are INACTIVE. User transactions that have been committed but not journaled also have a status of INACTIVE. If this option is set to Y, IPM also displays inactive transactions.

## Change Options on the Options Selection Screen

To make changes to the Option Selection screen:

1. Use the cursor to move from field to field, and type your changes as desired.
2. Select the OK menu item.

Your changes are saved.

**Note:** Some options are incompatible with other options. For example, do not specify the display of all resource types and also the display of table resource locks for a table, because a table resource lock type is a subset of all resource types. If any saved options are incompatible, IPM displays an error message.

3. Select the Refresh menu item on the Lock List Display or Resource Display screens, if you were using these screens previously.

The search is rerun with the new search criteria.

## Option Selection Menu Items

The Option Selection screen has the following menu items:

### **OK**

Saves the options that are shown and returns to the previous screen.

### **Cancel**

Ignores any changes made to the options and returns to the previous screen.

### **Defaults**

Resets all options to the state when the IPM Option Selection screen was entered and do not return to the previous screen. At this point, any changes to the options can be made.

### **Help**

Displays the help screens.

### **Quit**

Exits IPM.

# Chapter 4: Monitoring Server Information

This section contains the following topics:

- [Server Information](#) (see page 27)
- [Server List Screen](#) (see page 27)
- [Server Detail Screen \(More Info\)](#) (see page 30)
- [Session List Screen](#) (see page 32)
- [Session Detail Screen \(More Info\)](#) (see page 36)
- [Detailed Process Information Screen \(VMS Only\)](#) (see page 39)

## Server Information

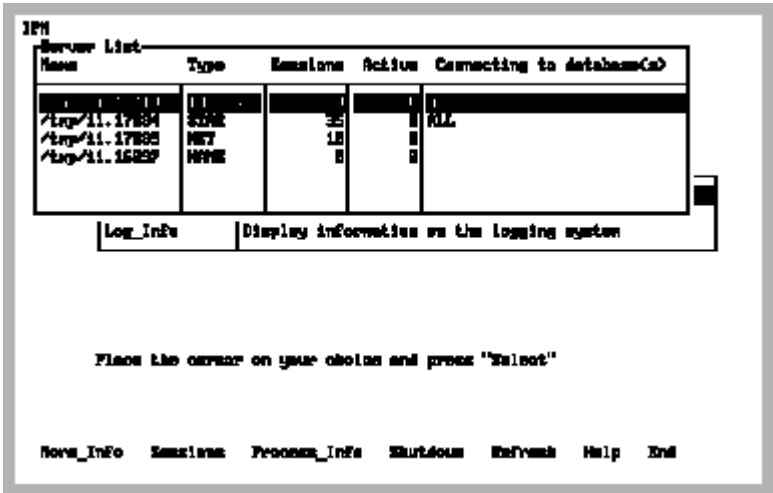
Server information displayed by IPM includes server lists, session lists, and related information.

A privileged user can terminate servers or sessions.

To review server information, select Server\_List from the Main Menu.

## Server List Screen

The Server List screen displays the servers registered with the Name Server.



The Server List screen contains the following fields:

**Name**

This field contains the name of the server.

**Type**

This field contains the type of server: Ingres DBMS Server, Ingres Star Server, Ingres Communications Server, or NAME (Name server, or GCN).

**Sessions**

This field displays the number of sessions in the server.

**Active**

This field contains the number of active sessions.

**Connecting to databases(s)**

This field indicates the databases that are accessible from this server. If your installation is running a server that was configured to connect to only certain databases (the `_dblist` server parameter), IPM lists each database (with the same server name) on a separate line. Otherwise, it displays ALL to indicate that this server can connect to any database in the current Ingres installation. If there are many databases or long database names, they can be displayed using the `More_Info` menu item.

## Server List Menu Items

The Server List screen contains the following menu items:

### **More\_Info**

Displays the Server Detail screen. The Server Detail screen contains more information for the server on which the cursor is positioned. This screen is available only for the Ingres DBMS Server and Ingres Star Servers.

For more information on this, see Server Detail Screen (More\_Info) (see page 30).

### **Sessions**


Displays the Session List screen. The Session List screen shows all of the sessions for the server on which the cursor is positioned. The information displayed includes the session name and session id. This screen is available only for the Ingres DBMS Server and Ingres Star Server.

For more information on this, see Session List Screen (see page 32).

### **VMS:**

#### **Process\_Info**

Displays the Detailed Process Information screen. The Detailed Process Information screen shows various job and process information (JPI) for the server on which the cursor is positioned. Such information includes CPU time, Direct I/O, Buffered I/O, Enqueue limit, and so on. This display automatically refreshes and can be selected for any server except the Name Server.

For more information on this screen, see Detailed Process Information Screen (VMS Only) (see page 39). 

### **Shutdown**

Displays a submenu that allows a privileged user to shut down a server normally or in an emergency. Only the Ingres DBMS Server or Ingres Star Server can be specified. Available choices are:

#### **Soft\_Shutdown**

Same as set server shutdown in iimonitor, Soft\_Shutdown is preferred, provided it is OK to wait until the current sessions end before the server stops. After this menu item is executed, the connection to the server is maintained and the submenu reappears. This allows the Hard\_Shutdown menu item to be selected, if desired. If IPM is connected to the server you are trying to shut down, you must exit from IPM for the shutdown to complete.

#### **Hard\_Shutdown**

Same as stop server in iimonitor. Use this instead of operating system commands like VMS stop or UNIX kill -9. Executing this menu item immediately stops the server and breaks out of the submenu.

### End

Drops the server connection after Soft\_Shutdown and returns to the Server List screen. After using this option, you cannot reconnect to the server.

### Refresh

Queries the Name Server for a list of servers. If there are none, IPM displays a message to that effect and returns to the Main Menu screen.

### Help

Displays help screens.

### End

Returns to the Main Menu screen.

### Quit

Exits IPM.

## Server Detail Screen (More\_Info)

The Server Detail screen displays information about a selected server.

To display detailed information on a server, position the cursor at a server in the Server List and select More\_Info from the Server List menu. The Server Detail pop-up is displayed. The boxed area shows the session count information.

IPM

Server List				
Name	Type	Sessions	Active	Connecting to database(s)
LP\COMSUF\998	NET	0	0	
LP\INGRES\c28	INGRES	19	3	ALL

Server Detail

Sessions	Current	Max
Total	19	54
Active	3	32

Name: LP\INGRES\c28  
Type: INGRES (DBMS Server)

Connecting to:  
all databases

on on the logging system

nd press "Select"

Refresh<SH-F1> Help<F1> End<F10> Quit<P6> :

The Server Detail Screen (More\_Info) screen displays the following information:

**Total current sessions**

Number of sessions connected to the specified server.

**Total maximum sessions**

Maximum number of sessions that the specified server can handle at any one time. This is equivalent to the server configuration parameter, `connected_sessions`.

**Active current sessions**

Number of sessions in a computable state. The server does not yet provide a count of the number of active transactions to IPM; therefore, this number is always 0.

**Active maximum sessions**

Maximum number of sessions that can be in a computable state. It is equivalent to the `active_sessions` server configuration parameter. This qualifier to the server startup command currently has no effect on the number of computable sessions allowed at any one time.

The maximum and active maximum sessions are determined at server startup.

**UNIX:** The Idle Quantums field is not displayed.

**VMS:** The amount of CPU used is displayed in terms of Quantums in the Idle Quantums field. As an example, a display of 324485/327697 indicates that there were 324,485 quantums idle out of 327,697 total quantums while this server was active.

## Server Detail Menu Items

The Server Detail screen has the following menu items:

**Refresh**

Queries the specified server for server detail information. If the specified server no longer exists, a message is displayed.

**Help**

Displays help screens.

**End**

Returns to the Server List screen.

**Quit**

Exits IPM.

## Session List Screen

The Session List screen appears when you select Sessions from the Server List screen. This pop-up screen displays the sessions for the selected server. The selected server is the one on which the cursor rests in the Server List.

IPM						
Server List						
Name	Type	Sessions	Active	Connecting to database(s)		
/tmp/11.16410	INGRES	70	0	startrack		
Session List						
ID	Name	TTY	Database	State	Facil	Query
2cc9c0	<idle job>			COM		
3053a0	<Fast Commit			LOG-IO		
306dc0	<Event Thread			LOCK		
3084c0	<Write Behind			LOCK		
11786e0	reaper	TTY01	factz	BIO		select * from wisdom
11c8a80	Freud	TTY01	info	BIO		
144b460	socrates	TTY04	greengro	BIO		
1b30040	bill	TTY04	windos	BIO		
1694040	ingres			BIO		
18be040	ted	batch	startrack	BIO		
More_Info DBA_Operations Refresh Find Help End Quit						

The Session List screen has the following columns:

### ID

Uniquely identifies the session.

### Name

Name of the session. This is a scrollable field; move the cursor to the field and use the arrow keys to see the entire contents.

Internal sessions are displayed with angle brackets <>. The bracketed internal sessions are available only if the option (Display Internal Sessions?) in the options panel is set to y. The default setting is n. Session names for user sessions are usually the same as the user name. (Both the user name and session name are shown under More\_Info).

### TTY

Terminal name, if known. Network and internal sessions do not show a terminal.

### Database

The database to which the session is currently connected.



**State**

State of the session. Use the Find menu item to search this column. The following states are shown. Note that these states are not identical in meaning for internal sessions, such as the Fast Commit Thread:

**BIO**

The session is waiting for client communications.

**COM**

The session is computable; it is not waiting for the user or for I/O.

**DIO**

The session is waiting for disk I/O.

**FREE**

The session is about to terminate.

**LOCK**

The session is waiting for another session to release locks. The wait continues until the other session completes its transaction.

**LOG-IO**

The session is waiting for output to the log file.

**MUTEX**

The session is waiting for another session to complete accessing an internal data structure. The wait continues only until the other session is done accessing.

**Facil**

The server facility currently handling the session. The More\_Info screen spells out the meaning of the facility acronym. Examples are:

**DMF**

Data Manipulation Facility

**OPF**

Optimizer Facility

**QEF**

Query Execution Facility

### Query

The first 24 characters of the query currently running is shown. This field is displayed only if the user running IPM is a privileged user.

The More\_Info screen shows more of the query. The query is shown only if it is current. A current query is one being processed by the Ingres DBMS Server, not a query that has returned results and finished executing, even though the user has not committed.

## Session List Menu Items

The Session List screen has the following menu items:

### More\_Info

Displays the Session Detail screen. This screen displays information about the selected session, indicated by the cursor position when this menu item is selected.

For more information on this, see Server Detail Screen (More\_Info) (see page 30).

### DBA\_Operations

Displays a submenu that allows a privileged user to delete the session on which the cursor is positioned.

The submenu choices are:

#### Delete

Removes session from the server. Any open transactions it has are rolled back.

#### Find

Same as Find menu item below.

#### End

Returns to the Session List screen.

**Caution!** *Do not remove internal sessions (marked with angle brackets <>). Removing an internal session must be used only as a last resort and only with assistance from Customer Support.*

*Removing an internal session can cause the loss of all uncommitted transactions and can prevent you from properly shutting down your Ingres installation.*

**Refresh**

Queries the specified server for a list of sessions and refresh the display. If the server no longer exists, a message is printed.

**Find**

Searches for matching values in any column in the scrolling area. Tab to the desired column and select Find.

For example, use Find to search for LOCK in the State column.

**Help**

Displays help screens.

**End**

Returns to the Server List screen.

**Quit**

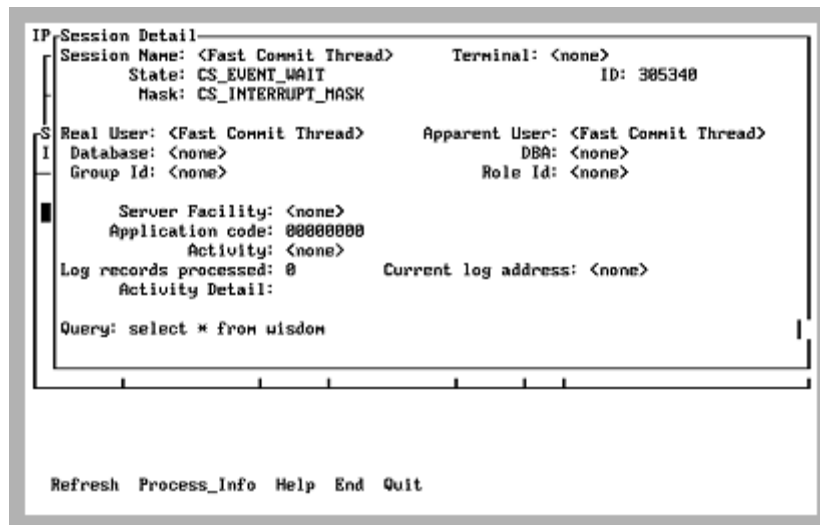
Exits IPM.

## Session Detail Screen (More\_Info)

The Session Detail screen displays detailed information for the selected session.

To display detailed information on a session, position the cursor at a session in the Session List and select More\_Info from the Session List menu. The Session Detail pop-up is displayed.

Session Name, Terminal, ID, Database, and Server Facility are the same as on the Session List screen. State is replaced by the expanded state and mask. The expanded state and mask expose details of the internal session state; those details are subject to change between Ingres releases and must be interpreted by qualified support personnel.



The Session Detail screen displays the following information:

### Real User, Apparent User

Usually identical. If the session was started with the -u flag to impersonate another user, the apparent user is the user who is being impersonated. For example, if privileged user, ted, started a session with the command `sql - ubill dbname`, the apparent user is bill and the real user is ted.

### DBA

The owner of the database (database administrator) to which the session is connected

### Group ID, Role ID

The group and role IDs, if any, for the current session. These features are part of the Knowledge Management Extension.

**Client PID**

Shows the client process ID (PID), which is displayed if the session is being run from a client that is local and interactive (as opposed to batch).

