Volume

2

ORACLE CORPORATION

RMU SHOW STATISTIC
DBA HANDBOOK
(Second Edition)

SCREEN INFORMATION

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Preface

Volume 2 Preface

Preface

Oracle Rdb is a general-purpose high-end database management system based on the relational data model. Applications operate in a client-server environment when accessing the database. The RMU Show Statistic utility is used by DBAs to monitor the operation of the application and analyze performance characteristics of the database.

PURPOSE OF THIS HANDBOOK

This handbook describes the various screens available for the RMU Show Statistic utility. The information contained in this handbook is an amalgamation of various sources of information on the utility, combined into a common frame of reference.

This handbook is not intended to be a reference manual nor should the handbook be construed as a tutorial on how to use the utility. Rather, the information contained in this handbook should be useful for anyone interested in detecting, analyzing and correcting performance problems with the database or application.

INTENDED AUDIENCE

This handbook is intended for experienced database administrators familiar with the RMU Show Statistic utility. You should also be familiar with database management procedures and terminology.

HANDBOOK CONTENTS

The RMU Show Statistic "DBA Handbook" is comprised of five volumes. These are the following:

- Volume 1 - Methods and Internals.

- Volume 2 - Screen Chapters 1 through 7.

- Volume 3 - Screen Chapters 8 Through 13.

- Volume 4 - Screen Chapters 14 Through 22.

- Volume 5 - Appendix Information.

ORACLE CODASYL DBMS

This handbook discusses the Oracle Rdb product. However, the RMU Show Statistic utility is almost identical for the Oracle CODASYL DBMS product DBO Show Statistic utility; in fact, it uses a common same source code. Therefore, the few statistic screens that are unique to the Oracle DBMS product are included in this handbook.

OPERATING SYSTEM INFORMATION

The information contained in this handbook is, for the most part, operating system independent. However, on the rare occasion when an operating system specific item is discussed, the section will be appropriately high-lighted.

RELATED MANUALS

For more information on the RMU Show Statistic utility, and database performance tuning information in general, please refer to the following Oracle Rdb documentation:

- Oracle Rdb RMU Reference Manual

- Oracle Rdb Guide to Database Maintenance

- Oracle Rdb Guide to Database Performance and Tuning

In addition, there are several "white papers" discussing RMU Show Statistic issues available in **MetaLink**. For information on the MetaLink system, please contact Oracle Client Relations or visit the Oracle Support webpage at

http://www.oracle.com/support/

ACKNOWLEDG-MENTS

A special word of thanks is extended to Simon Pickering for writing the initial version of the Handbook back in 1995, upon which this new version is loosely based.

A word of thanks is also extended to Kathy Oakey, Bill Gettys, Lilian Hobbs and all the other Oracle Rdb consultants who begged and pleaded for more detailed performance analysis screens to make their job easier. Without these suggestions and ideas, the RMU Show Statistic utility would not be as powerful as it is today.

Finally, I have to thank Anna Logan, who wrote the *Guide to Database Performance and Tuning* manual. She diligently kept after me to keep the "help" documentation up-to-

date, even when I was adding screens to the RMU Show Statistic was utility on a daily basis.

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Chapter

1

RMU Show Statistic Utility

O racle Rdb7 collects and maintains an immense amount of runtime statistical and analytical information about database activities as they occur over time. The RMU Show Statistic utility performs the presentation and analysis of this statistical information.

RMU Show Statistic Menu Overview

To display the "Main" menu, select the "Menu" on-screen menu option from any screen.

The following is the complete list of RMU Show Statistic utility menus, in alphabetical order:

Menu Name	Description	Restrictions
Database Dashboard	Run-time database attribute information, including global and per-process information	Not available if INPUT qualifier specified
Database Parameter Info	Database and operating system attribute information, similar to that available using the RMU DUMP HEADER utility	Not available if INPUT qualifier specified
General Information	General (obscure) information	None
Global Buffer Information	Global Buffer information	Not available if global buffers disabled
Help	Online "help" information	Use "**?**" keystroke
Hot Standby Information	Hot Standby feature information	None
Index Information	Index summary information	None

Menu Name	Description	Restrictions
IO Statistics (by file)	I/O information on a per-storage area basis, including storage area overview information	Not available if INPUT qualifier specified unless binary file created with OUTPUT=area qualifier
IO Statistics Information	IO summary information	None
Journaling Information	AIJ and RUJ journal menu. Also includes general process failure recovery screens	None
Lock Statistics (by file)	Lock information on a per-storage area basis, including storage area overview information	Not available if INPUT qualifier specified unless binary file created with OUTPUT=area qualifier
Locking (one lock type)	Lock information for a specific lock type, including summary lock information	None
Locking (one stat type)	Lock information for a specific statistic type	None
Logical Area Information	Logical Area (tables and indices) information	Not available if INPUT or NOLOGICAL_AREA qualifiers specified
Main Menu	Main menu displayed when "Menu" on-screen menu option selected comprised primarily of summary statistic information screens	None
Objects (one stat field)	Database rootfile "object" information for a specific statistic type	None
Objects (one stat type)	Database rootfile "object" information for a specific object type	None
Online Analysis & Info.	Online database and application statistical analysis	Not available if INPUT qualifier specified

Menu Name	Description	Restrictions
Process Information	Application process information menu	Not available if INPUT qualifier specified
Row Cache (One cache)	Row cache information for a specific row cache	Not available if row cache disabled or INPUT qualifier specified unless binary file created with OUTPUT=row_cache qualifier
Row Cache (One Field)	Row cache information for a specific statistic type	Not available if row cache disabled or INPUT qualifier specified unless binary file created with OUTPUT=row_cache qualifier
Row Cache Information	Detailed row cache information, displayed for a specific row cache	Not available if row cache disabled or INPUT qualifier specified unless binary file created with OUTPUT=row_cache qualifier
Tools	Collection of tools and RMU Show Statistic utility processing options	Use (**!**) keystroke

RMU Show Statistic Screen Overview

To move from one screen to another, select the "Menu" on-screen menu option to display the main menu. Then select the desired screen or sub-menu.

Although only one screen can be active at any one time, the RMU Show Statistic utility still maintains all the statistic field counters, including maximum and averages. If you specify the OUTPUT qualifier, you can select different screens without affecting the format of the binary statistics output file. The file contains all the database statistics, not just the current screen.

The following table provides a complete list of the RMU Show Statistic utility screens, in alphabetical order, with a brief description of each screen and indicates where you can find more information about each one.

Screen Name	Description	Menu
2PC Statistics	Provides information about distributed transaction performance.	Journaling Information
ABS Dashboard	Shows the actual database parameter and attribute settings used by the processes attached to the database.	Database Dashboard
ACTIVE Locks	Shows lock statistics for one particular lock type.	Locking (one lock type)
ACTIVE Object	Shows statistics for a specific database rootfile object collection category.	Objects (one stat field)
Active Stall Counts	Shows active stall activity broken down by stall types.	Journaling Information
Active User Chart	Shows the number of active users attached to the database over a period of time.	Journaling Information
Active User Information	Shows dynamic information that automatically changes to reflect database parameter modifications.	Database Dashboard
Active User Stall Messages	Shows all processes attached to the database on the current node and, if a process stalled, shows the reason why the stall occurred.	Journaling Information
AIJ Analysis	Displays runtime performance analysis information.	Online Analysis & Info.
AIJ Backup Activity	Shows one line of information for each active AIJ Backup Server (ABS) or manual RMU Backup After_Journal utility on the node.	Journaling Information
AIJ Dashboard	Shows the actual database parameter and attribute settings used by the processes attached to the database.	Database Dashboard

Screen Name	Description	Menu
AIJ Journal Growth Trend	Graphically portrays the size of the current AIJ journal over a measured period of time.	Journaling Information
AIJ Journal Information	Shows information about all of a database's after-image journals on the current node.	Journaling Information
AIJ Locks	Shows lock statistics for one particular lock type.	Locking (one lock type)
AIJ Statistics	Shows a summary of after-image journaling activity.	Journaling Information
AIJDB Object	Shows statistics for a specific database rootfile object collection category.	Objects (one stat field)
AIJFB Object	Shows statistics for a specific database rootfile object collection category.	Objects (one stat field)
ALS Dashboard	Shows the actual database parameter and attribute settings used by the processes attached to the database.	Database Dashboard
ALS Statistics	Shows AIJ log server activity.	Journaling Information
Area Analysis	Displays runtime performance analysis information.	Online Analysis & Info.
Area Locks	Shows lock statistics for one particular lock type.	Locking (one lock type)
Asynchronous IO Statistics	Shows statistics on asynchronous reads and writes to the database files.	IO Statistics Information
Audit Information	Shows dynamic information that automatically changes to reflect database parameter modifications.	Database Dashboard
Blocking ASTs	Shows lock statistics for all lock types of a particular statistical field.	Locking (one stat field)
Buffer Analysis	Displays runtime performance	Online Analysis

Screen Name	Description	Menu
	analysis information.	& Info.
Buffer Information	Shows dynamic information that automatically changes to reflect database parameter modifications.	Database Dashboard
Buffer/Page Locks	Shows lock statistics for one particular lock type.	Locking (one lock type)
Cache Full	Shows row cache statistics for all row caches of a particular statistical field.	Row Cache (One Field)
Cache Searches	Shows row cache statistics for all row caches of a particular statistical field.	Row Cache (One Field)
Cache Unmark	Shows row cache statistics for all row caches of a particular statistical field.	Row Cache (One Field)
Checkpoint Dashboard	Shows the actual database parameter and attribute settings used by the processes attached to the database.	Database Dashboard
Checkpoint Information	Shows process checkpoint information.	Process Information
Checkpoint Statistics	Shows transaction and checkpoint activity.	Journaling Information
CLIENT Locks	Shows lock statistics for one particular lock type.	Locking (one lock type)
CLIENT Object	Shows statistics for a specific database rootfile object collection category.	Objects (one stat field)
CLTSEQ Object[1]	Shows statistics for a specific client sequence object collection category.	Objects (one stat field)
Collision	Shows row cache statistics for all row caches of a particular statistical field.	Row Cache (One Field)
CPT Object	Shows statistics for a specific database rootfile object collection cate-	Objects (one stat field)

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[1] Available in Oracle Rdb 8.0.