You can observe the client process's Job and Process (JPI) parameters using the Process\_Info menu item from the Detailed Process Information screen.

Appears on VMS.

**TID**

The internal thread ID (TID). TID is displayed in the Session Details screen when Ingres is using OS threads.

Appears on UNIX.

**Activity**

Current state of the session. Possible states are as follows:

**Aborting**

A normal abort is being performed (that is, the user issued a rollback, deadlock, and so on).

**Performing force abort processing**

An abort of an old transaction is in process.

**Aborting on behalf of an interrupt**

An abort is taking place due to an interrupt (Control C).

**Aborting on behalf of a terminating session**

An abort is taking place for a session that is terminating ungracefully.

**Terminating session**

A session is terminating normally.

**Fetching IIDBDB information**

A session that is starting up is retrieving iidbdb information. This can show up for extended periods due to locks on the iidbdb, or the logging system is full.

**Optimizing query**

The optimizer is at work.

**Waiting on event lock signal (LKevent)**

The Event Thread is usually in this state.

### **Log records processed, Current log address**

Number of log records processed and current log address being processed when the session is backing out the transaction due to any cause. This allows visual confirmation that the server is indeed doing work on the rollout. Periodic refreshes give a measure of the progress in performing the rollout.

Causes of backing out include:

- The rollback statement in SQL
- The session being removed
- Running out of log file space
- Deadlock

**Caution!** *The session that is being rolled out must never be removed, nor can the server containing that session be terminated in any way.*

### **Query**

The first 128 characters of the query currently running is shown. A current query is one being processed by the Ingres DBMS Server, not a query that has returned results and finished executing, even though the user has not committed. This field is active only if the user running IPM is a privileged user.

## Session Detail Menu Items

The Session Detail screen has the following menu items:

### Refresh

Queries the specified server for new session detail for the specified session and refresh the display. If the server or session no longer exists, a message is printed.

### Process\_Info

Valid on VMS.

Displays a screen that shows job-process information for the client that is being examined. The client process must be local and interactive (not in batch) for this option to work: a PID cannot be obtained for a session's client unless the client is tied to a terminal. Information displayed includes CPU time, Direct I/O, Buffered I/O, Enqueue limit, etc. This display automatically refreshes. For more information on process\_info menu item, see Detailed Process Information Screen (VMS Only) (see page 39).

### Help

Displays help screens.

### End

Returns to the Session List screen.

### Quit

Exits IPM.

## Detailed Process Information Screen (VMS Only)

The Detailed Process Information screen displays detailed job/process information on the selected process (usually a server). This screen is available on VMS only.

```

INGRES IPM - Detailed Process Information                               17:39:29.12
PID 28a02a83      Owner PID: 0      Terminal:
Name: 11_DBMS_KK_2A83  Acct Name: R6304  Username: FE_64

CPU Time: 0:00:13.97  PRI: 7 / 4  UIC: 1166 , 1  1  Process State: HIB
Image Name: $2$DUA36: [INSTALLATION.R6304.1]INGRES.B  Mode: OTHER
Subprocess Quota: 8

-- ASI Information --
Limit: 325      Remaining: 323
-- Lock Enqueue Information --
Limit: 38      Remaining: 27
-- Page File Information --
Limit: 40800      Remaining: 34798
-- Open File Information --
Limit: 75      Remaining: 71
-- Timer Queue Information --
Limit: 37      Remaining: 36

-- Buffered I/O Information --
Limit: 74      Remain: 73      Total: 621
BYILM: 66032      Byte Count Left: 66032
-- Direct I/O Information --
Limit: 37      Remain: 37      Total: 597
-- Memory Information --
Page Faults: 2594      Global Pg Cnt: 11
-- Working Set Information --
Default Size: 472      Current Size: 7222
Quota: 472      Extent: 49152      Peak: 5406
Auth Extent: 49152
Current # of pgs: 5395

Print_Screen Help End Quit

```

This screen helps you to determine if the quotas for the account that started this process are adequate.

The display is automatically refreshed. The Display Refresh field on the Options Display screen does not affect the refresh time of this screen.

When the process that is being monitored is deleted, an appropriate message is displayed in the upper left corner of the form. At any time, the current screen can be written to a file for later analysis. This display is useful for observing servers that are running large queries, MQTs (Multi Query Transactions), or users to ensure that there are sufficient operating system resources. For more information on JPI parameters, see the *VMS System Services Manual*.

## Display Detailed Process Information Screen

To display the Detailed Process Information screen, select Process\_Info from any of the following screens:

- Server Information:
  - Server List
  - Session's More\_Info (Session Detail)  
When this screen is invoked from the Session Detail screen, the client process information is displayed. This works only when the client process is local and interactive.
- Logging Information:
  - Log Info's Processes (Log Process Display)
  - Log Info's Transactions (Log Transaction Display)

When invoked from the Logging area of IPM, information is displayed for a server, recovery process (RCP), or archiver (ACP).

Place the cursor on the process you want displayed from the appropriate screen before selecting this menu item.



## Detailed Process Information Screen Fields

The detail process information screen contains the following information:

### **CPU Time**

The cumulative CPU time.

### **Process State**

The VMS process state.

### **Lock Enqueue Information**

The important value is the Remaining field. When this value reaches zero the server cannot acquire any more locks. This leads to errors or lock escalation, which implies table level locking. Lock escalation causes serious concurrency problems. This is relevant only for Ingres installations on VMS clusters that use the VMS Distributed Lock Manager (DLM).

### **Direct I/O Information**

The Total field shows how many cumulative direct I/O requests were made. This indicates how much disk I/O is being performed.

### **Page Faults**

Indicates if the working set sizes (also displayed) are sufficient.

### **Open File Information**

The Remaining field shows how many more files the process can open. On queries that touch many tables, on databases with journals and queries that contain aggregates, the File Limit Quota (FILLM) can be exceeded if not set at sufficient levels. For more information, see the *System Administrator Guide*.

## Detailed Process Information Menu Items

The Detailed Process Information screen has the following menu items:

### **Print\_Screen**

Captures the current screen's contents to a file. You are prompted for the file name. This stops the screen refresh while writing the screen out. When the screen is written to the file, the screen refresh resumes.

### **Help**

Displays help screens.

### **End**

Returns to the previous screen.

### **Quit**

Exits IPM.

# Chapter 5: Monitoring Lock Information

---

This section contains the following topics:

- [Lock Information](#) (see page 43)
- [Lock Info Menu Screen](#) (see page 44)
- [Locking System Summary Screen](#) (see page 46)
- [Display Locking System Summary](#) (see page 51)
- [Lock List Display Screen](#) (see page 52)
- [Lock Detail Display Screen](#) (see page 57)
- [Resource Lock Display Screen](#) (see page 60)
- [Blocking Lock Display Screen](#) (see page 62)
- [Resource List Display Screen](#) (see page 66)
- [Resource Detail Display Screen](#) (see page 70)

## Lock Information

Lock information displayed by IPM includes lock lists, locks by resource, and other related information. This information is useful for concurrency analysis and the tuning of a running system. Displays include the following:

### **Lock List Display**

Lets you locate concurrency bottlenecks.

### **Resource List Display**

Lets you gauge the amount of activity in a database, table or page.

### **Locking System Summary**

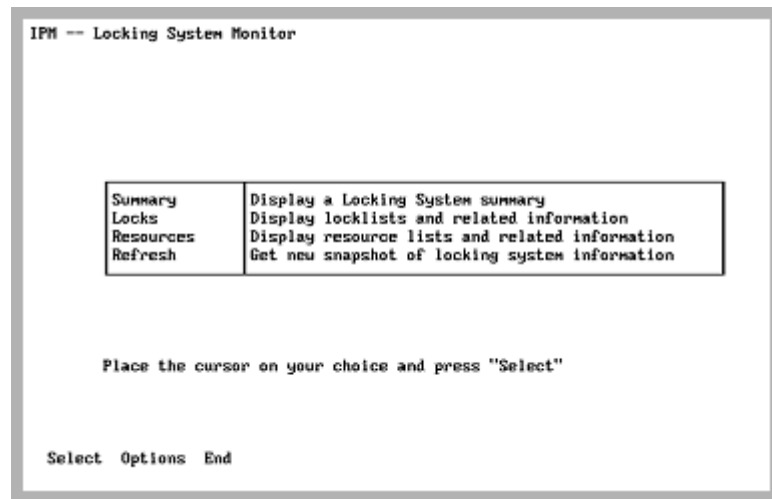
Lets you determine if the locking parameters specified at installation or configuration time are adequate.

To review lock information, select the Lock\_Info screen from the Main Menu.

## Lock Info Menu Screen

The Lock Info Menu screen appears when you select Lock\_Info from the Main Menu.

This screen is the top-level screen for IPM monitoring of the Ingres locking system.



From this screen, you can select various locking system parameters for monitoring, including a snapshot of the locking system. You may experience a delay as the system displays locking system parameters.

The options specified at IPM startup can be viewed on the Options selection screen. To specify the information that is obtained from the locking system, see Option Selection Screen (see page 24).

## Lock Info Selections

The Lock\_Info screen has the following selections:

### Summary

Displays the Locking System Summary screen. Information on the locking system is displayed (lock list activity, deadlock counts, and other data).

For more information on this screen, see Locking System Summary Screen (see page 46).

### Locks

Displays the Lock List Display screen. All lock lists in the locking system that meet the appropriate option selections are displayed.

For more information on this screen, see Lock List Display Screen (see page 52).

### Resources

Displays the Resource List Display screen. All resources of interest that have locks on them are displayed. The resources displayed depend on the setting of IPM options.

For more information on this screen, see Resource Lock Display Screen (see page 60).

### Refresh

Queries the locking system for locking information. Lock List and Resource information are obtained together to ensure a consistent snapshot of the locking system. After setting IPM options, select this menu item so the locking information reflects the set options.

For more information, see Option Selection Screen (see page 24).

## Lock Info Menu Items

The Lock Info Menu has the following menu items:

### Select

Selects the item on which the cursor is resting.

### Options

Displays the Option Selection screen. The current option settings are displayed. They can be modified and saved. If any options for lock lists or resources were changed, select the Refresh menu item.

For more information on this, see Option Selection Screen (see page 24).

### End

Returns to the Main Menu screen.

## Locking System Summary Screen

The Locking System Summary screen appears when you select Locking System Summary from the Lock Info Menu screen.

The data on this screen helps you to determine which locking parameters need to be adjusted.

```

INGRES IPM Locking System Summary      Autorefresh: Disabled

-----Lock list information-----
Created: 2392957      In use: 432
Released: 2392915    Remaining: 368
Total available: 410

-----Hash table sizes-----
Lock: 3887      Resource: 3887

-----Lock information-----
Requested: 5862986    Released: 2069925    In use: 380
Re-requested: 1344849    Cancelled: 1    Remaining: 18828
Converted: 65947      Escalated: 0    Total available: 19534

Deadlock search: 2    Deadlocks: 1    Convert units: 0
Convert deadlock: 0    Lock wait: 12

Locks/Transaction: 500

Refresh(SH-F1)  Interval(SH-F2)  Help(F1)  End(F10)  Quit(F6)  : _
  
```

Because there is currently no way to view all of the locking parameters used to configure the locking system, keep a record of the parameters in a prominent place when viewing this screen.

Use autorefresh when monitoring this information. The screen autorefreshes if the -r flag was specified at startup or the Display Refresh field on the Option Selection screen was changed to a number between 1 and 999 seconds. For more information, see Option Selection Screen (see page 24).

When tests or benchmarks are run, monitor the locking system activity during the test by selecting the Interval menu item and selecting the Start\_Now menu item. IPM displays the statistics accumulated since the start time.

If the Interval option was previously enabled, the start time and current time fields appear in the upper right-hand corner of the Locking System Summary screen. To reset the start time (which is the time when the Start\_Now menu item is selected), select the Interval menu item and the Start\_Now menu item.

The start time and statistics obtained at the start time remains unchanged until the Begin\_Now or Since\_Startup menu items are selected or the user exits IPM. This allows other functions (for example, logging, other locking, or server information) to be used while accumulating statistics. When the Locking System Summary screen is displayed at a later time, the running totals since the start time are not lost.

When displaying statistics over an interval, you must set the Autorefresh option. This causes the display to be automatically updated.

When this screen is displayed on VMS cluster installations, additional fields are displayed. For more information, see VMS Cluster Only Fields (VMS Only) (see page 49).

## Locking System Summary Fields

By observing the fields on the Locking System Summary, you can spot conditions when more locking system resources need to be made available. You reconfigure the locking system using `rcpconfig`. For more information, see the *System Administrator Guide*.

The Locking System Summary has the following fields:

### **Lock List Created**

The number of times a lock list was created on behalf of a server, session, or transaction.

### **Lock List Released**

The number of times a release of a lock list occurred on behalf of a server, session, or transaction.

### **Lock Lists in Use**

The number of lock lists in use by a server, session, or transaction.

### **Lock Lists Remaining**

The number of lock lists remaining to be used by a server, session, or transaction.

### **Lock Requested**

The number of new lock requests that the locking system processed.

### **Lock Rerequested**

The number of times an implicit lock conversion request was issued on a resource that the lock list already had locked. Implicit lock conversions can occur when a request is made on a page for update that was previously requested for read.

### **Lock Converted**

The number of times an explicit lock conversion request is made to change a lock mode on a physical lock from one mode to another. These types of requests occur as a result of a physical lock being converted during an existing transaction to lower or higher modes.

**Lock Released**

The number of times a specific logical lock is released, as opposed to a full, partial, or physical lock release.

**Lock Cancelled**

The number of times a lock request was cancelled due to a timeout or interrupt.

**Lock Escalated**

The number of times a partial release occurred to allow escalation of lock granularity from page to table level.

**Locks in Use**

The number of locks in use by a server, session, or transaction.

**Locks Remaining**

The number of locks remaining to be used by a server, session, or transaction.

**Total available**

The total sum of resources in use, locks in use, and locks remaining

**Deadlock search**

The number of times a deadlock search was initiated.

**Deadlock**

The number of times that deadlock existed.

**Convert wait**

The number of times an existing lock waited for conversion to a different lock mode.

**Convert deadlock**

The number of times a request for conversion turned into a deadlock.

**Lock Wait**

The number of times a new lock request had to wait to be granted.



## VMS Cluster Only Fields (VMS Only)

The following shows the Locking System Summary as it appears when IPM is running on a VMS cluster installation.

INGRES IPM Locking System Summary				Autorefresh: Disabled	
Lock list information				Hash table sizes	
Created:	76	In use:	9	Lock:	436
Released:	67	Remaining:	73	Resource:	436
		Total available:	82		
Lock information				Resources in use: 325	
Requested:	1295	Released:	786	In use:	326
Re-requested:	13	Cancelled:	0	Remaining:	1533
Converted:	702	Escalated:	0	Total available:	2184
				Locks/Transaction:	80
Deadlock search:	0	Deadlock:	0	Lock wait:	0
Convert deadlock:	0	Convert wait:	0		
Global Locking Information					
Enqueue: 2810			Dequeue: 969		
Deadlock search pending:	0		Deadlock:	0	
Lock grant before search:	0		Deadlock search requests:	0	
Deadlock search calls:	0		Deadlock messages sent:	0	
Can't deadlock search calls:	0		Can't deadlock messages sent:	0	
Unsent deadlock search requests:	0		Sent all deadlock search requests:	0	
Refresh Interval Help End Quit					

The Global Locking Information box appears only in VMS cluster installations. The fields in this area are as follows:

### Enqueue

The number of times the VMS lock manager was called to map Ingres locks onto their VMS counterparts through the use of VMS system calls.

### Dequeue

The number of times the VMS lock manager was called to dequeue VMS locks using VMS system calls that occurred as a result of a change in status of the corresponding Ingres lock.

### Deadlock search pending

The number of pending global deadlock search requests.

### Deadlock

The number of global deadlocks that occurred.

### Lock grant before search

The number of global locks that were granted without contention as a result of the lock request.

### Deadlock search requests

The number of times a global deadlock search was initiated.

### Deadlock search calls

The number of times the Cluster Server Process (CSP) requested deadlock search information.

**Deadlock messages sent**

The number of times a global deadlock message was built up and sent.

**Con't deadlock srch calls**

The number of times a continue global deadlock search request was issued in response to an unresolved global contention problem.

**Con't deadlock msgs sent**

The number of continue global deadlock search messages that were sent due to an unresolved global contention problem.

**Unsent deadlock srch rqsts**

The number of unsent global deadlock search messages found.

**Sent all deadlock srch rqsts**

The number of times that global deadlock search requests were more than 50% of the total number of transactions.

## Locking System Summary Menu Items

The Locking System Summary has the following menu items:

**Refresh**

Queries the locking system for locking summary information. Even if the autorefresh option is set, this menu item can still be selected at any time.

**Interval**

Sets a start time to begin measuring locking summary information. Otherwise, the information displayed is activity since the locking system was started.

For more information on this menu item, see Interval Option (Locking System Summary) (see page 51).

**Help**

Displays help screens.

**End**

Return to the Lock Info Menu.

**Quit**

Exits IPM.

## Interval Option (Locking System Summary)

The Interval menu item displays a submenu that allows a start time to be set. This allows display of summary information that occurred since the selected start time. Choices available from the submenu are:

### Since\_Startup

Fields displaying cumulative statistical data reflect activity from initial Ingres startup. This is the default mode when starting IPM. Current and Start time fields are not displayed.

### Begin\_Now

Enables the Interval option and sets a new baseline for cumulative statistical data. Screens displaying cumulative statistical information display Current Time and Starting Time in the upper right hand corner, giving the current bounds of the interval.

### End

Returns to the previous menu.

When the Interval option is enabled, the following screen is displayed:

The screenshot displays the 'INGRES IPM Locking System Summary' screen. At the top, it shows 'Automatic: Disabled', 'Current Time: 11:00.00', and 'Start Time: 10:50.00'. Below this, there are several sections of data:

- Lock Time Information:**
  - Created: 678221
  - Released: 678221
  - In use: 115
  - Remaining: 205
  - Total available: 400
- Lock Table Status:**
  - Locks: 15013
  - Requested: 15013
  - Released: in use: 363
- Lock Information:**
  - Requested: 2949679
  - Released: 2545781
  - In use: 462
  - Remaining: 74175
  - Converted: 151051
  - Executed: 25859
  - Total available: 75000
- Deadlock Search:**
  - Deadlock search: 829
  - Deadlocks: 3
  - Convert wait: 7
  - Lock wait: 829
- Lock Transaction:** 200

At the bottom, there is a navigation bar with the following options: Refresh, To Lock, Help, End, Quit.

## Display Locking System Summary

### To display a summary of locking information

Select the Locking System Summary screen from the Lock Info Menu screen.

The Locking System Summary screen is displayed.

## Lock List Display Screen

The Lock List Display screen appears when you select Locks from the Lock Info Menu screen.

This screen displays all lock lists for current user transactions in the Ingres locking system on the current machine for the current installation. Lock lists that belong to user transactions also have an associated session name displayed.

It is useful to view locks by lock list to see what transactions are currently active. Use this screen to locate transactions that cannot proceed because they are blocked by another transaction.

This screen contains an entry for each lock, as shown in this example:

IPM -- Locking System Monitor

Lock List Display

TD	Session	Count	Logical	Info	Status
08000	bill	2	1	08	ENQWAIT
08000	bill	5	5	08	ENQWAIT

Refresh More Info Examine Block Info Options Find Help and Quit

System lock lists (NONPROTECT) are not displayed unless the "Display system locklists" option is set or the -e flag is specified on the command line.

**VMS:** If the status is ENQWAIT, the lock list in question is waiting for a resource locked by another Ingres user on another node in the VMS cluster. In this case, invoke IPM on the other nodes and search for a lock list holding locks on the resource in contention.

To view the locks for a given lock list, select the Examine menu item. The submenu that appears displays all locks for a particular lock list.

By selecting the Options menu item, you can change the IPM options. The only option that affects this screen is the Display empty locklists option. If any options were changed for lock lists or resources, select the Refresh menu item. For more information, see Option Selection Screen (see page 24). ▣

## Find Waiting Locks

Each transaction is represented in the Lock List Display screen by a lock list. The session name (if any) is also displayed.

### To find waiting lock lists

1. Tab to the Status column and select the Find menu item.

The Find prompt appears.

2. Type **WAIT** and press the Return key.

If there are any lock lists with blocked locks, place the cursor on that lock list.

## Lock List Display Fields

The Lock List Display has the following columns:

### ID

Internal lock list identifier.

### Session

The name of the session or <none>. Only lock lists belonging to user transactions have session names.

### Count

The total number of locks on the list currently.

### Logical

The number of logical locks on the list currently.

### MaxL

The total number of logical locks allowed on this list. For user transactions, this is the maximum number of locks per lock list. Some internal lock lists that contain physical locks exceed this number.

### **Status**

State of the lock list when the locking information was obtained. Values include:

#### **WAIT**

Waiting for a lock. This indicates a blocked lock. Use the Block\_Info menu item to find the blocking lock.

#### **NONPROT**

Can be released without going through recovery (system lock lists only).

#### **ORPHAN**

Lock list remaining without transaction.

#### **EWAIT**

Waiting on a system event.

#### **RECOVER**

Lock list taken over by the recovery process.

#### **MASTER**

Lock list owned by the recovery process.

#### **ESET**

Lock list set on wait queue for event.

#### **EDONE**

Event that the lock list is waiting on is done.

#### **NOINT**

Lock requests on this list are non-interruptible.

The following statuses apply only on VMS cluster installations:

#### **ENQWAIT**

Waiting for VMS lock request.

#### **G\_DEADLOCK\_SEARCH**

Global deadlock search in progress.

#### **STALL\_ENQ**

Lock requests are stalled for node failure recovery.

## Lock List Display Menu Items

The Lock List Display has the following menu items:

### **Refresh**

Queries the Ingres locking system for locking information. Lock List and Resource information are obtained together to ensure a consistent snapshot of the locking system. After setting IPM Options, select this menu item so the locking information reflects the current options. For more information, see Option Selection Screen (see page 24).

### **More\_Info**

Displays a pop-up screen with additional information on the selected lock list.

For more information on this pop-up screen, see Lock List Display More\_Info Screen (see page 56).

### **Examine**

Displays the Lock Detail Display screen, which displays all locks in the selected lock list. If table names must be retrieved, a delay may occur because a database must be opened.

For more information on this screen, see Lock Detail Display Screen (see page 57).

### **Block\_Info**

Displays the Blocking Lock Display screen if the selected lock list contains a lock that cannot be granted. The lock that is blocking a lock in the current lock list is displayed, as well as all other locks on that given resource.

For more information, see Blocking Lock Display Screen (see page 62).

If this menu item is selected and the current lock list does not have any locks waiting (to be granted), a pop-up message to that effect is displayed.

### **Options**

Displays the Option Selection screen. The current option settings are displayed. Various options can be modified and saved.

### **Find**

Searches a column in a scrolling region (tablefield). If searching a text column, Find locates all occurrences in the column. To locate the next occurrence of your previous search, enter (.).

### **Help**

Displays help screens.

**End**

Returns to the Lock Info Menu screen.

**Quit**

Exits IPM.

**Lock List Display More\_Info Screen**

When the More\_Info menu item is selected from the Lock List Display, a pop-up containing additional fields for the specified lock list is displayed.

```
IPM -- Locking System Monitor
+Lock List Display+
+-----+-----+-----+-----+-----+
| ID      | Session | Count | Locks | MaxL | Status |
|-----|-----|-----|-----|-----|-----|
| 32000a | Ingres  | 1     | 0     | 250  | <none> |
+-----+-----+-----+-----+-----+
+More Info+
+-----+-----+-----+-----+
| Transaction ID: 4ae04b7e1649 |
| Related Lock List ID: 380003 | Count: 0 |
| Waiting Resource List ID: 0 |
| Session ID: 7fca47542200 PID: 3207 |
+-----+-----+-----+-----+
| | | | | |
| | | | | |
| | | | | |
+-----+-----+-----+-----+
End<F10> :  
```

The additional fields are:

**Transaction ID**

Transaction identifier associated with this lock list. This value corresponds to the External TX ID column on the Log Transaction Display screen. For more information, see Log Transaction Display Screen (see page 98).

**Related Lock List ID**

Related lock list identifier, if not a transaction lock list

**Count**

Number of related lock list identifiers that this lock list must assure are released before this lock list can be released

**Waiting Resource List ID**

Internal resource block identifier of the lock that is currently blocked

**Internal Session ID**

Internal session ID number

**External OS Process ID**

External operating system process ID number



## Lock Detail Display Screen

The Lock Detail Display screen pops up when you select the Examine menu item from the Lock List Display screen. This screen contains the individual locks for the selected lock list or all locks for all lock lists.

ID	Session	Count	Logical	Mode	Status
dc0009	111	2	1	WT	WT

ID	IPM	State	Lock type	DB Table	Pg
dc0009	X	WT	Table	demo. table: posting9	267
dc0009	X	WT	Page		

More\_Info Resource\_Info Print Help Exit Quit

Database and table names are shown for table and page type locks. If a database cannot be opened or if IPM is running in stand-alone mode (-s flag), the table ID is displayed instead of the table name. The table is identified by the reloid and reloidx values in the irelation catalog.

If this screen is displaying the locks for a particular lock list, IPM displays locks in the order in which they were acquired by the session to which the lock list belongs.

The Lock Detail Display has the following fields:

### ID

Internal lock ID

### RQ

Mode in which the lock was requested. For possible values, see Mode Values (see page 61).

### State

Current state of the lock:

- GR = granted
- WT = waiting
- PHY = this lock is a physical lock).

This column scrolls, so additional information can be displayed to the right of the visible part. Use the arrow keys to scroll the column.

**Lock Type**

Type of resource. For a list of resource types, see Resource Type (see page 14).

**DB Table-Pg**

The resource key on which this lock is held. Typically a database name, table name, and page on which this lock is held, but format can vary depending on the Lock Type. The values are justified and formatted for ease of reading.

## Lock Detail Display Menu Items

The menu items on the Lock Detail Display screen are:

**More\_Info**

Place the cursor on the desired lock and select this menu item. Additional information for that lock is displayed on a pop-up screen.

For more information on this screen, see Lock Detail Display More\_Info Screen (see page 59).

**Resource\_Info**

All locks for the resource on which the cursor rests are displayed on the Resource Lock Display screen, providing useful information about the number of other sessions that have a lock on that resource. For example, you can see what other locks are held for page 0 in table foo. Other information displayed includes the session name (if any).

For more information on this screen, see Resource Lock Display Screen (see page 60).

**Find**

Searches a column in a scrolling region (tablefield). If searching a text column, Find locates all occurrences wherever they are in the column. To locate the next occurrence of your previous search, enter (.).

**Help**

Displays help screens

**End**

Returns to the Lock List Display screen

**Quit**

Exits IPM

## Lock Detail Display More\_Info Screen

When the More\_Info menu item is selected from the Examine submenu, a pop-up containing additional fields for the specified lock is displayed.

IPM -- Locking System Monitor

Lock List Display

ID	Session	Count	Logical	MaxL	Status
e0002	bill	2	1	80	UNIT

Lock Detail Display

ID	RQ	State	Lock Type	DB Table	Pg
dc0003	IX	GR PHV	Table	demo. TABLE: posting89	267

More Info

Resource List ID: 3d001d  
 VMS Lock ID: <n/a>  
 VMS Lock ID Value: <n/a>

End

The additional fields are described in the following table.

### Resource List ID

The Internal Resource block identifier to which this lock belongs

### Distributed Lock ID

The distributed lock ID assigned to this Ingres lock.

Appears on VMS and UNIX cluster installations only.