Screen Name	Description	Menu
	gory.	
CPU Utilization	Shows the current CPU utilization of each database process.	Process Information
Custom Statistics	Shows a customized screen of any of the base statistics information (for example, non-by-area and non-per-process statistics).	Main menu
DBKEY Information	Shows the last retrieved DBKEY for data, snapshot, SPAM, AIP, and ABM pages.	Process Information
DBR Activity	Shows one line of information for each Database Recovery process (DBR) active on the node.	Process Information
DBR Dashboard	Shows the actual database parameter and attribute settings used by the processes attached to the database.	Database Dashboard
Defined Logicals	Shows a list of all the logical names currently accessible to the RMU Show Statistic utility.	Process Information
Device Information	Shows an online view of the storage area device information.	IO Statistics (by file)
Device IO Overview	Shows a composite view of I/O activity for all affected disk devices.	IO Statistics (by file)
Fast Commit Information	Shows dynamic information that automatically changes to reflect database parameter modifications.	Database Dashboard
Fast Incremental Backup Statistics	Shows "Fast Incremental Backup" feature activity.	Journaling Information
File IO Overview	Shows a composite view of I/O activity for all storage areas.	IO Statistics (by file)
File Locking Overview	Provides locking information for all storage areas.	Lock Statistics (by file)
FILID Locks	Shows lock statistics for one particu-	Locking (one

Screen Name	Description	Menu
	lar lock type.	lock type)
FILID Object	Shows statistics for a specific database rootfile object collection category.	Objects (one stat field)
Found in Cache	Shows row cache statistics for all row caches of a particular statistical field.	Row Cache (One Field)
Found in Workset	Shows row cache statistics for all row caches of a particular statistical field.	Row Cache (One Field)
Found Too Big	Shows row cache statistics for all row caches of a particular statistical field.	Row Cache (One Field)
Freeze Locks	Shows lock statistics for one particular lock type.	Locking (one lock type)
GB Frequency Information	Displays the effectiveness of the global buffer pool for sharing of pages.	Global Buffer Information
GB Hot Page Information	Displays a list of the most heavily shared pages in the global buffer pool.	Global Buffer Information
GB Utilization	Shows the utilization of each page in a global buffer.	Global Buffer Information
General Information	Shows dynamic information that automatically changes to reflect database parameter modifications.	Database Dashboard
Group Commit Statistics	Provides information about AIJ group commit processing.	Journaling Information
Hash Index Statistics	Shows hashed index update and retrieval activity.	Index Information
Hash Misses	Shows row cache statistics for all row caches of a particular statistical field.	Row Cache (One Field)
Hot Row Information	Displays a list of the most frequently accessed rows for a specific row cache.	Row Cache Information

Screen Name	Description	Menu
Hot Standby Dashboard	Shows the actual database parameter and attribute settings used by the processes attached to the database.	Database Dashboard
Hot Standby Information	Shows dynamic information that automatically changes to reflect database parameter modifications.	Database Dashboard
Hot Standby Statistics	Provides information about the performance and status of the hot standby feature.	Hot Standby Information
Index Analysis	Displays runtime performance analysis information.	Online Analysis & Info.
Index Statistics	Shows Oracle DBMS index information.	Index Menu
Index Statistics (Insertion)	Shows sorted index insertion and modification activity.	Index Information
Index Statistics (Removal)	Shows sorted index deletion activity.	Index Information
Index Statistics (Retrieval)	Shows sorted index retrieval activity.	Index Information
Insert Cache	Shows row cache statistics for all row caches of a particular statistical field.	Row Cache (One Field)
IO Dashboard	Shows the actual database parameter and attribute settings used by the processes attached to the database.	Database Dashboard
IO Stall Time	Shows a summary of all I/O stall activity.	IO Statistics Information
IO Statistics (by file)	I/O statistics for each database file.	IO Statistics (by file)
Journal Information	Shows dynamic information that automatically changes to reflect database parameter modifications.	Database Dashboard
Journaling Information	Shows dynamic information that automatically changes to reflect	Database Dashboard

Screen Name	Description	Menu
	database parameter modifications.	
KROOT Object	Shows statistics for a specific database rootfile object collection category.	Objects (one stat field)
Latch Requests	Shows row cache statistics for all row caches of a particular statistical field.	Row Cache (One Field)
Latch Retried	Shows row cache statistics for all row caches of a particular statistical field.	Row Cache (One Field)
Lock Deadlock History	Identifies the object that causes a deadlock event.	Process Information
Lock Information	Shows dynamic information that automatically changes to reflect database parameter modifications.	Database Dashboard
Lock Statistics (by file)	Provides information about page locks that are specific to storage areas and snapshot files.	Lock Statistics (by file)
Lock Timeout History	Identifies the object that causes a timeout event.	Process Information
Locking Analysis	Displays runtime performance analysis information.	Online Analysis & Info.
Locking Dashboard	Shows the actual database parameter and attribute settings used by the processes attached to the database.	Database Dashboard
Locks Demoted	Shows lock statistics for all lock types of a particular statistical field.	Locking (one stat field)
Locks Promoted	Shows lock statistics for all lock types of a particular statistical field.	Locking (one stat field)
Locks Released	Shows lock statistics for all lock types of a particular statistical field.	Locking (one stat field)
Locks Requested	Shows lock statistics for all lock types of a particular statistical field.	Locking (one stat field)
Logical Area Locks	Shows lock statistics for one particu-	Locking (one

Screen Name	Description	Menu
	lar lock type.	lock type)
Logical Area Overview	Shows database activity for all logical areas	Logical Area Information
Logical Area Specific Displays	Shows database activity on a per-logical area basis.	Logical Area Information
MEMBIT Locks	Shows lock statistics for one particular lock type.	Locking (one lock type)
Monitor Dashboard	Shows the actual database parameter and attribute settings used by the processes attached to the database.	Database Dashboard
Monitor Log	Allows you to view the monitor log on line.	Process Information
Name translation	Shows statistics on database dashboard updates and logical name translation.	General Information
Nowait Locks	Shows lock statistics for one particular lock type.	Locking (one lock type)
Objects Fetch Excl	Shows statistics for a specific database object.	Objects (one stat type)
Objects Fetch Shrd	Shows statistics for a specific database object.	Objects (one stat type)
Objects Modified	Shows statistics for a specific database object.	Objects (one stat type)
Objects Refreshed	Shows statistics for a specific database object.	Objects (one stat type)
Objects Released	Shows statistics for a specific database object.	Objects (one stat type)
Objects Written	Shows statistics for a specific database object.	Objects (one stat type)
OpenVMS SYSGEN Information	Shows dynamic information that automatically changes to reflect operating system parameter modifi-	Database Dashboard

Screen Name	Description	Menu
	cations.	
Per-Process IO Dashboard	Shows the actual database parameter and attribute settings used by the processes attached to the database.	Database Dashboard
Per-process Journal Dashboard	Shows the actual database parameter and attribute settings used by the processes attached to the database.	Database Dashboard
Per-Process Row Cache Dashboard	Shows the actual database parameter and attribute settings used by the processes attached to the database.	Database Dashboard
PIO Statistics--Data Fetches	Shows statistics on how data page requests are handled.	IO Statistics Information
PIO Statistics--Data Writes	Shows a summary of data file writes and buffer unmarking activity.	IO Statistics Information
PIO Statistics--File Access	Shows information about file access.	IO Statistics Information
PIO Statistics--SPAM Accesses	Shows statistics on what caused SPAM page requests.	IO Statistics Information
PIO Statistics--SPAM Fetches	Shows statistics on how SPAM page requests are handled.	IO Statistics Information
PIO Statistics--SPAM Writes	Shows SPAM write I/O information.	IO Statistics Information
Process Accounting	Shows continuously updated OpenVMS accounting information about local processes in a cluster environment.	Process Information
Process Analysis	Displays runtime process performance analysis information.	Online Analysis & Info.
Process IO Overview	Displays process-specific I/O summary information for all activated processes	Process Information
Process Journal IO Overview	Displays process-specific RUJ and AIJ journal I/O summary informa-	Process Information

Screen Name	Description	Menu
	tion for all activated processes	
Process Lock Overview	Displays process-specific locking summary information for all activated processes	Process Information
Process Object Overview	Displays process-specific rootfile object summary information for all activated processes	Process Information
Process Record Overview	Displays process-specific record summary information for all activated processes	Process Information
Process Snapshot Overview	Displays process-specific snapshot summary information for all activated processes	Process Information
Prom Deadlocks	Shows lock statistics for all lock types of a particular statistical field.	Locking (one stat field)
Prom Timeouts	Shows lock statistics for all lock types of a particular statistical field.	Locking (one stat field)
Proms Not Queued	Shows lock statistics for all lock types of a particular statistical field.	Locking (one stat field)
Proms Stalled	Shows lock statistics for all lock types of a particular statistical field.	Locking (one stat field)
Quiet Point Locks	Shows lock statistics for one particular lock type.	Locking (one lock type)
RCACHE Object	Shows statistics for a specific database rootfile object collection category.	Objects (one stat field)
RCS Statistics	Provides information about the runtime operation of the row cache server (RCS) process.	Row Cache Information
Record Analysis	Displays runtime performance analysis information.	Online Analysis & Info.
Record Locks	Shows lock statistics for one particular lock type.	Locking (one lock type)

Screen Name	Description	Menu
Record Statistics	Shows a summary of data row activity.	Main Menu
Recovery Analysis	Displays runtime performance analysis information.	Online Analysis & Info.
Recovery Information	Displays runtime Hot Standby recovery performance information.	Hot Standby Information
Recovery Statistics	Identifies various recovery phases and shows information on how long each phase took to complete.	Journaling Information
Row Cache (One Cache)	Provides summary information for a specific row cache.	Row Cache (One Cache)
Row Cache Analysis	Displays runtime performance analysis information.	Online Analysis & Info.
Row Cache Dashboard	Shows the actual database parameter and attribute settings used by the processes attached to the database.	Database Dashboard
Row Cache Information	Shows dynamic information that automatically changes to reflect database parameter modifications.	Database Dashboard
Row Cache Queue Length	Provides information to determine the relative CPU performance impact of row caching.	Row Cache Information
Row Cache Status	Provides overall status for a specific row cache.	Row Cache Information
Row Cache Utilization	Provides utilization information for each row in a specific row cache.	Row Cache Information
Row Length Distribution	Shows the distribution of the various row lengths in a specific row cache.	Row Cache Information
Row Too Big	Shows row cache statistics for all row caches of a particular statistical field.	Row Cache (One Field)
Rqst Deadlocks	Shows lock statistics for all lock types of a particular statistical field.	Locking (one stat field)

Screen Name	Description	Menu
Rqst Timeouts	Shows lock statistics for all lock types of a particular statistical field.	Locking (one stat field)
Rqsts Not Queued	Shows lock statistics for all lock types of a particular statistical field.	Locking (one stat field)
Rqsts Stalled	Shows lock statistics for all lock types of a particular statistical field.	Locking (one stat field)
RTUPB Locks	Shows lock statistics for one particular lock type.	Locking (one lock type)
RTUPB Object	Shows statistics for a specific database rootfile object collection category.	Objects (one stat field)
RUJ Analysis	Displays runtime performance analysis information.	Online Analysis & Info.
RUJ Dashboard	Shows the actual database parameter and attribute settings used by the processes attached to the database.	Database Dashboard
RUJ Statistics	Provides summary information for all active update transactions.	Journaling Information
SEQBLK Locks	Shows lock statistics for one particular lock type.	Locking (one lock type)
SEQBLK Object	Shows statistics for a specific database rootfile object collection category.	Objects (one stat field)
Skipped Dirty Slot	Shows row cache statistics for all row caches of a particular statistical field.	Row Cache (One Field)
Slipped Inuse Slot	Shows row cache statistics for all row caches of a particular statistical field.	Row Cache (One Field)
Snapshot Locks	Shows lock statistics for one particular lock type.	Locking (one lock type)
Snapshot Statistics	Shows snapshot activity for update and read-only transactions.	Main Menu
Stall Messages	Shows a summary of database users'	Process Infor-