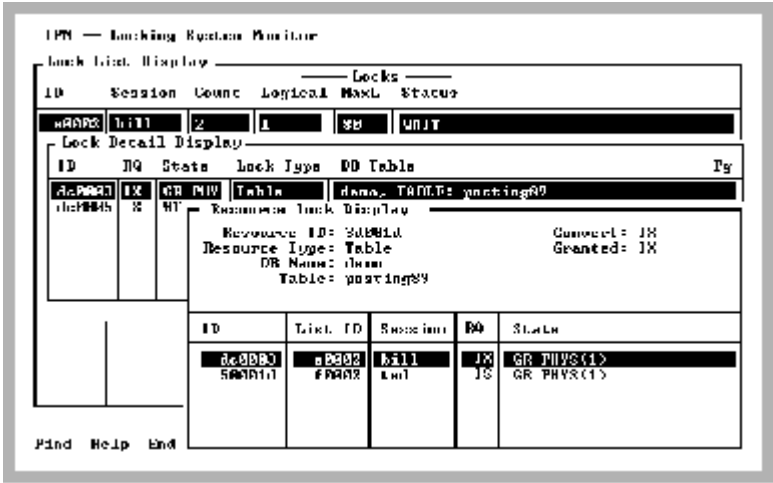
### Distributed Lock ID value

The value contained in the VMS lock assigned to this Ingres lock.

Appears on VMS and UNIX cluster installations only.

## Resource Lock Display Screen

The Resource Lock Display screen is displayed when you select Resource\_Info from the Lock Detail Display screen. All the locks held on the resource related to the lock specified on the Lock Detail Display screen are displayed.



If the specified lock belonged to page 0 of the foo table, the Resource Lock Display screen displays all locks held on that same resource (page 0, foo table).

For example, if the specified lock is a table lock, it is useful to see what other locks are held on that table because it is an indication of how much activity is occurring there.

The Resource Lock Display has the following items:

### Resource ID

Resource block identifier of the resource on which the blocking lock is held

### Resource Type

Type of resource. For a list of resource types, see Resource Type (see page 14).

### Convert

Mode to which this resource is converting. For a list of possible modes, see Mode Values (see page 61).

### Granted

Mode in which this resource is granted. For a list of possible modes, see Mode Values (see page 61).

**DB Name**

Name of the database

**Table**

Table name to which this resource belongs. If the resource is not a table or page resource type, this field does not appear.

**Page**

Page number of this resource. If the resource is not a page resource type, this field does not appear.

## Mode Values

Possible mode values that can appear in locking displays (for example, in the Convert and Granted fields of the Resource Lock Display) are as following:

**S (Shared)**

This mode is used when reading.

**IS (Intent shared)**

For table resource types, this means that there are shared page locks in this table.

**Note:** This lock strength can be seen on pages if row level locking is used.

**X (Exclusive)**

This mode is used when writing.

**IX (Intent exclusive)**

This is same as intent shared, except pages are exclusively locked.

**Note:** This lock strength can be seen on pages if row level locking is used.

**N (Null)**

Used to keep a lock without causing locking contention. It is less expensive to convert a lock than to drop and request a new one.

**SIX (Shared with intent to update)**

This mode is used with Embedded SQL cursors.

## Resource Lock Display Menu Items

The Resource Lock Display has the following menu items:

### Find

Searches any column in the scrolling area. To initiate the search, tab to the desired column and select Find. If you are searching a text column, Find locates all occurrences in the column.

### Help

Displays help screens.

### End

Returns to the Lock Detail Display screen.

## Blocking Lock Display Screen

The Blocking Lock Display screen appears when you select Block\_Info from the Lock List Display screen. This screen helps locate bottlenecks in the database.

The screenshot shows the 'Blocking Lock Display' screen. At the top, it says 'TPM - Locking System Monitor'. Below that is a header 'Lock List Display' with a sub-header 'Locks'. The main area is divided into two sections. The top section shows session details for a selected session (ID: 278884, Session: 6, Count: 1, Logical Max: 30, Status: WAIT). The bottom section is a table with columns: TD, List TD, Session ID, ID, and State. The table contains two rows of data. At the bottom of the screen, there are three buttons: Find, Help, and End.

ID	Session	Count	Logical Max	Status
278884	6	1	30	WAIT

TD	List TD	Session ID	ID	State
278884	278884	6	6	GR
278885	278885	6	6	WT

If there are tables where concurrent access is not occurring (that is, much waiting is occurring because a database session is performing table level locking or has page locks that escalate to table level locks), Block\_Info finds the lock that is granted on a resource for which another lock is waiting.

For example, if there is a lock list that is blocked (waiting or converting). The granted lock is known as a blocking lock because it is blocking access to a resource. Block\_Info finds the blocking lock. It is either be a granted page lock on the same page or a granted table lock on the table that contains the page. All locks that are found are displayed in the scrolling area in the bottom area of the pop-up. The upper portion of the pop-up contains information on the selected resource. The first lock in the scrolling area is the blocking lock. All other (waiting) locks are displayed below it.

## Look for Concurrency Bottlenecks

The Blocking Lock Display helps locate bottlenecks in the database.

### To look for concurrency bottlenecks

1. Run IPM on the desired database, and display the Lock List Display.
2. Tab to the Status column and select the Find menu item.

The String to search for prompt appears.

3. Enter **WAIT**.
4. Select the Block\_Info menu item if a waiting lock list is found.

The blocking lock is found if it is in the locking system in the current installation on the machine where IPM is running.

**Note:** If you are searching for a lock on another node in the cluster, the lock may not be visible on the current node. To find the lock, run IPM on the other nodes.

## Blocking Lock Display Fields

The Blocking Lock Display includes the following information:

**Resource ID**

Resource block identifier of the resource that the blocking lock is held on

**Resource Type**

Type of resource. For a list of resource types, see Resource Type (see page 14).

**Convert**

Mode to which this resource is converting. For a list of possible modes, see Mode Values (see page 61).

**Granted**

Mode in which this resource is requested. For a list of possible modes, see Mode Values (see page 61).

**DB Name**

Name of the database.

**Table**

The table name to which this resource belongs. If the resource is not a table or page resource type, this field does not appear.

**Page**

Page number of this resource. If the resource is not a page resource type, this field does not appear.



## Scrolling Area (Blocking Lock Display)

The scrolling area in the Blocking Lock Display contains the following columns:

**ID**

Internal lock identifier for this lock

**List ID**

Internal lock list identifier to which this lock belongs

**Session**

Name of the session to which this lock belongs

**RQ**

Mode in which the lock was requested. For a list of possible modes, see Mode Values (see page 61).

**State**

Current state of the lock:

- GR = granted
- WT = waiting

## Blocking Lock Display Menu Items

The Blocking Lock Display has the following menu items:

**Find**

Searches any column in the scrolling area. To initiate the search, tab to the desired column select Find. If you are searching a text column, Find locates all occurrences in the column.

**Help**

Displays help screens.

**End**

Returns to the previous menu.

## Resource List Display Screen

The Resource List Display screen appears when you select Resources from the Lock Info Menu screen. This screen contains an entry for each resource that has one or more locks granted or requested on it.

IPM -- Locking System Monitor						
Resource List Display						
Id	GR	CU	Lock Type	DB	Table	Page
2c0005	IX	IX		Database	deno	
2c0007	N	X		DB_TBL_ID	deno	
3d001d	IX	IX		Tables	posting89	
780004	S	S		Page		267
740002	S	S		Page		269
e00001	S	S		Page		270
de0001	S	S		Page		271
720001	S	S		Page		1367

Refresh More\_Info Examine Find Help End Quit

The information displayed is sorted by database. Page and row resources are listed under the table resource to which they belong (for example, all pages for table x in database test are listed under the entry for table x). The Database name is left-justified in the DB-Table-Page column. The database name is printed only when it changes. The same applies for table names. Table names are indented 5 spaces.

This screen allows high traffic areas to be found. If there is much page locking in a given table and there are many page type entries under the table entry of interest, select the Examine menu item by placing the cursor on the table entry of interest.

For example, to see what and how many locks are on table test, place the cursor on that table resource entry and select the Examine menu item. When the Lock Detail Display screen appears, there is one lock for each session touching the test table. If many locks are displayed, it is an indication that this table is a potential contention source (for example, any session attempts to lock the table shared or exclusive).

If a database cannot be opened to display table names, IPM displays <can't find [x, y]> instead. The x is the reltid of the table and y is the reldidx of that table ("reltid" and reldidx are columns in the iirelation catalog).

When a database cannot be opened, the possible reasons are given below:

- The database is locked exclusively by another session.
- Another user is accessing that database using a server started up with the -sole or /sole option.
- IPM is being run in stand-alone mode (**-s** option).

By selecting the Options menu item, you can view or modify various IPM options that affect which resources are displayed. To use this menu item, see Option Selection Screen (see page 24).

Selecting the Refresh menu item after changing the options collects resource information based on the new option settings.

It is not necessary to select the Refresh menu item when the options you have changed result in a subset of the resource information currently displayed.

For example, all resources for database test are selected based on the previous options. If the new option settings select only a specific resource type for that database, return to the Lock Info Menu and select the Resources menu item.

## Resource List Display Fields

Columns in the Resource List Display screen are:

### **Id**

The internal resource block identifier

### **GR**

The mode in which this resource is granted. For a list of possible modes, see Mode Values (see page 61).

### **CV**

The mode to which this resource is converting. For a list of possible modes, see Mode Values (see page 61).

### **Lock Type**

The type of resource. For a list of resource types, see Resource Type (see page 14).

### **DB Table-Pg**

The database name, table name or page that identifies this resource. The values are justified and formatted for ease in reading.

## Resource List Display Menu Items

The menu items available on this screen are:

### **Refresh**

Queries the Ingres locking system for locking information. Lock List and Resource information are obtained together to ensure a consistent snapshot of the locking system. After setting IPM Options, select this menu item so the locking information reflects the options you set. For more information, see Option Selection Screen (see page 24).

### **More\_Info**

Place the cursor on the desired resource and select this menu item. Additional information for that resource is displayed on a pop-up screen (including the number of physical locks).

For more information on this screen, see Resource List Display More\_Info Screen (see page 69).

### **Examine**

Place the cursor on the desired resource and select this menu item. The Resource Detail Display screen is displayed. It contains information for all locks on that resource. Other information, such as the session name, is also shown.

For additional information on this screen, see Resource Detail Display Screen (see page 70).

### **Find**

Searches any column in the scrolling area. To initiate the search, tab to the desired column and select Find. If you are searching a text column, Find locates all occurrences in the column.

### **Help**

Displays help screens

### **End**

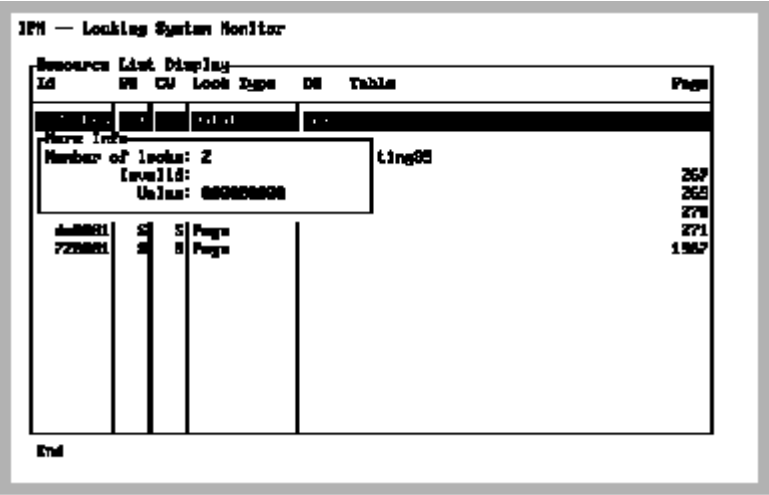
Returns to the Lock Info Menu screen

### **Quit**

Exits IPM

Resource List Display More\_Info Screen

When the More\_Info menu item is selected from the Resource List Display, a pop-up containing additional fields for the specified resource is displayed.



The additional fields are:

Number of locks

The number of physical locks held on this resource

Invalid

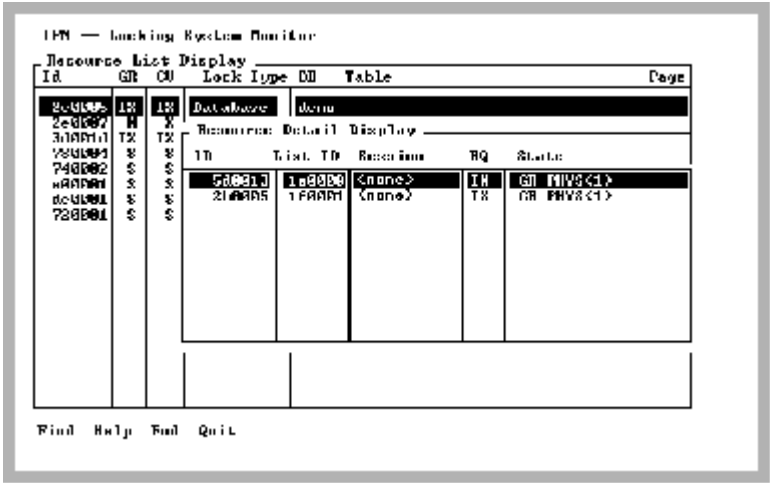
Indicates if the value is valid or not

Value

The lock value associated with this resource

## Resource Detail Display Screen

The Resource Detail Display screen pops up when you select the Examine menu item from the Resource List Display screen. This screen displays all the locks held on the specified resource.



The number of locks held on a resource indicates the amount of concurrent activity and points to potential concurrency bottlenecks.

## Resource Detail Display Fields

The Resource Detail Display has the following information:

**ID**

The internal lock identifier for this lock

**List ID**

The internal lock list identifier to which this lock belongs

**Session**

The name of the session to which this lock belongs

**RQ**

The mode in which this lock was requested. For a list of possible modes, see Mode Values (see page 61).

**State**

The current state of the lock:

- GR = granted
- WT = waiting

## Resource Detail Display Menu Items

The Resource Detail Display has the following menu items:

### **Find**

Searches any column in the scrolling area. To initiate the search, tab to the desired column and select Find. If you are searching a text column, Find locates all occurrences in the column.

### **Help**

Displays help screens.

### **End**

Returns to the Resource List Display screen.

### **Quit**

Exits IPM.





# Chapter 6: Monitoring Log Information

---

This section contains the following topics:

- [Log Information](#) (see page 73)
- [Log Info Menu Screen](#) (see page 73)
- [Logging System Summary Screen](#) (see page 75)
- [Logging System Header Screen](#) (see page 82)
- [Log Process Display Screen](#) (see page 92)
- [Log Database Display Screen](#) (see page 95)
- [Log Transaction Display Screen](#) (see page 98)

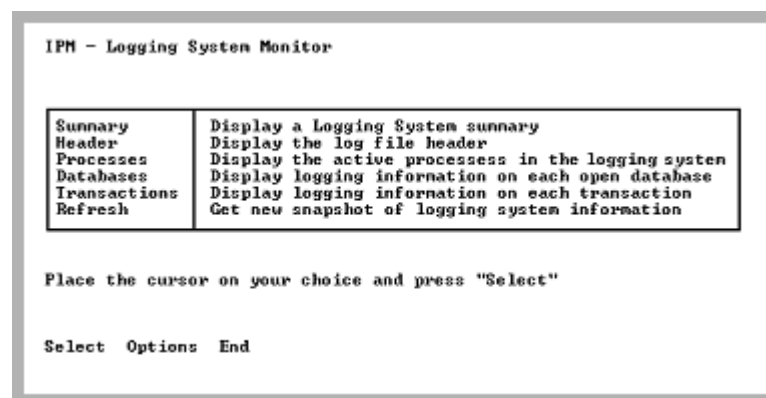
## Log Information

Log information displayed by IPM includes log summary information, header information, log processes, transactions, and databases. You can use the information for logging system analysis and tuning, and for determining if the log file size is adequate. Other logging system parameters set at installation or configuration time can be compared against the Logging System Summary screen to see if they are sufficient.

To review log information, select the Log\_Info screen from the Main Menu.

## Log Info Menu Screen

The Log Info Menu screen appears when you select Log\_Info from the Main Menu. This screen is the top-level screen for IPM monitoring of the Ingres logging system.



The Log Info menu has the following selections:

**Summary**

Displays the Logging System Summary screen. Information on the logging system is displayed (transactions started and finished, Log I/Os, and other data).

For more information on this screen, see Logging System Summary Screen (see page 75).

**Header**

Displays the Logging System Header screen. Information shown includes force abort and log full points and a diagram showing log file usage and percent full.

For more information on this screen, see Logging System Header Screen (see page 82).

**Processes**

Displays the Log Process Display screen. This screen contains a list of all processes in the Ingres installation (Ingres DBMS Server(s) and archiver and recovery processes).

For more information on this screen, see Log Process Display Screen (see page 92).

**Databases**

Displays the Log Database Display screen. This screen contains a list of all databases currently in the logging system.

For more information on this screen, see Log Database Display Screen (see page 95).

**Transactions**

Displays the Log Transaction Display screen. This screen contains a list of all transactions currently in the logging system.

For more information on this screen, see Log Transaction Display Screen (see page 98).

**Refresh**

Queries the logging system for logging information. Process, database, and transaction information are obtained together to ensure a consistent snapshot of the logging system.

## Log Info Menu Items

The Log Info menu screen contains the following menu items:

### Select

Selects the item on which the cursor is resting.

### Options

Displays the Option Selection screen. The current option settings are displayed. They can be modified and saved.

For more information on this screen, see Option Selection Screen (see page 24).

### End

Returns to the Main Menu.

## Logging System Summary Screen

The Logging System Summary screen appears when you select Summary from the Log Info Menu screen.

The data on this screen helps you to determine which logging parameters need to be adjusted.

```

IPM - Logging System Summary
Autorefresh: Disabled

INGRES IPM Logging System Summary
Database adds: 15
Database removes: 8
Transaction begins: 36
Transaction ends: 29
Logs writes: 17
Log write I/O's: 11
Log read I/O's: 0
Log waits: 68
Log split waits: 0
Log free waits: 0
Log stall waits: 0
Log forces: 0
Check commit timer: 148251
Timer write: 0
Log group commit: 11
Log group count: 11
Kbytes written: 5
Inconsistent DB: 0

Refresh Interval Help End Quit

```

Because there is currently no way to view all of the logging parameters used to configure the logging system, keep the parameters in a prominent place when viewing this screen.

This screen automatically refreshes the information if the -r flag was specified at startup or the Display Refresh field on the Option Selection screen was changed to a number between 1 and 999 seconds. For more information, see Option Selection Screen (see page 24).

When tests or benchmarks are run, monitor the locking system activity during the test by selecting the Interval menu item and selecting the Start\_Now menu item. IPM displays the statistics accumulated since the start time.

In addition, if the Interval option was previously enabled, the start time and current time fields appear in the upper right-hand corner of the Logging System Summary screen. To reset the start time (which is the time when the Start\_Now menu item is selected), select the Interval menu item followed by the Start\_Now menu item.

The start time and statistics obtained at the start time remains unchanged until the Begin\_Now or Since\_Startup menu items are selected or the user exits IPM. This allows other functions (for example, locking, other logging, or server information) to be used while accumulating statistics. When the Logging System Summary screen is displayed at a later time, the running totals since the start time are not lost.

When displaying statistics over an interval, you must set the Autorefresh option, which causes the display to be automatically updated.

## Logging System Summary Fields

The Logging System Summary screen has the following fields:

### **Database adds**

The number of databases added to the logging system.

### **Database removes**

The number of databases removed from the logging system. This means the last user of a database has disconnected from Ingres. The number of databases currently open is the difference between Database adds and Database removes.

### **Log writes**

The number of log writes. This is a memory-to-memory write.

**UNIX:** Shows the number of log writes into shared memory.

**VMS:** Shows the number of log writes into the non-paged pool.

### **Log write I/O's**

The number of write I/Os actually done to the log file. This is a physical write.

### **Log read I/O's**

The number of read I/Os actually done to the log file. This is a physical read.

### **Log forces**

The number of log force requests. These occur under the following circumstances:

- The buffer manager forces a specific log page to disk. This occurs during the consistency point (for fast commit) or before a transaction commit.
- The buffer manager forces the last log buffer in the logging system to disk. This occurs normally during the close of a table.
- The RCP or DBMS Server forces the last log record of a transaction to disk before recovering the transaction.

### **Check commit timer**

The number of times that the timer, associated with the group commit, is completed. This does not necessarily mean that a write to the log file occurs. A write does not occur if the log buffer, that initiated the timer, is full. This timer is activated only when there are multiple transactions active in the logging system that can cause delays for users because of group commit.

The timer wakes up every 10 milliseconds and checks if there is a buffer waiting to be forced to the log file. If a buffer is found, the timer waits for 20 additional milliseconds before calling the routine to write out the buffer.

#### **Timer write**

The number of times a group commit timer check resulted in a group commit.

#### **Inconsistent DB**

The number of inconsistent database occurrences. This number must be zero. If it is not, check the errlog.log file.

**UNIX:** The errlog.log file is in \$II\_SYSTEM/INGRES/files

**VMS:** The errlog.log file is in II\_SYSTEM:[INGRES.FILES]

#### **Transaction begins**

The number of transactions started.

#### **Transaction ends**

The number of commits or transactions ended. This value represents user-initiated transaction ends such as commits, rollbacks, and interrupts. It does not include system-generated transaction ends such as LOG-FULL. The difference between Transaction begins and Transaction ends is the number of current transactions.

#### **Log waits**

The number of times any event wait condition requires a log buffer write to stall. These events encompass things like LOG-FULL, CP writing, RECOVERY, archiving required, FREE WAIT for log buffer, OPENDB wait, log buffer SPLIT WAIT, and wait for log I/O to complete (the log buffer being written to the log file).

#### **Log split waits**

The number of times a log split operation is delayed due to the lack of free log buffers. This must be watched because the logging system cannot proceed with the log record split until a free buffer is available. You can reduce this by increasing the number of log buffers or increasing their size.

#### **Log free waits**

The number of times all the log buffers are either in force mode or unavailable for writing. Only one log buffer is currently written to at a time. If this state is frequent (more than five per minute during busy times), an increase in the number of log buffers is the solution. Remember that an increase in the number of buffers requires more memory (number\_of\_buffers x buffer\_size). This condition affects throughput to the log file. For more information, see the *System Administrator Guide* for more information.

**Log stall waits**

The number of times stalled while making requests to the logging system. This occurs while consistency points are being taken or during LOG-FULL conditions. This is acceptable (not in the LOG-FULL case) and these types of stalls only last for a fraction of a second. If 100 sessions are stalled for one event, this count is incremented by 100. Only stalls due to LOG-FULL events are reflected in this value.

For more information on log stall waits see, Logging System Header Screen (see page 82). Depending upon the causes of a Log stall wait, the following statuses are shown in the Logging System Header screen:

**LOGFULL, FORCE\_ ABORT**

The log file is full.

**LOGFULL, CPFLUSH**

The log file is overly full while executing a consistency point (CP). The CP must complete before log space can be released. The status LOGFULL, ARCHIVE is also be displayed.

**LOGFULL, ARCHIVE**

The log file becomes full and journaled transactions must be archived to free up log space. When the archiver is done, log file space is released.

**Log group commit**

The number of times that multiple transactions are participating in a log buffer flush to the log file. The value is incremented every time a write to disk completes a group commit (piggyback write).

**Log group count**

The number of transactions that are participating in the flush to the log file. If one group commit event writes on behalf of ten sessions (threads), this number is incremented by ten. The ratio between this number and the Log group commit indicates how effective group commit is (for example, group count/group commit indicates the number of log write requests by threads that are satisfied per group commit write).

**Kbytes written**

The number of kilobytes written to the log file.

## Logging System Summary Menu Items

The menu items available on this screen are:

### **Refresh**

Queries the logging system for logging summary information. Even if the autorefresh option is set, this menu item can still be selected at any time.

### **Interval**

Sets a start time to begin measuring logging summary information. Otherwise, the information displayed is activity since the logging system was started.

For more information on this menu item, see Interval Option (Logging System Summary) (see page 81).

### **Help**

Displays help screens.

### **End**

Returns to the Log Info Menu screen.

### **Quit**

Exits IPM.



## Interval Option (Logging System Summary)

The Interval menu item on the Logging System Summary displays a submenu that allows a start time to be set. This lets you display information that occurred since the selected start time. Options available from the submenu are:

### Since\_Startup

Fields displaying cumulative statistical data reflect activity from initial Ingres startup. This is the default mode when starting IPM. Current and Start time fields are not displayed.

### Begin\_Now

Enables the Interval option and sets a new baseline for cumulative statistical data. Screens displaying cumulative statistical information display Log commits per second and Log write I/O per second at the bottom of the main screen.

### End

Returns to the previous menu.

When the Interval option is enabled, the Logging System Summary appears as follows. Two additional items appear at the bottom of the main screen: Log commits per second and Log write I/O per second.

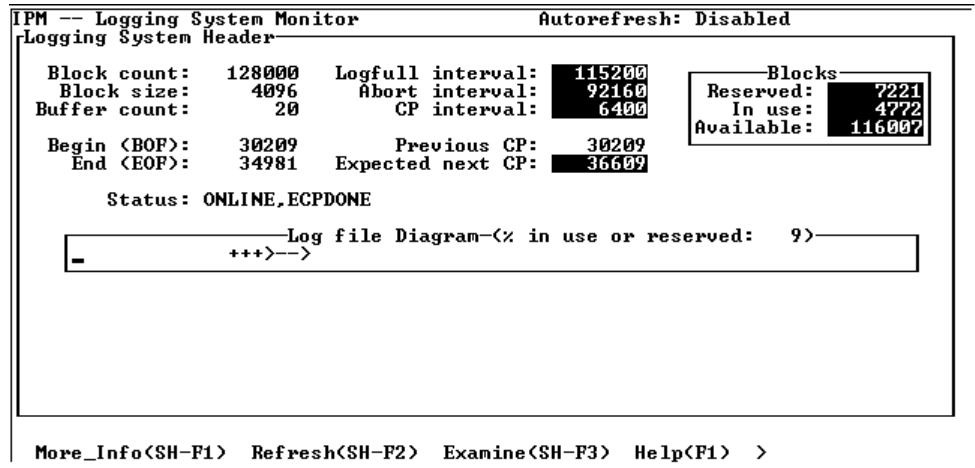
The screenshot shows the 'IPM - Logging System Summary' screen. At the top right, it says 'Autorefresh: Disabled'. The main area is titled 'INGRES IPM Logging System Summary' and contains two columns of statistics. On the right side, there is a vertical submenu with options: 'Since Startup', 'Begin Now', and 'End'. The 'Begin Now' option is currently selected, indicated by a black bar. At the bottom of the screen, there are two sections: 'Log commits per second' and 'Log write I/O per second', each showing 'Current', 'Minimum', and 'Maximum' values. The bottom of the screen has a navigation bar with 'Refresh', 'Interval', 'Help', 'End', and 'Quit'.

INGRES IPM Logging System Summary		Autorefresh: Disabled	
Database adds:	0	Transaction begins:	0
Database removes:	0	Transaction ends:	0
Log writes:	0	Log waits:	0
Log write I/O's:	0	Log split waits:	0
Log read I/O's:	0	Log free waits:	0
Log forces:	0	Log stall waits:	0
Check commit timer:	0	Log group commit:	0
Timer write:	0	Log group count:	0
Inconsistent DB:	0	Kbytes written:	0
---Log commits per second---		---Log write I/O per second---	
Current:	0	Minimum:	0
Average:	0	Maximum:	0

Refresh Interval Help End Quit

## Logging System Header Screen

The Logging System Header screen appears when you select Header from the Log Info Menu screen. This screen displays the current state of the logging system and critical points in the log file.