Screen Name	Description	Menu
	stall activity.	mation
Stall Statistics	Shows a summary of stalls broken down by stall types.	Process Information
Stall Time x100	Shows lock statistics for all lock types of a particular statistical field.	Locking (one stat field)
Statistics Event Information	Shows dynamic information that automatically changes to reflect database parameter modifications.	Database Dashboard
Storage Area Information	Shows dynamic information that automatically changes to reflect database parameter modifications.	Database Dashboard
Summary Cache Statistics	Shows cumulative information for all row caches in the database.	Main Menu
Summary Cache Unmark Statistics	Shows cumulative row cache "unmark" statistics that describe how rows in the row caches are written back to disk.	Main Menu
Summary IO Statistics	Shows a summary of database I/O activity.	Main Menu
Summary Locking Statistics	Shows a summary of the locking activity.	Main Menu
Summary Object Statistics	Shows cumulative information for all database root file objects.	Main Menu
Summary Tx Statistics	Shows a summary of database transaction activity.	Main Menu
Synchronization Mode Statistics	Provides a breakdown of each type of synchronization mode.	Hot Standby Information
Total Locks	Shows lock statistics for one particular lock type.	Locking (one lock type)
Transaction Analysis	Displays runtime performance analysis information.	Online Analysis & Info.
Transaction Duration	Shows overall real-time transaction	Main Menu

Screen Name	Description	Menu
	processing performance.	
TSNBLK Locks	Shows lock statistics for one particular lock type.	Locking (one lock type)
TSNBLK Object	Shows statistics for a specific database rootfile object collection category.	Objects (one stat field)
UTILITY Object	Shows statistics for a specific database rootfile object collection category.	Objects (one stat field)
Verb Statistics (1)	Shows Oracle DBMS verb information.	Main Menu
Verb Statistics (2)	Shows more Oracle DBMS verb information.	Main Menu
VLM Requests	Shows row cache statistics for all row caches of a particular statistical field.	Row Cache (One Field)
Window Turns	Shows row cache statistics for all row caches of a particular statistical field.	Row Cache (One Field)

Chapter

2
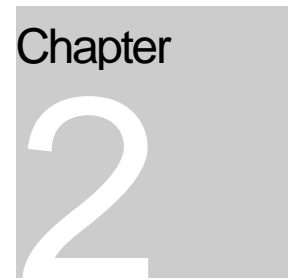
Main Menu Screens

RMU Show Statistic Main Menu Screens

The "Main" menu is displayed when the "Menu" on-screen menu option selected comprised primarily of summary statistic information screens.

Summary IO Statistics Screen

This screen summarizes database I/O activity and indicates transaction and verb execution rates. This screen should be used as a starting point; use the "File IO Statistics" screen and the "File IO Overview" screen to narrow down I/O problems.

The information displayed on the screen is a summation of the information displayed on a per-storage-area basis in the "IO Statistics (by file)" screens.

SCREEN LOCATION

This screen resides in the "Main" menu.

SCREEN EXAMPLE

The following is an example of the "Summary IO Statistics" screen:

```
Node: MYNODE (1/1/2)    Oracle Rdb X7.0-00 Perf. Monitor 15-JAN-1998 13:10:27.90
Rate: 1.00 Second              Summary IO Statistics          Elapsed: 00:09:13.89
Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1    Mode: Online
--------------------------------------------------------------------------------

statistic.........      rate.per.second............. total....... ave rage......
name.............      max..... cur..... avg....... count....... per.trans....

transactions                0        0       0.0            0            0.0
verb successes              0        0       0.0            0            0.0
verb failures               0        0       0.0            0            0.0

synch data reads            0        0       0.0            0            0.0
synch data writes           0        0       0.0            0            0.0
asynch data reads           0        0       0.0            0            0.0
asynch data writes          0        0       0.0            0            0.0
RUJ file reads              0        0       0.0            0            0.0
RUJ file writes             0        0       0.0            0            0.0
AIJ file reads              0        0       0.0            0            0.0
AIJ file writes             0        0       0.0            0            0.0
ACE file reads              0        0       0.0            0            0.0
ACE file writes             0        0       0.0            0            0.0
root file reads             0        0       0.0            0            0.0
root file writes            0        0       0.0            0            0.0

--------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Unreset Write X_plot
```

SCREEN FIELDS

transactions
This field gives the number of completed database transactions. This is the count of the COMMIT and ROLLBACK statements that have executed.

verb successes
This field gives the number of completed verbs that returned a successful status code.

A verb is an atomic SQL statement or action. For example, a record insert is a verb, as is a record deletion.

Also, within a compound statement each individual statement is atomic and Oracle Rdb performs a verb-success operation after processing each one. To avoid this overhead, you can use the SQL BEGIN atomic statement to treat the entire block as a single verb.

verb failures
This field gives the number of completed verbs that returned an error status code. Errors include end-of-collection and deadlocks, as well as all other exception conditions.

A verb is an atomic SQL statement or action. For example, a record insert is a verb, as is a record deletion.

Excessive verb failures are usually an indication of a failed constraint, such as uniqueness criteria, or an invalid DDL statement. Note that in the case of cursors and scans, reaching the end-of-stream always results in a verb failure.

Note that SQL performs its own internal queries to identify metadata, such as relation or index names.

Oracle Rdb rarely issues a verb-failure unless there is an exception of some kind, such as a constraint failure.

synch data reads
This field gives the number of synchronous read QIOs (queued I/O requests) issued to the database storage area for single-file and multi-file databases and snapshot files. This operation reads database pages synchronously from the database.

synch data writes
This field gives the number of synchronous write QIOs (queued I/O requests) issued to the database storage area for single-file and multi-file databases (.RDA) and snapshot files (.SNP). This operation writes modified database pages synchronously back to the database.

asynch data reads
This field gives the number of asynchronous read QIOs (queued I/O requests) issued to the database storage area for single-file and multi-file databases (.RDA) and snapshot (.SNP) files. This operation reads database pages asynchronously from the database.

asynch data writes
This field gives the number of asynchronous write QIOs (queued I/O requests) issued to the database storage area for single-file and multi-file databases (.RDA) and snapshot files (.SNP). This operation writes modified database pages asynchronously back to the database.

RUJ file reads This field gives the number of read QIOs (queued I/O requests) issued to the database recovery unit journal (.RUJ) files. This operation reads before-image records from the RUJ file to roll back a verb or a transaction.

This statistic field includes both synchronous and asynchronous I/O read requests.

RUJ file writes This field gives the number of write QIOs (queued I/O requests) issued to the database recovery unit journal (.RUJ) files. This operation writes before-image records to the RUJ file in case a verb or transaction must be rolled back. Before-images must be written to the RUJ file before the corresponding database page can be written back to the database.

This statistic field includes both synchronous and asynchronous I/O write requests.

AIJ file reads The number of read QIOs issued to the database after-image journal (.AIJ) file. If after-image journaling is not enabled for the database this statistic will be zero.

This statistic field includes both synchronous and asynchronous I/O read requests.

AIJ file writes This field gives the total number of write QIOs (queued I/O requests) issued to the database after-image journal (.AIJ) file. If after-image journaling is not enabled for the database, this statistic will be zero. This operation writes after-image records to the after-image journal to facilitate roll-forward recovery using the RMU Recover utility.

This statistic field includes both synchronous and asynchronous I/O write requests.

ACE file reads The number of read QIOs issued to the database after-image journal cache (.ACE) file. If after-image journaling is not enabled for the database this statistic will be zero.

ACE file writes This field gives the total number of write QIOs (queued I/O requests) issued to the database after-image journal cache (.ACE) file. If after-image journaling is not enabled for the database, this statistic will be zero. This operation writes after-image records to the after-image journal to facilitate roll-forward recovery using the RMU Recover utility.

root file reads This field gives the number of read QIOs (queued I/O requests) issued to the database root (.RDB) file. Oracle Rdb reads the .RDB file when a new user attaches to the database and when an .RDB file control block needs to be updated because of database activity on another OpenVMS cluster node.

root file writes This field gives the number of write QIOs (queued I/O requests) issued to the database root (.RDB) file. Oracle Rdb writes to the .RDB file when a user issues a COMMIT or ROLLBACK statement. Other events also cause updates to the .RDB file.

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph   This on-screen menu option displays a histogram graph instead of numbers.

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot   This on-screen menu option plots a specific field's value by time.

Unreset   This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot   This on-screen menu option plots a specific field's value using scatter-based display.

Compare the "verb successes" statistic to the "verb failures" statistic. A high failure rate compared to the success rate indicates that many things are failing. The problem might be too many deadlocks, but this is really application-dependent.

Compare the RUJ file reads and the RUJ file writes statistics. Too many RUJ file reads indicate too many rollbacks. Too many RUJ file writes might indicate data page contention problems or transactions that modify a lot of data. More than one write for each transaction indicates that marked pages are being written back to the database before the actual commit, meaning either another recovery-unit requested the page, the buffer pool overflowed, or there are very large transactions with lots of updates.

Compare the synchronous data file reads with the asynchronous data file reads. If the ratio is high, it is likely that there are too many sequential scans being performed. These scans can be either sequential access to tables, or full btree index scans. In either case, you should further investigate this issue to understand if this is normal behaviour of the application. You may need to add or re-define your btree indexes to minimize the number of sequential scans being performed.

Page Navigation	This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.
Binary File Support	This screen is available during replay of a binary file specified by the INPUT qualifier.
ster Statistic Collection Support	This screen is integrated into the "Cluster Statistic Collection" facility.
Zoom Screen	This screen does <u>not</u> have a zoom screen.

**C O N F I G U R A T I O N
O P T I O N S**

This screen does <u>not</u> have any configuration options.

Summary Locking Statistics Screen

This screen monitors the total database locking activity. The statistics in this screen are the totals for all types of database locks.

S C R E E N   L O C A T I O N

This screen resides in the "Main" menu.