The Log file Diagram displays a logical view of the log file in use. The Log file Diagram starts at page 1 of the log file through the page specified by the Block count field. In the sample screen, the upper end of the diagram represents page 1024. The area of the diagram covered by the arrow (>----->) is the area of the log file in use (in this case from page 12 to 22). As the BOF (beginning of file) and EOF (end of file) move, so does the arrow.

This screen can be displayed during benchmarks, tests, or daily use to help the system administrator determine if the log file is near FORCE\_ABORT. The Blocks in use field shows the actual number of blocks in use. If it is greater than the value in the Abort interval field, IPM displays a warning indicator. The same occurs when the Blocks in use exceeds the value in the Logfull interval field. The system administrator can decide to increase the size of the log file if the percentage of the log file in use approaches the Abort interval.

This screen autorefreshes the information if the -r flag was specified at startup or the Display Refresh field on the Option Selection screen was changed to a number between 1 and 999 seconds. For more information, see Option Selection Screen (see page 24).

## Logging System Header Fields

The Logging System Header screen has the following fields:

### **Block count**

The number of blocks in the log file. This value is also specified when running IIBUILD or rcpcfg. Multiply by the block size to get the log file size in bytes.

### **Block size**

The log file block size in bytes. This value is specified when running the install or configure program.

### **Buffer count**

The number of log buffers. These are the same size as the log file block size.

### **Logfull interval**

The logging system parameter LOG\_FULL\_LIMIT occurs. When the Blocks in use field is equal to this value, all transaction activity is halted. A warning field is displayed in the lower right-hand corner. This value is also determined when running the install or configure program. For more information see, the *System Administrator Guide*.

### **Abort interval**

The logging system parameter FORCE\_ABORT. When the Blocks in use field exceeds this value, the oldest transaction is aborted. To find out which transaction is being aborted, use the Log Transaction Display screen. Also, see Logging System Header Screen with Transaction Display (see page 89). Tab to the Status column and select the Find menu item to look for the word FORCE. A warning indicator is also displayed. For more information, see the *System Administrator Guide*.

### **CP interval**

A consistency point occurs when the log file size (Blocks in use field) reaches a multiple of this number.

### **Blocks in use**

The number of blocks in use in the log file. This is determined by the Begin (BOF) and End (EOF) values. This value is used for the Log file in use diagram.

### **Blocks available**

The number of remaining blocks in the log file

### **Blocks Reserved**

The number of blocks set aside to write compensation records in the event that transactions need to rollback.

**Begin (BOF)**

The logical beginning of file. This is the position in the log file that holds the oldest transaction.

**End (EOF)**

The logical end of file. This is the position in the log file that holds the newest uncommitted transaction.

**Previous CP**

The log file address of the last consistency point. This is the position in the log file where the last consistency point was taken.

**Expected next CP**

The log file address of the next expected consistency point

**Status**

The status of the logging and recovery systems. For a list of valid status fields, see Logging System Header Screen Status Field Values (see page 85).

**Log file Diagram**

Depicts a logical view of the log file with the left side of the field representing page 1 and the right side representing Block count pages (for example, 1024 pages). Within this field an arrow diagram (">----->") represents the portion of the log file in use. If the portion of the log file in use spans only one position in the field, an "\*" is displayed. As the EOF and BOF change, the arrow moves from left to right and wrap around the diagram.

**% in use**

The percentage of the log file in use. This is determined by the Begin (BOF) and End (EOF) values.

## Logging System Header Screen—Status Field Values

The Status field on the Logging System Header screen can have the following values:

### **ACP\_SHUTDOWN**

The archiver is preparing to shut down. (This indicates that an rcpconfig command with the shutdown option has been issued.)

### **ARCHIVE**

The archiver process is archiving journaled transactions to the journal files.

### **BCPSTALL**

The logging system is requesting the recovery process to start writing a begin consistency point.

### **CKP\_SBACKUP**

The logging system marks the start of on-line backup. It marks this block as the on-line backup start block (SB). Ckpdb starts backing up the database.

### **CLOSEDB**

The logging system is in the process of closing a database.

### **CPFLUSH**

DBMS servers are flushing their modified pages to disk.

### **CPNEEDED**

The logging system is about to take a consistency point.

### **CPWAKEUP**

The logging system is synchronizing the fast-commit threads.

### **DISABLE\_DUAL\_LOGGING**

The logging system is in the process of disabling dual logging.

### **DUAL\_LOGGING**

Dual logging is enabled.

**Note:** DUAL\_LOGGING does not mean that both primary and dual logs are active. To determine this, check for Active Log(s).)

### **ECP**

The logging system is requesting that the recovery process start writing an end consistency point.

### **ECPDONE**

The logging system has taken an end consistency point. This status flag is present most of the time while the logging system is functioning normally.

**FORCE\_ABORT**

The force-abort-limit has been reached; the logging system is aborting the oldest transaction. The Log Transaction Display screen can be used to find out which transaction is being aborted.

**IMM\_SHUTDOWN**

The logging system has been told to shut down immediately. (This is displayed when the user invokes rcpcfg with the imm\_shutdown option.) Note that the logging system does not perform any housekeeping as part of the shutdown process. The recovery process becomes responsible for backing out any uncommitted transactions left in the log file once the logging system has been restarted.

**LOGFULL**

The log file is full. The system administrator must determine the cause of this and increase the log file size. A warning indicator is also displayed.

**MAN\_ABORT**

The logging system has been requested to manually abort a distributed transaction.

**MAN\_COMMIT**

The logging system has been requested to manually commit a distributed transaction.

**ONLINE**

The logging system is on line. The logging and recovery systems are operating OK.

**OPENDB**

The logging system is in the process of opening a database.

**PURGEDB**

A database has been closed by the last user who had it open; the archiver is archiving transactions that belong to this database.

**RCP\_RECOVER**

The recovery process is recovering transactions from a runaway DBMS.

**RECOVER**

The logging system has requested the recovery process to perform recovery.

**START\_ARCHIVER**

This is an important status that indicates that the archiver has stopped and must be restarted by the database administrator (DBA). This is not done automatically. If the archiver is not restarted, the log file eventually fills up, reaching the LOG\_FILE\_FULL limit, and causing Ingres to stall.

**START\_SHUTDOWN**

The logging system is shutting down. As part of the shutdown process, the logging system commits to disk all the committed transactions and backs out any uncommitted ones. The archiver also journals all the committed transactions for tables with journaling enabled.

## Logging System Header Menu Items

The Logging System Header screen has the following menu items:

**More\_Info**

Displays additional information on the log file addresses.

For more information on this screen, see Logging System Header More\_Info Screen (see page 88).

**Refresh**

Queries the logging system for logging system header information. Even if the autorefresh option is set, this menu item can be selected at any time.

**Examine**

Displays a submenu and additional screen display fields that allow examination of the transactions in the log file. For more information, see Logging System Header Screen with Transaction Display (see page 89).

**Help**

Displays help screens.

**End**

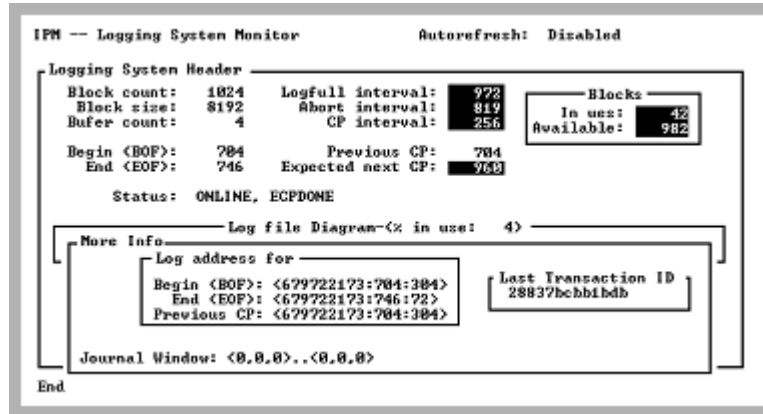
Returns to the Log Info Menu screen.

**Quit**

Exits IPM.

## Logging System Header More\_Info Screen

Selecting the More\_Info menu item from the Logging System Header screen displays a pop-up screen, providing additional log address information.



The pop-up has the following fields:

### Begin (BOF)

The log file address of the beginning of file

### End (EOF)

The log file address of the end of file

### Previous CP

The log file address of the last consistency point

### Last transaction ID

The last transaction ID used. This number corresponds to the External TX ID column on the Log Transaction Display screen and the Transaction ID column on the Lock List Display screen.

### Journal window

The log file address range where the archiver looks for records to journal



## Logging System Header Screen with Transaction Display

When you select the Examine menu item, the Logging System Header screen displays additional transaction information.

IPM -- Logging System Monitor      Autorefresh: Disabled

Logging System Header

Block count:	1024	Logfull interval:	972	Blocks In use: 10 Available: 1014
Block size:	8192	Abort interval:	819	
Buffer count:	4	CP interval:	256	

Begin <BOF>: 12      Previous CP: 12  
End <EOF>: 22      Expected next CP: 268

Status: ONLINE, ECPDONE

Log file Diagram-Cx in use: 0

>^

	Transaction ID	Session	Database
Transactions occurring in the log file between pages 14 and 22 are displayed in the scrolling area to the right ----->	28837bcbh00id	\$recovery	\$recover

Next Previous More\_Info Find End

The Log file Diagram field is highlighted and a caret symbol ^ appears in that field marking the position of the log file currently being examined. Any transactions occurring in the range of pages covered by the caret (^) symbol are displayed in the scrolling area. The range of log file pages currently being examined is also displayed.

By using the Next and Previous menu items, you can move the caret symbol to any area of the Log file diagram covered by the arrow (">----->"). By default, when the Examine menu item is selected, the caret symbol appears at the BOF. The Next menu item can be selected until a user transaction appears in the scrolling area. This transaction is the oldest transaction in the log file and prevents log file space from being reclaimed.

## Examine a Particular Position in the Log File

From the Logging System Transaction Display, a position in the log file can be examined.

### To examine a particular position in the log file

1. Open the Logging System Transaction Display and move the cursor to the Log file Diagram.
2. Place the cursor (using the arrow keys) anywhere on the arrow representation of the log file, and then select the Examine menu item.

A snapshot is taken of the transactions, as well as the BOF and EOF. A pop-up screen displays the range of log file pages with transactions. The snapshot is used until the Examine submenu is exited.

### To obtain the latest state of the logging system

1. Exit the Examine submenu and select Examine again.

Autorefresh, if enabled, is suspended during the Examine phase. Autorefresh is re-enabled when you exit the submenu.

## Transaction Display Menu Items

After the Examine menu item is selected, a submenu appears. The menu items allow the caret symbol to be moved around on the diagram.

**Note:** Until you exit this submenu, the information being displayed is a snapshot.

The Transaction Display has the following menu items:

### **Next**

Moves the caret symbol to the right by one position. Moving beyond the EOF wraps around to the BOF. Any transactions occurring in the range covered by the next position are displayed in the scrolling area.

### **Previous**

Moves the caret symbol to the left by one position. Moving below the BOF wraps around to the EOF. Any transactions occurring in the range covered by the previous position are displayed in the scrolling area.

### **More\_Info**

Place the cursor on the transaction of interest (in the Transaction scrolling area) and select this menu item. Additional information for that transaction is displayed.

For more information on this screen, see More\_Info Screen (Transaction Display) (see page 92).

### **Find**

Searches any column in the scrolling area. To initiate the search, tab to the desired column and select Find. If you are searching a text column, Find locates all occurrences in the column.

### **End**

Returns to the Logging System Header screen main menu.

## More\_Info Screen (Transaction Display)

When you select the More\_Info menu item from the Examine submenu, the Logging System Header screen displays a pop-up screen displaying additional transaction information.

IPM -- Logging System Monitor      Autorefresh: Disabled

---

Logging System Header

Block count: 1824	Logfull interval: 972	Blocks
Block size: 8192	Abort interval: 819	In use: 10
Buffer count: 4		

Begin (BOF): 12      End (EOF): 22      Status: ONLINE, ECP

More\_Info

Page in log file	Logging Statistics
First: 13	Write: 3    Split: 0
Last: 14	Force: 0    Wait: 18
CP: 10	

Process ID: 4cd4

Status: INACTIVE

Log

>^

Transaction ID	Session	Database
28837bcb001d	\$recovery	\$recover

Transactions occurring in the log file between pages 13 and 22 are displayed in the scrolling area to the right ----->

Next Previous More\_Info Find End

## Log Process Display Screen

The Log Process Display screen appears when you select Processes from the Log Info Menu screen. As shown below, this screen displays the current processes in the logging system and their states and statistics.

IPM - Logging System Monitor

Log Process Display

ID	PID	Type	OpenDB	Write	Force	Wait	Begin	End
1000a	4cf0	FCYDBMS	5	14	0	28	33	28
1000d	4cd8	ARCHIV	1	0	0	14	2	1
10010	4cd4	RECOVER	1	3	0	18	1	0

Databases	Display logging information on each open database
Transactions	Display logging information on each transaction
Refresh	Get new snapshot of logging system information

Place the cursor on your choice and press "Select"

Refresh Process\_Info Find Help End Quit

The processes include DBMS servers, the archiver and recovery processes. Information available includes number of open databases and log write requests. By viewing this data you can, for example, determine how much logging activity (by process) is occurring for a DBMS server.

The Log Process Display screen has the following information:

**ID**

The internal process ID (PID) of processes in the logging system. This is not the operating system PID.

**PID**

The operating system process ID (PID) for this process

**Type**

The type of process. Valid types are as follows:

**ARCHIV**

Archiver processor for the current installation (ACP)

**CKPDB**

Online backup

**DBMS**

DBMS server process

**FCTDBMS**

DBMS server process running with fast commit

**RECOVER**

Recovery process (RCP)

**SBM**

Server is attached to a shared data buffer.

**OpenDB**

The number of different databases currently opened

**Write**

The number of log file write requests made by this process

**Force**

The number of log forces

**Wait**

Indicates how many times the current process waited to use the logging system

**Begin**

The number of transactions started by this process

**End**

The number of transactions ended. The difference between the value in this column and the value in the Begin column is the number of current transactions for this process.

## Log Process Display Menu Items

The Log Process Display has the following menu items:

**Refresh**

Queries the logging system for logging information. Process, database, and transaction information are obtained together to ensure a consistent snapshot of the logging system.

**Process\_Info**

Appears on VMS.

Displays the Detailed Process Information screen. This screen shows various job-process information for the process on which the cursor is positioned. Such information includes CPU time, Direct I/O, Buffered I/O, Enqueue limit, etc. This display automatically refreshes.

For details on this screen, see Detailed Process Information Screen (VMS Only) (see page 39).

**Find**

Searches any column in the scrolling area. To initiate the search, tab to the desired column and select Find. If you are searching a text column, Find locates all occurrences in the column.

**Help**

Displays help screens.

**End**

Returns to the Log Info Menu screen.

**Quit**

Exits IPM.

## Log Database Display Screen

The Log Database Display screen appears when you select Databases from the Log Info Menu screen.

This screen can be used to monitor logging activity by database.

The screenshot shows a terminal window titled "IPM -- Logging System Monitor". Inside, there's a section titled "Log Database Display" which contains a table with 7 columns: DB Name, Status, TX Cnt, Begin, End, Read, and Write. The table has three rows of data. Below the table, there is a prompt: "Place the cursor on your choice and press 'Select'". At the bottom of the screen, there are several menu options: Refresh, More\_Info, Find, Help, End, and Quit.

DB Name	Status	TX Cnt	Begin	End	Read	Write
frecovery	NOTDB	6	289	281	0	1964
info	JOURNAL,FAST_CO	8	69881	69873	0	165282
facts	JOURNAL,FAST_CO	4	577743	577739	0	998081

Place the cursor on your choice and press "Select"

Refresh More\_Info Find Help End Quit

The screen contains an entry for each active database. Information includes the number of transaction begins and ends, and the number of log file write requests. The status of a database can also be determined. For a list of valid status values, see Logging System Header Screen Status Field Values (see page 85).

The Log Database Display shows the following information:

### DB Name

The database name.

### Status

The database status. Valid values are as follows:

#### CKPDB\_PEND

Online backup for this database is about to start.

#### CLOSEDB\_PEND

This database is about to be closed; the last user in the database is exiting.

#### EBACKUP

Online backup

#### FAST\_COMMIT

This database is running with Fast Commit.

**FBACKUP**

Online backup

**JOURNAL**

This database has journaling enabled.

**NOTDB**

The entry is not a database.

**OPENDB\_PEND**

This database is about to be opened for the first user of the database.

**PURGE**

This database is closed and the archiver is archiving transactions.

**TX Cnt**

The number of currently open transactions. This is the difference between the Begin and End columns.

**Begin**

The number of transaction begins that have occurred so far.

**End**

The number of transaction ends that have occurred so far.

**Read**

The number of log file read requests that have been made so far. It is unusual for this value to be greater than 0 for any entry except the \$recovery entry. Log file reads are usually done during transaction rollout and during journaling by the archiver.

**Write**

The number of log file write requests made.



## Log Database Display Menu Items

The Log Database Display has the following menu items:

### Refresh

Queries the logging system for logging information. Process, database and transaction information are obtained together to ensure a consistent snapshot of the logging system.

### More\_Info

Displays additional information for the selected database, including the database location and journal window. For more information on this screen, see Log Database Display More\_Info Screen (see page 97).

### Find

Searches any column in the scrolling area. To initiate the search, tab to the desired column and select Find. If you are searching a text column, Find locates all occurrences in the column.

### Help

Displays help screens.

### End

Returns to the Log Info Menu screen.

### Quit

Exits IPM.

## Log Database Display More\_Info Screen

When the More\_Info menu item is selected from the Log Database Display screen, a pop-up screen containing additional fields for the specified database is displayed.

Log Name	Status	TK	Cnt	Tngin	Tnd	Tlead	Write
Frequency	NULL	0	1	0	2		

More Info

ID: 7111111111	Owner: Singman	Location: None	Start Backup: 08.08.08
----------------	----------------	----------------	------------------------

Place the cursor on your choice and press "Select"

End

The pop-up screen has the following fields:

**ID**

The internal database ID for this database

**Owner**

The DBA for this database

**Force**

The number of times log file forces occurred for this database

**Wait**

The number of times transactions in this database had to wait to use the logging system

**Location**

The database location

**Jnl Window**

The range of log file addresses where there are transactions for this database that must be journaled. This field implies that journaling is enabled for this database.

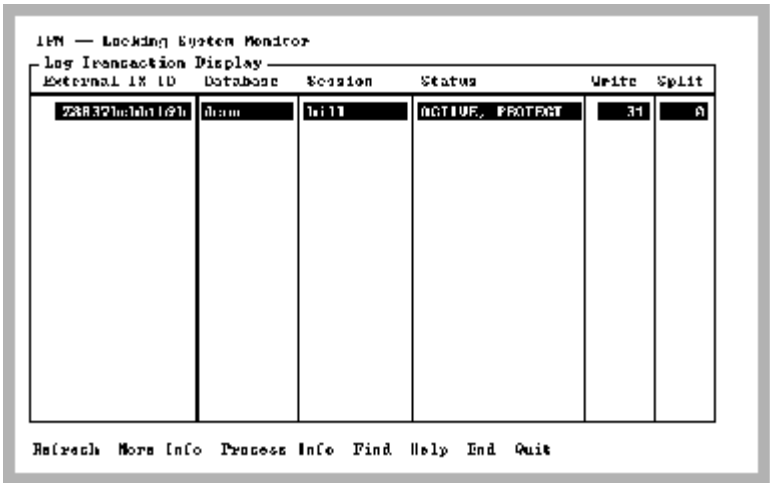
**Start Backup**

The log file address where on-line backup for this database begins

## Log Transaction Display Screen

The Log Transaction Display screen appears when you select Transactions from the Log Info Menu screen.

This screen contains an entry for each transaction in the logging system.



The screenshot shows a window titled "IBM - Locking System Monitor" with a sub-header "Log Transaction Display". Below this is a table with the following columns: External ID, Database, Session, Status, Write, and Split. The first row of data shows "228832m:aln189n" in the External ID column, "dnam" in the Database column, "1611" in the Session column, "ACTIVE, PROTECT" in the Status column, "31" in the Write column, and "8" in the Split column. At the bottom of the window is a menu bar with the options: Refresh, More Info, Process Info, Find, Help, End, and Quit.

External ID	Database	Session	Status	Write	Split
228832m:aln189n	dnam	1611	ACTIVE, PROTECT	31	8

This screen lets you observe the activity of each transaction and pinpoint those transactions that are generating extensive logging system activity. The status of each transaction is also displayed. You can use the Find menu item to search for FORCE\_ABORT transactions by tabbing to the Status column and selecting Find.

The Process\_Info menu item allows monitoring of the process to which the selected transaction belongs. For example, in multi-server installations, it is not necessary to determine to which server a transaction belongs. Place the cursor on the desired transaction and select the Process\_Info menu item. The Detailed Process Information Screen (VMS Only) (see page 39) is displayed.

Once a transaction is committed, it is no longer in the logging system. When this screen is refreshed, the transaction disappears from the display if it was committed between the last screen refresh and the current time. Transactions that have been committed and not yet journaled (and when fast commit is on) appear with a status of INACTIVE. By default, INACTIVE transactions are not displayed. The -i option or the Display inactive transactions field on the Options Display screen can be set to "y" to force display of inactive transactions.

## Log Transaction Display Fields

The columns of information on the Log Transaction Display screen are:

### **External TX ID**

The Transaction ID. This column corresponds to the Transaction ID field on the More\_Info pop-up screen for the Lock List display. For more information, see Lock List Display Screen (see page 52).

### **Database**

The name of the database in which this transaction is running

### **Session**

The session name running this transaction. Session names beginning with \$ are internal transactions.

### **Status**

The status of the transaction. Valid statuses are as follows:

#### **ACTIVE**

Active. User transactions are usually in this state. No commit has been issued.

#### **DISTRIBUTED**

The transaction is a slave transaction of a larger distributed transaction.

#### **FORCE\_ABORT**

The transaction is being rolled out because the log file reached the FORCE\_ABORT limit.

#### **INACTIVE**

Not Active. Internal transactions are usually in this state.

#### **MAN\_ABORT**

The distributed transaction was manually rolled out.

#### **MAN\_COMMIT**

The distributed transaction was manually committed.

#### **NOABORT**

The transaction cannot be aborted due to FORCE\_ABORT or LOG\_FILE\_FULL. Distributed transactions have this status.

#### **PROTECT**

The transaction must be recoverable. User transactions always have this status.

**RE-ASSOC**

The transaction's connection to the master coordinating application has been lost and the transaction is awaiting reconnection in order to close the transaction.

**RECOVER**

The transaction has been taken over by the recovery process.

**SERVER\_ABORT**

The server to which this transaction belongs is aborting that transaction.

**SESSION\_ABORT**

The transaction is being rolled out because the session owning this transaction has requested the abort.

**WILLING\_COMMIT**

The transaction is ready to commit. This applies to distributed transactions only.

**Write**

The number of log file write requests made by this transaction

**Split**

The number of times a write to the log file was split across more than one log file page and there was not a free buffer. If this occurs frequently, the number or size of the log buffers must be increased to prevent throughput problems to the log file.

## Log Transaction Display Menu Items

The menu items available on this screen are:

### **Refresh**

Queries the logging system for logging information. Process, database, and transaction information are obtained together to ensure a consistent snapshot of the logging system.

### **More\_Info**


Place the cursor on the desired transaction and select this menu item. Additional information for that transaction is displayed, including the first and last page address in the log file for this transaction.

For more information on this screen, see Log Transaction Display More\_Info Screen (see page 103).

### **VMS:**

#### **Process\_Info**

Displays the Detailed Process Information screen. This screen shows various job-process information for the process on which the cursor is positioned. Such information includes CPU time, Direct I/O, Buffered I/O, Enqueue limit, etc. This display automatically refreshes.

For more information on this screen, see Detailed Process Information Screen (VMS Only) (see page 39). 

#### **Find**

Searches any column in the scrolling area. To initiate the search, tab to the desired column and select Find. If you are searching a text column, Find locates all occurrences in the column.

#### **Help**

Displays help screens

#### **End**

Returns to the Log Info Menu screen

#### **Quit**

Exits IPM

## Log Transaction Display More\_Info Screen

When the More\_Info menu item is selected from the Log Transaction Display screen, a pop-up screen containing additional fields for the specified transaction is displayed.

IPM -- Logging System Monitor					
Log Transaction Display					
External TX ID	Database	Session	Status	Write	Split
3fa940b8d5e1	wiz	schka24	ACTIVE, PROTECT, JOU	8339	0
More Info					
Internal TX ID: 11d974		Force: 6		Wait: 0	
Session ID: 3f8e100		Internal PID: 1d0001		External PID: c28	
Database ID: 304cb					
First: <1068050506,31011,328>			Last: <1068050506,31273,168>		
CP: <1068050506,30209,248>					
Dis TX ID: Dis_tran_id: <0,0>					
End(F10) :					

The pop-up has the following fields:

### Internal TX ID

The internal transaction ID used by the logging system

### Force

Indicates how many times this transaction has caused a log buffer to be forced to the log file

### Wait

The number of times this transaction had to wait to use the logging system

### Session ID

The session ID of the session that owns this transaction. This ID corresponds to the ID column on the Session List screen. For more information, see Session List Screen (see page 32).

### Internal PID

The internal process ID (PID) used by the logging system for the process to which this transaction belongs. This field corresponds to the ID column on the Log Process display. For more information, see Log Process Display Screen (see page 92).

**External PID**

The operating system PID for the process to which this transaction belongs. This field corresponds to the PID column on the Log Process display. For more information, see Log Process Display Screen (see page 92).

**Database ID**

The internal database ID used by the logging system. This field corresponds to the ID field on the More\_Info pop-up screen for the Log Database display. For more information, see Log Database Display Screen (see page 95).

**Dis TX ID**

The distributed transaction ID to which this transaction belongs

**First**

The log file address (position in the log file) for the begin transaction marker for this transaction. It is possible to determine the oldest transaction by viewing the middle number of this field.

**Last**

The log file address (position in the log file) for the last record written to the log file

**CP**

The log file address (position in the log file) where a consistency point is taken



# Chapter 7: Using IPM to Monitor and Troubleshoot

---

This section contains the following topics:

- [View Running Servers](#) (see page 105)
- [View Sessions](#) (see page 106)
- [Monitor Resource Usage](#) (see page 106)
- [Operate With an Unresponsive Server](#) (see page 107)
- [Check for Logging Delays](#) (see page 108)
- [Locate Concurrency Problems](#) (see page 109)
- [Determine Group Commit Efficiency](#) (see page 110)
- [Check Log File Capacity](#) (see page 110)
- [Locate a Problem Transaction](#) (see page 111)
- [IPM as a Troubleshooting Tool](#) (see page 112)

## View Running Servers

To determine which servers are running in an installation, use IPM to display either the Server List or the Log Process Display.

### To display the Server List screen

Select Server\_List from the Main Menu.

Only servers registered with the Name server are shown.

### To display the Log Process Display screen

1. Select Log\_Info from the Main Menu.

The Log\_Info Menu is displayed.

2. Select Processes.

The Log Process screen is displayed. All servers, and the archiver and recovery processes in the current installation are shown.