S C R E E N   E X A M P L E

The following is an example of the "Summary Locking Statistics" screen:

```
Node: MYNODE (1/1/1)    Oracle Rdb X7.0-00 Perf. Monitor 23-JAN-1998 13:32:40.03
Rate: 1.00 Second            Summary Locking Statistics        Elapsed: 00:00:04.15
Page: 1 of 1     DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1     Mode: Online
--------------------------------------------------------------------------------

statistic........        rate.per.second............  total.......  ave rage......
name.............        max..... cur..... avg.......  count.......  per.trans....

locks requested              0        0       0.0          0            0.0
 rqsts not queued            0        0       0.0          0            0.0
 rqsts stalled               0        0       0.0          0            0.0
 rqst timeouts               0        0       0.0          0            0.0
 rqst deadlocks              0        0       0.0          0            0.0
locks promoted               0        0       0.0          0            0.0
 proms not queued            0        0       0.0          0            0.0
 proms stalled               0        0       0.0          0            0.0
 prom timeouts               0        0       0.0          0            0.0
 prom deadlocks              0        0       0.0          0            0.0
locks demoted                0        0       0.0          0            0.0
locks released               0        0       0.0          0            0.0
blocking ASTs                0        0       0.0          0            0.0
stall time x100              0        0       0.0          0            0.0
invalid lock block           0        0       0.0          0            0.0
ignored lock mode            0        0       0.0          0            0.0


--------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Unreset Write X_plot
```

S C R E E N   F I E L D S

locks requested This field gives the number of lock requests, also referred to as "enqueue" lock requests, for new locks. Whether the lock request succeeds or fails, it is included in this count. The "rqsts not queued", "rqsts stalled", and "rqst deadlocks" counts provide further detail for enqueue lock requests statistics.

rqsts not queued   This field gives the number of enqueue lock requests for new locks that were rejected immediately because of a lock conflict. Oracle Rdb often requests a lock without waiting and, when a conflict is detected, resorts to a secondary locking protocol to avoid unnecessary deadlocks. This number is one measure of lock contention.

rqsts stalled   This field gives the number of enqueue lock requests for new locks that were stalled because of a lock conflict. Whether or not the lock request ultimately succeeds, it is included in this count. This number is one measure of lock contention.

rqst timeouts   This field shows the total number of lock requests that could not be granted because they timed out. These are typically logical areas.

Each lock timeout reported in the "rqst timeouts" field is also reported in the "rqsts stalled" field. This is because each timed out request is also a stalled request.

rqst deadlocks   This field gives the number of stalled enqueue lock requests for new locks that ultimately resulted in a deadlock. Most deadlocks are tried again and resolved by Oracle Rdb without the application program ever knowing there was a deadlock. Therefore, the number shown in this field does not necessarily reflect the number of deadlocks reported to the application program.

Each lock deadlock reported in the "rqst deadlocks" field is also reported in the "rqsts stalled" field. This is because each deadlocked request is also a stalled request.

locks promoted   This field gives the number of enqueue lock requests to promote an existing lock to a higher lock mode. Whether or not the lock request succeeds, it is included in this count. The "proms not queued," "proms stalled," and "prom deadlocks" counts provide further detail for the locks promotion statistics.

proms not queued   This field gives the number of enqueue lock requests to promote an existing lock that were rejected immediately because of a lock conflict. Oracle Rdb often requests a lock without waiting. When a conflict is detected, Oracle Rdb resorts to a secondary locking protocol to avoid unnecessary deadlocks. This number is one measure of lock contention.

proms stalled   This field gives the number of enqueue lock requests to promote an existing lock to a higher lock mode that were stalled because of a lock conflict. Whether or not the lock request ultimately succeeds, it is included in this count. This number is one measure of lock contention.

prom timeouts   This field shows the total number of lock promotions that could not be granted because they timed out. These are typically logical areas.

Each promotion timeout reported in the "prom timeouts" field is also reported in the "proms stalled" field. This is because each timed out request is also a stalled request.

prom deadlocks   This field gives the number of stalled enqueue lock requests to promote an existing lock that ultimately resulted in a deadlock. Most deadlocks are tried again and resolved

by Oracle Rdb without the application program ever knowing there was a deadlock. Therefore, this number does not necessarily reflect the number of deadlocks reported to the application program.

Each promotion deadlock reported in the "prom deadlocks" field is also reported in the "proms stalled" field. This is because each deadlocked request is also a stalled request.

locks demoted This field gives the number of enqueue lock requests to demote an existing lock to a lower lock mode. These requests always succeed.

locks released This field gives the number of deallocating lock requests to release an existing lock. These requests always succeed. The number of outstanding locks can be determined by the formula:

(locks requested) - (rqsts not queued) - (rqst deadlocks) - (locks released).

blocking ASTs This field gives the number of blocking ASTs, sometimes referred to as "blasts", delivered to Oracle Rdb by the lock manager. A blocking AST is delivered to the holder of a lock when a lock conflict is detected, which is a good indication of contention problems. When Oracle Rdb receives a blocking AST, it often demotes or releases a lock in an attempt to avoid unnecessary deadlocks.

The number of blocking ASTs reported is composed of two different types of blocking ASTs: those generated externally and those generated internally.

An externally generated blocking AST occurs when a blocking AST is actually received by the process from the operating system in response to some lock conflict with another process. A blocking AST routine is executed and the RMU Show Statistic utility records the blocking AST activity.

An internally generated blocking AST occurs when a lock-blocking AST routine is executed by the process in anticipation that the same work would have to be performed anyway if a blocking AST were to be received from the operating system. This algorithm serves as an optimistic code optimization; the process, assuming it would eventually receive a blocking AST for the particular lock, executes the blocking AST routine. The RMU Show Statistic utility does not differentiate between these two types of blocking ASTs.

stall time x100 This field gives the total time in hundredths of a second spent by all users waiting for a lock. Since more than one user can be waiting for a lock at the same time, this total can be greater than the actual elapsed clock time. This statistic gives a relative measure of work lost due to lock conflicts.

invalid lock block This field gives the number of invalid lock value blocks encountered during a lock request or lock promote operation. The lock value block is the means by which Oracle Rdb communicates information between processes, either on the local node or to remote nodes in the cluster.

The following events may cause a lock value block to become invalid:

- The premature failure of a process while holding a lock in a strong mode, such as protected-update (PU) or exclusive-update (EX).

- The failure of a node on which a process is holding a lock in a strong mode.

- The OpenVMS lock tree is dynamically re-mastered to a new node in the cluster, while processes are holding locks in a strong mode.

Note that there is no storage area specific statistic for invalid lock value blocks.

Ignored lock mode   This field indicates the number of lock release operations that could not be performed due to the lock release being requested from AST context. The lock is instead de-moted to NL mode, and can be released later.

Note that there is no storage area specific statistic for ignored lock mode statistics.

**ON-SCREEN MENU
OPTIONS**

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph   This on-screen menu option displays a histogram graph instead of numbers.

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot   This on-screen menu option plots a specific field's value by time.

Unreset   This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot   This on-screen menu option plots a specific field's value using scatter-based display.

✔ The most important statistic is the "stall time x100" field. This field provides a measure of lost work as a result of waiting for lock requests to be granted. Eliminating lock stalls will probably provide the largest increase in performance throughput.

✔ Look at the "rqsts not queued", "rqsts stalled", and "rqst deadlocked" statistics. High numbers for these statistics, relative to the norm for your database, indicate contention problems. The problem might be that your database design is not optimal. The problem could also be a high number of blocking asynchronous system traps (ASTs) or it may be that users are contending for frequently accessed data.

Page Navigation	This screen does not contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.
Binary File Support	This screen is available during replay of a binary file specified by the INPUT qualifier.
ster Statistic Collection Support	This screen is integrated into the "Cluster Statistic Collection" facility.
Zoom Screen	This screen does not have a zoom screen.

This screen does not have any configuration options.

Summary Object Statistics Screen

This screen provides cumulative information for all database root file objects.

SCREEN LOCATION

This screen resides in the "Main" menu.

SCREEN EXAMPLE

The following is an example of the "Summary Objects Statistics" screen:

```
Node: MYNODE (1/1/1)    Oracle Rdb X7.0-00 Perf. Monitor 23-JAN-1998 13:43:30.31
Rate: 1.00 Second            Summary Object Statistics         Elapsed: 00:10:54.43
Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1    Mode: Online
--------------------------------------------------------------------------------

statistic.........     rate.per.second............. total....... ave rage......
name..............     max..... cur..... avg....... count....... per.trans....

objects fetch shrd          0        0       0.0          0            0.0
objects fetch excl          0        0       0.0          0            0.0
objects refreshed           0        0       0.0          0            0.0
objects modified            0        0       0.0          0            0.0
objects written             0        0       0.0          0            0.0
objects released            0        0       0.0          0            0.0


--------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Unreset Write X_plot
```

SCREEN FIELDS

objects fetch shrd This field displays the number of objects that are fetched for shared retrieval access.

objects fetch excl This field displays the number of objects that are fetched for exclusive access with the intention of subsequently being updated. This statistic does not indicate that the object was actually updated.

objects refreshed This field displays the number of objects whose information in the global section was detected as being stale, so the information was read again from the database root file.

objects modified This field displays the number of objects whose information was modified. Only objects fetched for exclusive access can be modified.

objects written This field displays the number of objects whose information was written back to the database root file.

objects released   This field displays the number of objects whose shared or exclusive access was re-leased to other processes.

**ON-SCREEN MENU
OPTIONS**

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph   This on-screen menu option displays a histogram graph instead of numbers.

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot   This on-screen menu option plots a specific field's value by time.

Unreset   This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot   This on-screen menu option plots a specific field's value using scatter-based display.

**SCREEN
INFORMATION**

This section discusses screen-specific issues.

Page Navigation   This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support   This screen is available during replay of a binary file specified by the INPUT qualifier.

Cluster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   This screen does <u>not</u> have a zoom screen.

**CONFIGURATION
OPTIONS**

This screen does <u>not</u> have any configuration options.

Summary Tx Statistics Screen[2]

This screen summarizes database transaction activity and indicates transaction and verb execution rates.

SCREEN LOCATION

This screen resides in the "Main" menu.

SCREEN EXAMPLE

The following is an example of the "Summary Tx Statistics" screen:

```
Node: ALPHA3 (1/1/24)   Oracle Rdb X7.0-00 Perf. Monitor  8-JUN-1998 08:41:35.40
Rate: 1.00 Second              Summary Tx Statistics         Elapsed: 02:40:31.18
Page: 1 of 1          KODA_TEST:[R_ANDERSON.TCS_MASTER]TCS.RDB;1      Mode: Online
--------------------------------------------------------------------------------
statistic.........     rate.per.second............. total....... ave rage......
name.............     max..... cur..... avg....... count....... per.trans....
transactions              0        0       0.0          3           1.0
  committed               0        0       0.0          3           1.0
  rolled back             0        0       0.0          0           0.0
    duration x100         0        0       0.0          0           0.0
  prepared                0        0       0.0          0           0.0
  not modified            0        0       0.0          0           0.0

verb successes            0        0       0.0          9           3.0
verb failures             0        0       0.0          0           0.0
  duration x100           0        0       0.0          0           0.0

checkpoints               0        0       0.0          0           0.0
    duration x100         0        0       0.0          0           0.0

RUJ file reads            0        0       0.0          0           0.0
    file writes           0        0       0.0          3           1.0
    file extend           0        0       0.0          0           0.0
--------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

SCREEN FIELDS

transactions   This field gives the number of completed database transactions. This is the count of the transaction COMMIT and ROLLBACK statements that have executed.

---

[2] Available in Oracle Rdb 7.0.2.0.

---

committed   This field identifies the actual number of transactions that committed successfully to the database.

rolled back   This field identifies the actual number of transactions that aborted and were not applied to the database.

duration x100   This field identifies the duration of the transaction rollback operation, expressed in hundredths of a second displayed as a whole number. For example, the value "500" is actually "5" seconds.

prepared   This field identifies the number of distributed transactions that have successfully "prepared" themselves for subsequent transaction commit.

not modified   This field identifies the number of committed transactions that did not modify any database objects. This field includes both read-only and read/write transactions.

verb successes   This field gives the number of completed verbs that returned a successful status code.

A verb is an atomic SQL statement or action. For example, a record insert is a verb, as is a record deletion.

Also, within a compound statement each individual statement is atomic and Oracle Rdb performs a verb-success operation after processing each one. To avoid this overhead, you can use the SQL BEGIN atomic statement to treat the entire block as a single verb.

verb failures   This field gives the number of completed verbs that returned an error status code. Errors include end-of-collection and deadlocks, as well as all other exception conditions.

A verb is an atomic SQL statement or action. For example, a record insert is a verb, as is a record deletion.

Excessive verb failures are usually an indication of a failed constraint, such as uniqueness criteria, or an invalid DDL statement. Note that in the case of cursors and scans, reaching the end-of-stream always results in a verb failure.

Note that SQL performs its own internal queries to identify metadata, such as relation or index names.

Oracle Rdb rarely issues a verb-failure unless there is an exception of some kind, such as a constraint failure.

duration x100   This field identifies the duration of the verb failure rollback operation, expressed as hundredths of a second displayed as a whole number. For example, the value "500" is actually "5" seconds.

checkpoints   This field identifies the number of checkpoints performed by users. This field does not include the initial checkpoint when the user first attaches to the database.

duration x100   This field displays the checkpoint duration, expressed in hundredths of a second displayed as a whole number. For example, the value "500" is actually "5" seconds.

RUJ file reads   This field displays the total number of read I/O operations performed on the RUJ journal during the transaction undo phase. The RUJ file is never written by the Database Recovery process (DBR).

This statistic field includes both synchronous and asynchronous I/O read requests.

file writes   This field displays the total number of write I/O operations performed on the RUJ journal during the transaction phase.

This statistic field includes both synchronous and asynchronous I/O write requests.

file extends   This field identifies the number of times an RUJ file has been extended. Ideally, this value should be "0" or as close to "0" as possible. Each RUJ file extension represents a performance bottleneck that is easily resolved.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph   This on-screen menu option displays a histogram graph instead of numbers.

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot   This on-screen menu option plots a specific field's value by time.

Unreset   This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot   This on-screen menu option plots a specific field's value using scatter-based display.

SCREEN
INFORMATION

✓ Compare the "verb successes" statistic to the "verb failures" statistic. A high failure rate compared to the success rate indicates that many things are failing. The problem might be too many deadlocks, but this is really application-dependent.

✓ Compare the RUJ file reads and the RUJ file writes statistics. Too many RUJ file reads indicate too many rollbacks. Too many RUJ file writes might indicate data page contention problems or transactions that modify a lot of data. More than one write for each transaction indicates that marked pages are being written back to the database before the actual commit, meaning either another recovery-unit requested the page, the buffer pool overflowed, or there are very large transactions with lots of updates.

✓ Examine the "rolled back duration x100" statistic field to ensure that transaction rollback operations are not excessively long. To identify transactions with potentially long transaction rollback durations, it is recommended that you carefully review the "Transaction Recovery Duration Estimate" screen, located in the "Process Information" sub-menu.

Page Navigation   This screen does not contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support   This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   This screen does not have a zoom screen.

CONFIGURATION
OPTIONS

This screen does not have any configuration options.

Summary Cache Statistics Screen

This screen provides cumulative information for all row caches in the database.

The Summary Cache Statistics screen is recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is available when you replay a binary file using the INPUT qualifier.

This screen is only available if the database has the row cache feature enabled.

SCREEN LOCATION

This screen resides in the "Main" menu.

SCREEN EXAMPLE

The following is an example of the "Summary Cache Statistics" screen:

```
MYNODE (1/1/1)   Oracle Rdb X7.0-00 Perf. Monitor 23-JAN-1998 14:02:07.09
Rate: 1.00 Second           Summary Cache Statistics        Elapsed: 00:29:31.21
Page: 1 of 1     DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1     Mode: Online
--------------------------------------------------------------------------------

statistic.........      rate.per.second............. total....... ave rage......
name..............      max..... cur..... avg....... count....... per.trans....

latch requests              0        0        0.0         0            0.0
  retried                   0        0        0.0         0            0.0
cache searches              0        0        0.0         0            0.0
  found in workset          0        0        0.0         0            0.0
  found in cache            0        0        0.0         0            0.0
  found too big             0        0        0.0         0            0.0
insert cache                0        0        0.0         0            0.0
  row too big               0        0        0.0         0            0.0
  cache full                0        0        0.0         0            0.0
  collision                 0        0        0.0         0            0.0
VLM requests                0        0        0.0         0            0.0
  window turns              0        0        0.0         0            0.0
skipped dirty slot          0        0        0.0         0            0.0
skipped inuse slot          0        0        0.0         0            0.0
hash misses                 0        0        0.0         0            0.0
cache unmark                0        0        0.0         0            0.0


--------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Unreset Write X_plot
```

SCREEN FIELDS

---

latch requests   This field displays the total number of latch requests that have occurred. A latch is requested whenever an internal data structure needs to be atomically modified, and indicates a potential stall point. The duration of the latch is essentially non-measurable.

retried   This field indicates the latch could not be immediately acquired and the latch had to be requested again. This field provides an indication of the contention on the row cache. Ideally, this field should be as close to zero as possible.

cache searches   This field displays the total number of times the row cache was searched for a particular row DBKEY. Values within this field are subdivided into the following fields:

- found in workset

- found in cache

- found too big

found in workset   This field indicates the particular row was found in the process' working set and no additional work was required to fetch the row. This is the ideal situation.

found in cache   This field indicates the particular row was not found in the process' working set, but was found in the global row cache. When this occurs, it is possible that the process will have to make room in the working set by removing an existing row to the global cache.

found too big   This field indicates the particular row was found in the global cache, but the row is now too large to fit into the specified cache buffer. At one time, the row fit into the cache, but it no longer does. Therefore, the cache effectiveness is reduced because a cache entry is reserved for the row but no row caching is possible.

insert cache   This field indicates the total number of times new rows have been inserted into the row cache. Values within this field are subdivided into the following fields

- row too big

- cache full

- collision

row too big   This field indicates the row was initially too large to fit into the specified row cache buffer.

cache full   This field indicates that all row cache entries were modified and could not be flushed to disk in order to make space for the new row. This is an indication that the row cache checkpoint intervals specified for the database may be too large.

collision   This field displays the total number of row cache hash table collisions that occurred when inserting new rows. This field provides an indication of the effectiveness of the cache size.

VLM requests   This field displays the number of VLM requests made.

window turns   This field displays the number of VLM requests made for which the VLM address range was not immediately available.

skipped dirty slot   This field displays the total number of cache entries that could not be replaced because the slot contained modified data rows. This field provides an indication of the relative amount of work required to find space in order to insert a new row into the cache.

skipped inuse slot   This field displays the total number of cache entries that could not be replaced because the slot was referenced by other processes. This field provides an indication of the relative amount of work required to find space in order to insert a new row into the cache.

hash misses   This field displays the total number of times the row cache hash table overflowed.

cache unmark   This field displays the total number of times a row in the cache was flushed to disk, thus making it eligible to be replaced. However, this field does not indicate whether or not the row was emptied from the cache.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph   This on-screen menu option displays a histogram graph instead of numbers.

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot   This on-screen menu option plots a specific field's value by time.

Unreset   This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot   This on-screen menu option plots a specific field's value using scatter-based display.

**S C R E E N
I N F O R M A T I O N**

This section discusses screen-specific issues.

Page Navigation   This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support   This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   This screen does <u>not</u> have a zoom screen.

**C O N F I G U R A T I O N
O P T I O N S**

This screen does <u>not</u> have any configuration options.

Summary Cache Unmark Statistics Screen

This screen provides row cache "unmark" statistics which describe how rows in the row caches are written back to disk.

The Summary Cache Unmark Statistics screen is recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is available when you replay a binary file using the INPUT qualifier.

This screen is only available if the database has the row cache feature enabled.

This screen resides in the "Main" menu.

The following is an example of the "Summary Cache Unmark Statistics" screen:

```
Node: MYNODE (1/1/1)    Oracle Rdb X7.0-00 Perf. Monitor 23-JAN-1998 14:13:14.01
Rate: 1.00 Second        Summary Cache Unmark Statistics      Elapsed: 00:40:38.13
Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1     Mode: Online
--------------------------------------------------------------------------------

statistic.........      rate.per.second............. total....... ave rage......
name..............      max..... cur..... avg....... count....... per.trans....

latch granted                    0        0        0.0            0             0.0
latch stalled                    0        0        0.0            0             0.0
latch deadlock                   0        0        0.0            0             0.0
latch demoted                    0        0        0.0            0             0.0
latch stall x100                 0        0        0.0            0             0.0


--------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Unreset Write X_plot
```

latch granted This field displays the number of times the row lock (latch) was granted.

latch stalled This field displays the number of times the row lock stalled before being granted.

latch deadlock This field displays the number of times the row lock stall resulted in a deadlock.

latch demoted This field displays the number of times the row lock was released.

latch stall x100 This field displays the row lock stall time in hundredths of a second.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph   This on-screen menu option displays a histogram graph instead of numbers.

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot   This on-screen menu option plots a specific field's value by time.

Unreset   This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot   This on-screen menu option plots a specific field's value using scatter-based display.

SCREEN INFORMATION

This section discusses screen-specific issues.

Page Navigation   This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support   This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   This screen does <u>not</u> have a zoom screen.

CONFIGURATION OPTIONS

This screen does <u>not</u> have any configuration options.

Verb Statistics (1) Screen

Oracle
DBMS
only

This screen monitors the most commonly executed Oracle DBMS verbs. Lesser-used
verbs are available on the next screen.

SCREEN LOCATION

This screen resides in the "Main" menu.

SCREEN EXAMPLE

The following is an example of the "Verb Statistics (1)" screen:

```
Node: MYNODE (1/1/16)    Oracle CODASYL DBMS X7.0-00    30-JAN-1998 08:30:30.61
Rate: 1.00 Second              Verb Statistics (1)           Elapsed: 00:00:14.67
Page: 1 of 1           DISK$:[DB_HOMEDIR.WORK.STATS]MUT.ROO;1          Mode: Online
--------------------------------------------------------------------------------

statistic.........    rate.per.second............. total....... ave rage......
name.............    max..... cur..... avg....... count....... per.trans....
transactions              0        0        0.0           0            0.0
verb successes            0        0        0.0           0            0.0
verb failures             0        0        0.0           0            0.0

COMMIT                    0        0        0.0           0            0.0
CONNECT                   0        0        0.0           0            0.0
DISCONNECT                0        0        0.0           0            0.0
ERASE                     0        0        0.0           0            0.0
FIND/FETCH/GET            0        0        0.0           0            0.0
MODIFY/RECONNECT          0        0        0.0           0            0.0
READY                     0        0        0.0           0            0.0
ROLLBACK                  0        0        0.0           0            0.0
STORE/PLACE               0        0        0.0           0            0.0


--------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

SCREEN FIELDS

transactions This field gives the number of completed database transactions. This is the count of
the COMMIT and ROLLBACK statements that have executed.

verb successes This field gives the number of completed verbs that returned a successful status code.