## View Sessions

### To view a list of sessions in a DBMS server

1. Select Server\_List from the Main Menu.

The Server List screen is displayed.

2. Select a server and then select the Sessions menu item.

The Session List screen is displayed. If desired, you can view session detail. Privileged users can remove unwanted sessions.

## Monitor Resource Usage

If you are monitoring a busy system and want to view the amount of locking and logging resources being consumed for a certain period, use the Interval option with autorefresh on.

Both the Locking System Summary and Logging System Summary screens allow statistics to be collected over an interval whose starting point is determined by selecting the Interval menu item.

### To start the interval

1. Invoke IPM with autorefresh on. To do this, either use the -r flag on the ipm command, or set the autorefresh option on the Option Selection screen (select the Options menu item from the Main Menu).

2. Select either Lock\_Info or Log\_Info from the Main Menu.

Either the Lock Info Menu or Log Info Menu is displayed.

3. Select Summary from either the Lock Info Menu screen or the Log Info Menu screen.

The System Summary screen is displayed.

4. Select the Interval menu item.

The Interval submenu is displayed.

5. Select the Begin\_Now menu item to enable the Interval option.

A starting and current time is displayed. The starting times and statistics are saved until reset. This allows you to use other parts of IPM and view these screens to see the latest cumulative locking and logging statistics.

## Operate With an Unresponsive Server

If a server becomes unresponsive, you can still monitor the state of the system with IPM. There are two methods:

- Restart IPM with the **-s** (stand-alone) option.

In this case, IPM cannot print database or table names because it cannot connect to any server in stand-alone mode. However, this is the simplest method.

- Start up a second server.

Delete the first (problem) server from the Name Server's list using the `iinamu` utility. You must be a privileged user to invoke this utility. For more information on starting a server and using the `iinamu` utility, see the *System Administrator Guide*.

After IPM connects to the new server, you can use IPM to determine the state of the system. Use the Log and Lock Information areas (Log Info and Lock Info from the Main Menu) to view the state of the system.

## Check for Logging Delays

Certain logging conditions may result in user complaints of slow response time. The Logging System Header screen in IPM can help you determine if a sluggish system is due to logging activities.

### To check for logging delay

1. Select Log\_Info from the Main Menu.

The Log Info Menu is displayed.

2. Select Header.

The Logging System Header screen is displayed.

3. Check the Status field.

Any of the following states indicates that the delay is due to the logging system:

#### **LOGFULL,CPFLUSH**

The log file is overly full while executing a consistency point (CP). The CP must complete before log space can be released. The status LOGFULL, ARCHIVE may also be displayed.

#### **LOGFULL,ARCHIVE**

The log file becomes full and journaled transactions must be archived to free up log space. When the archiver is done, log space is released.

#### **LOG\_FULL**

The log file has reached a limit where all database updates/deletes/inserts are stalled until enough space is reclaimed. The Warning field is also visible.

#### **FORCE\_ABORT**

The logging system is backing out the oldest transaction. Doing this does not block any other transactions, but it does take CPU cycles. The amount of CPU cycles used depends upon what the transaction was doing when it was singled out for rollback.

## Locate Concurrency Problems

If a session is stalled, it may be waiting for a lock.

### To check for concurrency problems

1. Select Lock\_Info from the Main Menu.  
The Lock Info Menu is displayed.
2. Select Locks.  
The Lock List Display screen is displayed.
3. Tab to the Status column and select the Find menu item.  
The String to search for prompt appears.
4. Type **WAIT** and press the Return key.  
If there are lock lists with blocked locks, the cursor is placed on that lock list. Any lock lists with a status of WAIT are blocked from proceeding.
5. Select the Block\_Info menu item to determine what lock is preventing the transaction from proceeding. (The cursor must be on the blocked lock list.)  
The Blocking Lock Display screen is displayed.
6. Look in the scrolling area. The blocking lock is at the top, and all other waiting locks are below. Note the session name so that you can track down the user.
7. Select End.  
You are returned to the Lock List Display screen.
8. Select a lock list and then select the Examine menu item to view the individual locks for that lock list.

## Determine Group Commit Efficiency

You can use IPM to determine how efficient group commit is in your installation. The ratio of Log group count to Log group commit indicates how many waiting transactions are satisfied for each group commit operation.

### To determine the efficiency of group commit in your installation

1. Select Log\_Info from the Main Menu.

The Log Info Menu is displayed.

2. Select Summary.

The Logging System Summary screen is displayed.

3. Look at the ratio of Log group count to Log group commit.

A ratio of 10:1 indicates that 10 commits were satisfied with one group commit write. You can use the Interval menu item to observe this over a short period of time.

If the ratio approaches 1:1, potentially empty (or near empty) log buffers are being written out, possibly wasting space in the log file. To avoid this, decrease the size and number of the log buffers.

## Check Log File Capacity

The Logging System Header screen in IPM lets you determine how full and how close to FORCE\_ABORT the log file is.

**Note:** This procedure is most useful when the autorefresh option is set.

### To check the capacity of the log file

1. Select Log\_Info from the Main Menu.

The Log Info Menu is displayed.

2. Select Header.

The Logging System Header screen is displayed.

3. Check the following values:

- The Log file diagram, which shows how full the log file is.
- The Blocks in use field.

4. Compare the Block in use value to Abort interval and Logfull interval to determine how close to FORCE\_ABORT and LOG\_FILE\_FULL the logging system is.

## Locate a Problem Transaction

### **To see which transaction is preventing reclamation of log file space**

1. Select Log\_Info from the Main Menu.

The Log Info Menu is displayed.

2. Select Header.

The Logging System Header screen is displayed.

3. Examine the Log File diagram.

The diagram depicts the log file as it logically appears. The field boundaries represent the physical begin and end of file. The logical begin and end are marked by > symbols.

4. Select the Examine menu item.

A submenu and additional transaction information on the Logging System Header screen is displayed.

On this transaction display, you can view the transactions that span the portion of the log file represented by the ^ symbol on the Log file diagram field. All transactions found for the current portion of the log file appear in the scrolling area on the bottom right of the screen. The Next and Previous menu items move the caret symbol to any area of the Log file Diagram covered by the arrow (">----->").

5. Select Next to logically step through the log file (starting at the BOF-- where the caret rests) until a user transaction appears in the scrolling area.

This transaction is the oldest transaction in the log file that is preventing log file space from being reclaimed.

6. Take steps to remove or commit the offending transaction.

## IPM as a Troubleshooting Tool

You can use IPM as an efficient troubleshooting tool to locate the source of various operating or functional problems by using IPM utilities. IPM includes the following utilities, often used in troubleshooting an Ingres installation:

### **iimonitor**

This utility is used to monitor and administer DBMS servers. With iimonitor or IPM, you can examine the status of a DBMS server or shut down a server or particular server session.

### **lockstat**

The lockstat utility allows you to display locking status information.

### **logstat**

The logstat utility allows you to display logging status information.

### **iinamu**

This utility is used to monitor and administer the Name Server. You can display DBMS server information, register servers, and delete servers from the registered list.

For detailed troubleshooting procedures, see the *System Administrator Guide*.



# Index

---

## A

authorization  
    running IPM • 11

## B

Begin\_Now operation • 51, 81  
Block\_Info operation • 55  
    Lock List Display screen • 62  
blocking display information • 65  
blocking lock • 8  
Blocking Lock Display screen • 62

## C

cancel operation • 26  
committing transactions  
    group efficiency • 110  
concurrency  
    finding problems • 109

## D

-d flag • 13  
database display information • 95, 97  
Databases operation • 73  
    Log Info Menu screen • 95  
DBA\_Operations operation • 32  
DBA\_Operations submenu • 32  
defaults operation • 26  
delay checking • 108  
Delete operation • 32  
Detailed Process Information screen • 39  
display options • 24

## E

-e flag • 13  
End operation • 27, 32, 36, 45, 49, 51, 55, 58,  
    68, 71, 80, 81, 87, 91, 94, 97, 102  
Examine operation • 55, 68, 87  
    Lock List Display screen • 57  
    Logging System Header screen • 89  
    Resource List Display screen • 70

## F

Find operation • 32, 55, 58, 68, 71, 91, 94, 97,  
    102

## H

Hard\_Shutdown operation • 27  
header display information • 83  
Header operation • 73  
    Log Info Menu screen • 82  
help operation • 23, 26, 32, 36, 49, 55, 58, 68,  
    71, 80, 87, 94, 97, 102

## I

-i flag • 13  
iimonitor (utility) • 112  
iinamu (utility) • 107, 112  
inactive display option • 24  
information screens • 71, 103  
Interval operation  
    Locking System Summary screen • 51, 106  
    Logging System Summary screen • 81, 106  
Interval submenu • 51, 81  
IPM • 14  
    described • 7  
    functionality • 7  
    installing • 11  
    locking information menus • 20  
    logging information menus • 21  
    options • 13, 24  
    release compatibility • 15  
    running • 12  
    server information menus • 19  
    startup • 13  
    using • 7  
ipm (command) • 13  
    syntax • 13  
IPM main menu • 22, 23  
IPM screens • 23, 26, 27, 32, 36, 45, 56, 69,  
    94, 97, 103  
    Blocking Lock Display • 62  
    Detailed Process Information • 39  
    IPM main menu • 22  
    Lock Detail Display • 57

---

- Lock Info Menu • 44
- Log Database Display • 95
- Log Info Menu • 73
- Logging System Header • 82
- Logging System Summary • 75
- Option Selection • 24
- Resource Detail Display • 70
- Resource List Display • 66
- Resource Lock Display • 60
- Server List • 27
- Session Detail • 36
- Session List • 32

## L

- l flag • 13
- listing
  - sessions • 106
- Lock Detail Display screen • 57, 58
- lock display information • 70
- Lock Info Menu screen • 44, 45
- Lock Info menu<\$endrange> • 45
- lock list • 8
- lock list display information • 53, 56
- Lock List Display screen • 55, 56
- lock state display information • 57
- Lock\_Info operation • 22
  - IPM main menu • 43
- locking • 71
  - information menus • 20
  - information screens • 43
- Locking System Summary screen • 49
- locks • 8, 24, 49, 53, 56, 57, 65, 70
  - blocking display information • 64
  - blocking lock • 109
  - lock list display information • 53, 56
  - lock state display information • 57, 59
  - mode values • 61
  - resource display information • 60, 67, 70
  - summary display information • 47
  - VMS cluster display information • 49
- Lockstat (utility) • 112
- Log Database Display • 97
- Log Database Display screen • 95, 97
- log display information • 103
- log file
  - checking capacity • 110
- Log Info Menu screen • 73
- Log Process Display • 94
- Log Process Display screen • 94, 105

- Log Transaction Display • 103
- Log Transaction Display screen • 102, 103
- Log\_Info operation • 22
  - IPM main menu • 73
- logging • 77, 83, 92, 95, 97, 100, 103, 108
  - checking delay • 108
  - database display information • 95, 97
  - header display information • 83, 88
  - information menus • 21
  - information screens • 73
  - process display information • 92
  - states • 108
  - summary display information • 77
  - transaction display information • 89, 100
- Logging System Header screen • 82, 87, 88
- Logging System Summary screen • 75, 80
- logical • 8
- Logstat (utility) • 112

## M

- main menu • 23
  - IPM • 18, 22
- mode
  - lock values • 61
- More\_Info operation • 27, 32, 55, 56, 58, 68, 69, 87, 88, 91, 97, 103
  - Lock Detail Display screen • 59
  - Lock List Display screen • 56
  - Log Database Display screen • 97
  - Log Transaction Display screen • 103
  - Logging System Header screen • 88
  - Resource List Display screen • 69
  - Session List screen • 36

## N

- n flag • 13
- Next operation • 91
- null display option • 24

## O

- OK operation • 26
- option selection • 26
- Option Selection screen • 24, 26
- Option Selection screen screen • 26
- options • 14, 26
- options operation • 23, 45, 55
- Options Selection screen • 26

---

## P

- physical • 8
- Previous operation • 91
- process display information • 92
- Process\_Info operation • 27, 36, 94, 102
  - Log Process Display screen • 39
  - Log Transaction Display screen • 39, 98
  - Server List screen • 39
- Processes operation • 73

## Q

- quit operation • 23, 26, 32, 36, 49, 55, 58, 68, 71, 80, 87, 94, 97, 102
- quitting • 23, 26

## R

- r flag • 13
- refresh operation • 24, 27, 32, 36, 49, 55, 68, 73, 80, 87, 94, 97, 102
- resource • 8, 24, 70
  - lock display information • 60, 70
  - monitoring • 106
  - types • 14
- Resource Detail Display screen • 70, 71
- resource display information • 70
- resource list display • 69
- Resource List Display screen • 66, 68, 69
- Resource Lock Display screen • 60
- Resource\_Info operation • 58
  - Lock Detail Display screen • 60
- Resources operation
  - Lock Info Menu screen • 66
- running • 14

## S

- s flag • 13
  - ipm (command)[s] • 107
- Select operation • 45
- server • 27
  - information menus • 19
  - information screens • 27
  - listing • 105
  - second • 107
  - unresponsive • 107
- server list • 27
- server List operation • 22

- Server List screen • 27, 105
- Session Detail screen • 36
- Session List screen • 32, 106
- sessions
  - listing • 106
  - Server List screen • 32
- Sessions operation • 27
- Shutdown operation • 27
- Shutdown submenu • 27
- Since\_Startup operation • 51, 81
- Soft\_Shutdown operation • 27
- startup • 14
- status transaction values • 100
- summary display information • 49, 77
- Summary operation • 73
  - Log Info Menu screen • 75

## T

- t flag • 13
- terminology • 8
- transaction display information • 103
- Transaction display submenu • 91
- transactions • 24, 103
  - display information • 89
  - group commit • 110
  - locating problem • 111
  - log display information • 100
- Transactions operation • 73
- troubleshooting
  - IPM • 112
- type display options • 24
- type display options<\$startrange> • 24

## V

- VMS cluster display information • 49