A verb is an atomic SQL or DBQ statement or action. For example, a record insert is
a verb, as is a record deletion.

Also, within a compound statement each individual statement is atomic and Oracle CODASYL DBMS performs a verb-success operation after processing each one. To avoid this overhead, you can use the SQL BEGIN atomic statement to treat the entire block as a single verb.

verb failures   This field gives the number of completed verbs that returned an error status code. Errors include end-of-collection and deadlocks, as well as all other exception conditions.

A verb is an atomic SQL statement or action. For example, a record insert is a verb, as is a record deletion.

Excessive verb failures are usually an indication of a failed constraint, such as uniqueness criteria, or an invalid DDL statement. Note that in the case of cursors and scans, reaching the end-of-stream always results in a verb failure.

Note that SQL performs its own internal queries to identify metadata, such as relation or index names.

Oracle CODASYL DBMS rarely issues a verb-failure unless there is an exception of some kind, such as a constraint failure.

commit   This field gives the number of COMMIT verbs that have been executed.

connect   This field gives the number of CONNECT verbs that have been executed.

disconnect   This field gives the number of DISCONNECT verbs that have been executed.

erase   This field gives the number of ERASE verbs that have been executed.

find fetch get   This field gives the number of FIND, FETCH, and GET verbs that have been executed.

modify reconnect   This field gives the number of MODIFY and RECONNECT verbs that have been executed.

ready   This field gives the number of READY verbs that have been executed.

rollback   This field gives the number of ROLLBACK verbs that have been executed.

store place   This field gives the number of STORE and PLACE verbs that have been executed.

ON-SCREEN MENU OPTIONS   This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph   This on-screen menu option displays a histogram graph instead of numbers.

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot   This on-screen menu option plots a specific field's value by time.

Unreset   This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot   This on-screen menu option plots a specific field's value using scatter-based display.

SCREEN INFORMATION

This section discusses screen-specific issues.

Page Navigation   This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support   This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   This screen does <u>not</u> have a zoom screen.

CONFIGURATION OPTIONS

This screen does <u>not</u> have any configuration options.

Verb Statistics (2) Screen

Oracle
DBMS
only

This screen monitors the lesser-used Oracle DBMS verbs. The most commonly
executed verbs are available on the previous screen.

SCREEN LOCATION

This screen resides in the "Main" menu.

SCREEN EXAMPLE

The following is an example of the "Verb Statistics (2)" screen:

```
Node: MYNODE (1/1/16)     Oracle CODASYL DBMS X7.0-00     30-JAN-1998 08:30:32.67
Rate: 1.00 Second               Verb Statistics (2)            Elapsed: 00:00:16.73
Page: 1 of 1            DISK$:[DB_HOMEDIR.WORK.STATS]MUT.ROO;1          Mode: Online
--------------------------------------------------------------------------------

statistic.........     rate.per.second............. total....... ave rage......
name..............     max..... cur..... avg....... count....... per.trans....
transactions              0        0        0.0           0            0.0
verb successes            0        0        0.0           0            0.0
verb failures             0        0        0.0           0            0.0

ACCEPT                    0        0        0.0           0            0.0
FREE                      0        0        0.0           0            0.0
KEEP                      0        0        0.0           0            0.0
IF_ALSO                   0        0        0.0           0            0.0
IF_EMPTY                  0        0        0.0           0            0.0
IF_MEMBER                 0        0        0.0           0            0.0
IF_NULL                   0        0        0.0           0            0.0
IF_OWNER                  0        0        0.0           0            0.0
IF_TENANT                 0        0        0.0           0            0.0
IF_WITHIN                 0        0        0.0           0            0.0


--------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

SCREEN FIELDS

transactions This field gives the number of completed database transactions. This is the count of
the COMMIT and ROLLBACK statements that have executed.

verb successes This field gives the number of completed verbs that returned a successful status code.

A verb is an atomic SQL or DBQ statement or action. For example, a record insert is
a verb, as is a record deletion.

Also, within a compound statement each individual statement is atomic and Oracle CODASYL DBMS performs a verb-success operation after processing each one. To avoid this overhead, you can use the SQL BEGIN atomic statement to treat the entire block as a single verb.

verb failures This field gives the number of completed verbs that returned an error status code. Errors include end-of-collection and deadlocks, as well as all other exception conditions.

A verb is an atomic SQL statement or action. For example, a record insert is a verb, as is a record deletion.

Excessive verb failures are usually an indication of a failed constraint, such as uniqueness criteria, or an invalid DDL statement. Note that in the case of cursors and scans, reaching the end-of-stream always results in a verb failure.

Note that SQL performs its own internal queries to identify metadata, such as relation or index names.

Oracle CODASYL DBMS rarely issues a verb-failure unless there is an exception of some kind, such as a constraint failure.

accept This field gives the number of ACCEPT verbs that have been executed.

free This field gives the number of FREE verbs that have been executed.

keep This field gives the number of KEEP verbs that have been executed.

if also This field gives the number of IF ALSO verbs that have been executed.

if empty This field gives the number of IF EMPTY verbs that have been executed.

if member This field gives the number of IF MEMBER verbs that have been executed.

if null This field gives the number of IF NULL verbs that have been executed.

if owner This field gives the number of IF OWNER verbs that have been executed.

if tenant This field gives the number of IF TENANT verbs that have been executed.

if within This field gives the number of IF WITHIN verbs that have been executed.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph This on-screen menu option displays a histogram graph instead of numbers.

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot   This on-screen menu option plots a specific field's value by time.

Unreset   This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot   This on-screen menu option plots a specific field's value using scatter-based display.

SCREEN INFORMATION

This section discusses screen-specific issues.

Page Navigation   This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support   This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   This screen does <u>not</u> have a zoom screen.

CONFIGURATION OPTIONS

This screen does <u>not</u> have any configuration options.

Record Statistics Screen

This screen shows a summary of data row activity for storage areas in the database. Data row activity includes modification (marked), retrieval (fetch), store or erase operations.

SCREEN LOCATION

This screen resides in the "Main" menu.

SCREEN EXAMPLE

The following is an example of the "Record Statistics" screen:

```
Node: MYNODE (1/1/1)    Oracle Rdb X7.0-00 Perf. Monitor 23-JAN-1998 14:30:52.84
Rate: 1.00 Second                Record Statistics            Elapsed: 00:58:16.96
Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1      Mode: Online
--------------------------------------------------------------------------------

statistic.........     rate.per.second............. total....... ave rage......
name.............      max..... cur..... avg....... count....... per.trans....

record marked             0        0        0.0          0             0.0
record fetched            0        0        0.0          0             0.0
    fragmented            0        0        0.0          0             0.0
  record stored           0        0        0.0          0             0.0
      fragmented          0        0        0.0          0             0.0
   pages checked          0        0        0.0          0             0.0
        saved IO          0        0        0.0          0             0.0
        discarded         0        0        0.0          0             0.0
record erased             0        0        0.0          0             0.0
    fragmented            0        0        0.0          0             0.0

temp record marked        0        0        0.0          0             0.0
temp record fetchd        0        0        0.0          0             0.0
temp record stored        0        0        0.0          0             0.0
temp record erased        0        0        0.0          0             0.0
--------------------------------------------------------------------------------

Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Unreset Write X_plot
```

SCREEN FIELDS

record marked   This field gives the number of records marked. A record is marked when it is modified or it is erased, but not when it is stored. This field does not include records modified in a temporary table.

record fetched   This field gives the number of records fetched, including snapshot records. This field does not include records retrieved from a temporary table.

Note that this value may be more than the actual number of records returned by a query. The reason is that queries may fetch records during the search phase, and then re-fetch the selected records so that they may be returned to the user. Also, for uniform format storage areas, a sequential scan needs to fetch the "next" record on each page of the clump, even if there are no records on that page. In addition, every page in a uniform format storage area incurs an extra fetch to verify that there are no more records residing on that page.

fragmented   This sub-field indicates the number of record fragments that Oracle Rdb had to fetch. A record is fragmented if it is too large to fit on one page. A fragmented record requires more CPU time and more virtual memory, and often requires additional I/O operations because each record fragment must be fetched.

record stored   This field gives the number of records stored in the database. This field does not include records stored in temporary tables.

fragmented   This sub-field indicates the number of rows stored as fragmented records in the database. This number indicates that a page size is smaller than a record's uncompressed size, including overhead. You should use the RMU Analyze Areas utility to further analyze the problem and then increase the page size for the storage area that has the problem.

pages checked   This field indicates the number of pages checked in order to store a record. Ideally, very few candidate pages need to be checked when storing a record. However in certain cases, depending on record size, access method, locked space on a page, and SPAM thresholds, storing a record requires a number of page fetches.

saved IO   This field gives the number of pages checked that did not result in an I/O because the page was already in the buffer. It is essentially a "for free" pages checked.

discarded   This field identifies the number of pages checked but discarded because the actual free space on that page did not meet the physical requirements needed to store a new record.

record erased   This field gives the number of records erased from the database. This field does not include records erased from temporary tables.

fragmented   This sub-field indicates the number of fragmented records erased from the database.

temp record marked[3]   This field gives the number of records marked in a temporary table. A record is marked when it is modified or it is erased, but not when it is stored.

---

[3] The temporary table statistics are available in Oracle Rdb 7.0.2.0.

temp record fetchd   This field gives the number of records fetched from a temporary table.

temp record stored   This field gives the number of records stored in a temporary table.

temp record erased   This field gives the number of records erased from a temporary table.

<table>
<tr><td>ON-SCREEN MENU
OPTIONS</td><td>This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (?), Menu, Set_rate, Write and (!) on-screen menu options are available on all screens unless otherwise noted.</td></tr>
</table>

Graph   This on-screen menu option displays a histogram graph instead of numbers.

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot   This on-screen menu option plots a specific field's value by time.

Unreset   This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot   This on-screen menu option plots a specific field's value using scatter-based display.

Yank   Places a selected statistic on the "Custom Statistics" screen.

SCREEN
INFORMATION

☑ If the value of the "fragmented records fetched" statistic is high compared to the number of records fetched, Oracle Corporation recommends that you use the RMU Analyze Areas utility to further analyze the problem to see how many records are actually fragmented.

☑ If the number of pages discarded is high compared to the number of pages checked, one or more of the storage areas may contain a SPAM threshold problem. Determine if you are using compression on data records; if you are using data record compression, you should review the "Logical Area Statistics" screen to identify the

tables that are experiencing the SPAM threshold problem. Use the RMU Analyze utility to determine the average compression ratio, then recalculate the storage area thresholds based on the information you have gathered. The problem could also be related to non-unique indexes. If an index has a duplicates allowed, you need to follow the instructions contained in the *Guide to Database Performance and Tuning* manual on how to properly calculate thresholds.

Page Navigation This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen This screen does <u>not</u> have a zoom screen.

C O N F I G U R A T I O N
O P T I O N S

This screen does <u>not</u> have any configuration options.

Transaction Duration Screen

This screen shows a graphical or numerical representation of the duration of each application transaction in the database.

The presentation granularity can be configured as either seconds, the default, or minutes for those long-running transaction environments.

SCREEN LOCATION

This screen resides in the "Main" menu.

SCREEN EXAMPLE

The following is an example of the "Transaction Duration" screen:

```
Node: MYNODE (1/1/1)    Oracle Rdb X7.0-00 Perf. Monitor 23-JAN-1998 15:12:52.64
Rate: 1.00 Second            Transaction Duration (Total)      Elapsed: 00:06:18.06
Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1     Mode: Online
--------------------------------------------------------------------------------
Total transaction count:         0
Seconds     Tx.Count:   %  #Complete:   % #Incomplete:   %
 0-< 1:          0   0%         0   0%           0   0% <- avg=0.00 95th=0.00
 1-< 2:          0   0%         0   0%           0   0%
 2-< 3:          0   0%         0   0%           0   0%
 3-< 4:          0   0%         0   0%           0   0%
 4-< 5:          0   0%         0   0%           0   0%
 5-< 6:          0   0%         0   0%           0   0%
 6-< 7:          0   0%         0   0%           0   0%
 7-< 8:          0   0%         0   0%           0   0%
 8-< 9:          0   0%         0   0%           0   0%
 9-<10:          0   0%         0   0%           0   0%
10-<11:          0   0%         0   0%           0   0%
11-<12:          0   0%         0   0%           0   0%
12-<13:          0   0%         0   0%           0   0%
13-<14:          0   0%         0   0%           0   0%
14-<15:          0   0%         0   0%           0   0%
 15+++:          0   0%         0   0%           0   0%


--------------------------------------------------------------------------------
Config Exit Graph Help Menu Options Reset Set_rate Write !
```

SCREEN FIELDS

The information in the numeric version of the "Transaction Duration" screen includes:

Total transaction count   This is the total number of transactions represented by the information on the screen. Reset the number of transactions with the Reset option by typing "**R**".

Duration   This column contains the transaction duration categories.

For the short-duration transaction display, the format "n-<m" means that each category includes transactions of **n** seconds to less than but not including **m** seconds.

For the long-duration transaction display, the format "n-<m" means that each category includes transactions of **n** minutes to less than but not including **m** minutes.

The 15+++ category contains all transactions of 15 seconds/minutes or more.

Tx.Count, %   The "Tx. Count" field contains the number of transactions in each transaction duration category. The "%" column shows the percentage of the total transactions in each transaction duration category.

#Complete, %   The "#Complete" field contains the number of transactions that completed within the time specified by each transaction duration category. The "%" column shows the percentage of the total transactions that completed within the time specified by each transaction duration category.

#Incomplete, %   The "#Incomplete" field contains the number of transactions that did not complete within the time specified by each transaction duration category. The "%" column shows the percentage of the total transactions that did not complete within the time specified by each transaction duration category.

The "Complete %" and "Incomplete %" fields should always add up to 100% for each transaction duration category.

$\leftarrow$ average   The "$\leftarrow$ average" indicator on the right side of the screen points to the transaction duration category that contains the average transaction duration time. This indicator changes at runtime to maintain an accurate indication of the average transaction duration time.

$\leftarrow$ 95th %ile   The "$\leftarrow$ 95th %ile" indicator on the right side of the screen points to the transaction duration category that contains the 95th percentile transaction duration time. This indicator changes at runtime to maintain an accurate indication of the 95th percentile transaction duration time.

transaction rate current   This field identifies the total number of transactions being performed, per second. This field is available in graphical format only.

transaction rate average   This field identifies the average number of transactions being performed, per second. This field is available in graphical format only.

transaction duration average   This field identifies the average transaction duration. This field is available in graphical format only.

transaction duration 95th pctile   This field identifies the 95th percentile transaction duration. This field is available in graphical format only. If the 95th percentile occurs in the "15+++" category, then the exact percentile is approximate only, and is displayed using the "~" character.

transaction count total   This is the total number of transactions represented by the information on the screen. This field is available in graphical format only.

transaction count 15+++   This field identifies the number of transactions that are 15 seconds/minutes or longer. This field is available in graphical format only.

**ON-SCREEN MENU
OPTIONS**

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph   This on-screen menu option displays a histogram graph instead of numbers.

The following is an example of the "Transaction Duration" screen in graphical format:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 14:03:16.77
Rate: 1.00 Second            Transaction Duration (Total)      Elapsed: 03:36:19.22
Page: 1 of 1     DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1     Mode: Online
--------------------------------------------------------------------------------
Transaction rate (per second):   current =     0      average = 2.5
Transaction duration (seconds):  average = 0.72      95th pctile = 3.00
Transaction count:               total =      32776   15+++ =          0
              Scaled distribution of transaction lengths (in se conds)
  +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+---+
  **   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |
  ** * |    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |
  ** * |    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |
  *****|    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |
  *****|    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |
  *****|    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |
  ******    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |
  ******    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |
  *******   |    |    |    |    |    |    |    |    |    |    |    |    |    |   |
  ************* *    *    *    *    *    *    *    *    *    |    |    |    |   |
  +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+---+
  0....1....2....3....4....5....6....7....8....9....10...11...12...13...14...15+++
                  (Each "*" represents 623 transactions)
--------------------------------------------------------------------------------
Config Exit Help Menu Numbers Options Reset Set_rate Write !
```

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

The following is an example of the same "Transaction Duration" screen in numeric format:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 14:07:54.02
Rate: 1.00 Second          Transaction Duration (Total)      Elapsed: 03:40:56.47
Page: 1 of 1   DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1     Mode: Online
--------------------------------------------------------------------------------
Total transaction count:      32776
Seconds    Tx.Count:   %  #Complete:   % #Incomplete:   %
 0-< 1:      26004  79%     26004  79%         6772  21% <- ave rage = 0.72
 1-< 2:       5003  15%     31007  94%         1769   6%
 2-< 3:       1293   3%     32300  98%          476   2%
 3-< 4:        312   0%     32612  99%          164   1% <- 95th %ile = 3.00
 4-< 5:         89   0%     32701  99%           75   1%
 5-< 6:         32   0%     32733  99%           43   1%
 6-< 7:         24   0%     32757  99%           19   1%
 7-< 8:         12   0%     32769  99%            7   1%
 8-< 9:          4   0%     32773  99%            3   1%
 9-<10:          1   0%     32774  99%            2   1%
10-<11:          1   0%     32775  99%            1   1%
11-<12:          1   0%     32776 100%            0   0%
12-<13:          0   0%     32776 100%            0   0%
13-<14:          0   0%     32776 100%            0   0%
14-<15:          0   0%     32776 100%            0   0%
 15+++:          0   0%     32776 100%            0   0%
--------------------------------------------------------------------------------
Config Exit Graph Help Menu Options Reset Set_rate Write !
```

Options	This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.
Pause	This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.
Reset	This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.
Time_plot	This on-screen menu option plots a specific field's value by time.
Unreset	This on-screen menu option restores the original statistic values after using "Reset" option.
X_plot	This on-screen menu option plots a specific field's value using scatter-based display.
Yank	Places a selected statistic on the "Custom Statistics" screen.

SCREEN
INFORMATION

✔ You can view the "Transaction Duration" screen either graphically or numerically. The default display presents a graph. Choose the Numbers option by typing

"**N**" to change the display from graph to numbers. When in the numeric display, choose the Graph option by typing "**G**" to change to the graphical display.

The "Graph" on-screen menu option of this screen presents a graph that indicates the overall real-time processing performance of the database. It shows the transaction rate (number per second, by default)and the time required to complete transactions. The duration of each transaction is measured from the first SQL SET TRANSACTION statement to the completion of the COMMIT or ROLLBACK verb. In addition to displaying average transaction duration, this screen shows a graph of the transaction durations. As each transaction completes, it is added to the cumulative histogram display. The 95 percentile response time is continuously updated to show the time in which 95 percent or more of the transactions complete. The screen gives an indication of subjective system response time.

The "Numbers" on-screen menu option of this screen provides the exact number of transactions in each of the 16 time categories. The numeric display also shows the number of transactions that completed and the number of transactions that did not complete within each time category.

Page Navigation
: This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support
: This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support
: This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen
: This screen does not have a zoom screen.

CONFIGURATION
OPTIONS

You can use the Config menu option to configure the "Transaction Duration" screen. Select this option, by typing the letter C, to display the configuration sub-menu. The configuration sub-menu provides the following options:

Total transaction
: This on-screen menu option displays both read-only and read/write transactions.

Read/Write transaction duration
: This on-screen menu option displays read/write transactions only.

Read-Only transaction duration
: This on-screen menu option displays read-only transactions only.

word duration transaction display
: This on-screen menu option displays either the "short" or "long" duration transaction display. The option description changes depending on which duration is currently being displayed. Short duration transactions are considered to be 0 to 15 seconds in length, while long duration transactions are considered to be 0 to 15 minutes in length.

The default configuration option is "short".

The following is an example of the same "Transaction Duration" screen in numeric format; note that the "minutes" column header is now displayed:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 14:11:01.14
Rate: 1.00 Second          Transaction Duration (Total)       Elapsed: 03:44:03.59
Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1    Mode: Online
--------------------------------------------------------------------------------
Total transaction count:      32776
Minutes    Tx.Count:   %  #Complete:   % #Incomplete:   %
 0-< 1:      32776 100%     32776 100%           0   0% <- ave rage = 0.01
 1-< 2:          0   0%     32776 100%           0   0% <- 95th %ile = 1.00
 2-< 3:          0   0%     32776 100%           0   0%
 3-< 4:          0   0%     32776 100%           0   0%
 4-< 5:          0   0%     32776 100%           0   0%
 5-< 6:          0   0%     32776 100%           0   0%
 6-< 7:          0   0%     32776 100%           0   0%
 7-< 8:          0   0%     32776 100%           0   0%
 8-< 9:          0   0%     32776 100%           0   0%
 9-<10:          0   0%     32776 100%           0   0%
10-<11:          0   0%     32776 100%           0   0%
11-<12:          0   0%     32776 100%           0   0%
12-<13:          0   0%     32776 100%           0   0%
13-<14:          0   0%     32776 100%           0   0%
14-<15:          0   0%     32776 100%           0   0%
 15+++:          0   0%     32776 100%           0   0%

--------------------------------------------------------------------------------
Config Exit Graph Help Menu Options Reset Set_rate Write !
```

Custom Statistics Screen

This screen shows a customized display of any of the base statistics information (for example, non-by-area and non-per-process statistics).

The "Custom Statistics" screen is an ordinary screen; information can be displayed graphically as a histogram or in numeric tabular format. Also, the "Time plot" and "X plot" on-screen menu options are available for any of the selected statistics fields.

SCREEN LOCATION

This screen resides in the "Main" menu.

SCREEN EXAMPLE

The following is an example of the "Custom Statistics" screen:

```
Node: MYNODE (1/1/1)    Oracle Rdb X7.0-00 Perf. Monitor 23-JAN-1998 15:06:43.26
Rate: 1.00 Second               Custom Statistics            Elapsed: 00:00:08.68
Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1    Mode: Online
--------------------------------------------------------------------------------

statistic.........    rate.per.second............. total....... average......
name..............    max..... cur..... avg....... count....... per.trans....
database binds                  0        0        0.1         1              0.0
transactions                    0        0        0.0         0              0.0


--------------------------------------------------------------------------------
Config Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot
```

SCREEN FIELDS

All screen fields on this screen are user-selectable. See the "Screen Information" section below for information on how to select fields for this screen.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph   This on-screen menu option displays a histogram graph instead of numbers.

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot   This on-screen menu option plots a specific field's value by time.

Unreset   This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot   This on-screen menu option plots a specific field's value using scatter-based display.

Yank   Places a selected statistic on the "Custom Statistics" screen.

SCREEN

INFORMATION

The size of your "Custom Statistics" screen determines the number of statistics fields you can add to the display. The header and on-screen menu take up eight lines of the "Custom Statistics" screen; you can add a statistics field on each of the remaining lines, up to a maximum of 36 different fields. Each statistics field is placed on a separate line of the screen.

Initially, the "Custom Statistics" screen contains two statistics: database binds and transactions. These statistics can be moved, removed, or replaced.

There are two different methods available to populate the "Custom Statistics" screen: fields can either be "yanked" from an existing statistics display and implicitly "put" on the "Custom Statistics" screen or you can manually create a statistics field. Oracle Corporation recommends using the "yank and put" method, which is much easier.

To "yank and put" a statistics field, use the "Yank" on-screen menu option on the statistics display page containing the statistics field you wish to select. The "Yank" on-screen menu option is not available in the Custom Statistics display.

When you select the Yank option by pressing "**Y**", a menu of the selectable fields is displayed; this menu is similar to the Help on fields menu. Select the letter of the statistics field you want to yank and that field will automatically appear on the "Custom Statistics" screen.

! NOTE   Once you select a particular statistics field, you cannot select it again unless you first delete it from the "Custom Statistics" screen. This means that the field selection menu changes every time you select a field.

The selected field will be positioned on the first available row of the "Custom Statistics" screen. You cannot specify the row of the "Custom Statistics" screen on which the field will be placed using the "Yank and Put" method. However, once the field has been put on the "Custom Statistics" screen, you can change the position of that field.

✔ The "Yank and Put" menu will automatically be canceled when you have se-
lected all the available statistics field on any given display or when there are no more
fields available on the "Custom Statistics" screen.

For more advanced users, you can also manually create a statistics field. On the
"Custom Statistics" screen, you can use the "Config" on-screen menu option to
explicitly enter the index of the specific statistics field, numbered from 1 to 1020.
These indexes are documented in Appendix A, as well as in the text file

SYS$LIBRARY:RMU$SHOW STATISTICS.CDO

If you have installed multiple versions of Oracle Rdb on your system, the text file is
named

SYS$LIBRARY:RMU$SHOW STATISTICS*vv*.CDO

where *vv* is the Oracle Rdb software version (i.e. "70").

When selecting statistics files manually, the keyboard will beep if you specify the index
of an existing statistics field. However, no error message is displayed.

✔ Note that selection of some statistic fields for different RMU Show Statistic
utility screens may result in duplicate statistic field names being displayed on the
"Custom Statistics" screen. For example, selecting the "total locks" statistic field from
the "Locking (locks requested)" screen, and the "total locks" statistic field from the
"Locking (locks promoted)" screen will result in two separate "total locks" statistic
fields being put on the "Custom Statistics" screen. This is a good reason for annotat-
ing the statistic field names on the "Custom Statistics" screen.

Page Navigation This screen does <u>not</u> contain multiple pages of information and, therefore, does not
contain any special navigation keystrokes.

Binary File Support This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen This screen does not have a zoom screen.

C O N F I G U R A T I O N

O P T I O N S

When you select the configuration menu by typing "**C**" on the Custom Statistics
screen, the configuration menu will be displayed. The configuration menu allows you
to add, delete, move, and compress statistics fields on the Custom Statistics screen.
The configuration menu varies according to the state of the "Custom Statistics"
screen but typically all four options are displayed.

Add a statistics field When you select the "Add" configuration menu option, you will be prompted to select the screen position where you want to place the statistics field, the index of the statistics field, and the title of the statistics field. The title you specify is then appended with the respective index, in brackets, to show which statistics have been manually selected.

This option is extremely useful for tracking statistics values that are not normally displayed. For instance, the statistics field that tracks the total number of bytes of virtual memory allocated is not actually displayed by any RMU Show Statistic utility screen. However, you can select index number 16 and the number of bytes of virtual memory allocated is displayed on the "Custom Statistics" screen.

Delete a statistics field When you select the "Delete" configuration menu option, you will be prompted to select the statistics field you wish to delete.

Move a statistics field When you select the "Move" configuration menu option, you will be prompted to select the statistics field to be moved and the screen position where the selected field will be displayed.

Annotate a statistics field[4] When you select the "Annotate" configuration menu option, you will be prompted to select the statistics field to be annotated. You will then be prompted to enter a new name for the selected statistics field. Once you have annotated a statistic field name, you cannot retrieve the original name unless you delete the statistic field and re-yank it on to the "Custom Statistics" screen.

Compress the display Selecting the "Compress" configuration menu option eliminates all intervening blanks lines on the screen. This option is particularly useful after deleting one or more statistics fields.

---

[4] Available starting with Oracle Rdb 7.0.2.0.

Snapshot Statistics Screen

This screen shows snapshot activity for both update and read-only transactions. The "retrieved record", "fetched line", and "read snap page" statistics relate to read-only transactions, and the last five statistics are relevant for update transactions.

SCREEN LOCATION

This screen resides in the "Main" menu.

SCREEN EXAMPLE

The following is an example of the "Snapshot Statistics" screen:

```
Node: MYNODE (1/1/1)    Oracle Rdb X7.0-00 Perf. Monitor 23-JAN-1998 15:30:49.46
Rate: 1.00 Second              Snapshot Statistics           Elapsed: 00:24:14.88
Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1    Mode: Online
-----------------------------------------------------------------------------

statistic.........    rate.per.second............. total....... ave rage......
name..............    max..... cur..... avg....... count....... per.trans....

Total transactions        0        0       0.0           0             0.0
R/O transactions          0        0       0.0           0             0.0

retrieved record          0        0       0.0           0             0.0
  fetched line            0        0       0.0           0             0.0
     read snap page        0        0       0.0           0             0.0

stored snap record        0        0       0.0           0             0.0
     page in use          0        0       0.0           0             0.0
     page too full        0        0       0.0           0             0.0
     page conflict        0        0       0.0           0             0.0
     extended file        0        0       0.0           0             0.0


-----------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

SCREEN FIELDS

Total transactions This field gives the total number of transactions that have been committed or rolled back, including read-only transactions.

R/O transactions This field gives the total number of read-only transactions that have been committed or rolled back.

retrieved record This field gives the number of records retrieved by read-only transactions.

---

fetched line This field gives the number of lines fetched by read-only transactions. To retrieve a single record, a transaction might actually check a number of lines, some of which may be empty.

read snap page This field gives the number of snapshot pages fetched by read-only transactions. If this count is high relative to the other read fields, read-only transactions are fetching records that are being updated frequently, and the snapshot file is being used extensively.

stored snap record This field gives the number of records stored in the snapshot file by update transactions. Every snapshot record stored by an update transaction implies that a snapshot page was found and utilized. In the best case, this is a single-page fetch. The "page in use," "page too full," page conflict," and "extended file" sub-fields indicate some of the extra overhead involved in finding suitable snapshot pages on which to store snapshot records.

page in use This field gives the number of pages fetched that were unsuitable for storing snapshot records because the page was owned by another transaction. A new snapshot page cannot be used again until the Transaction Sequence Number (TSN) that denotes the age of the page is less than the oldest active TSN in the database. This ensures that read-only transactions always find the correct version of a record.

page too full This field gives the number of pages fetched that were unsuitable for storing snapshot records because there was not enough room on the snapshot page to include another version of a record. In this case, a new snapshot page must be fetched and linked with the full page. This allows read-only transactions to follow a chain of snapshot pages to find the correct version of a record.

page conflict This field gives the number of times a snapshot page fetch was requested but aborted due to a lock conflict with another process. When a page fetch conflicts with another process, another target page is fetched and checked so the lock conflict does not cost a disk I/O operation.

extended file This field gives the number of times the snapshot file has been extended. The snapshot file is extended when an update operation cannot find a suitable page on which to store a snapshot record after checking a certain number of pages.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph This on-screen menu option displays a histogram graph instead of numbers.

Numbers This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot   This on-screen menu option plots a specific field's value by time.

Unreset   This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot   This on-screen menu option plots a specific field's value using scatter-based display.

Yank   Places a selected statistic on the "Custom Statistics" screen.

S C R E E N
I N F O R M A T I O N

✓ Look at the retrieved record, the fetched line, and the read snap page statistics. If the fetched line number is much higher than that for retrieved record, read-only transactions are doing a lot of work to access their records. The problem might be that the access paths are not optimal.

✓ The read snap page also indicates the amount of database activity. If the read snap page number is higher than the number for retrieved record, the records fetched may be those that have been frequently updated. A zero indicates that read-only transactions are rarely accessing data modified by update transactions.

✓ Check the page too full statistic, which applies to read/write transactions. This statistic indicates that some data pages contain frequently accessed data that form chains of snapshot pages.

✓ Look at the page in use or page conflict statistics. Theses statistics indicate contention within the snapshot file. The problem might be that the snapshot file should be extended. The file might not extend itself because it can resolve the contention by doing extra work. However, you might want to extend the snapshot file manually to see if it helps alleviate the problem.

Page Navigation   This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support   This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   This screen does not have a zoom screen.

CONFIGURATION
OPTIONS

This screen does not have any configuration options.

Chapter

3

Process Information Screens

RMU Show Statistic Process Information Screens

The "Process Information" menu contains screens whose primary purpose is the display of application process information.

The screens contained in the menu provide the primary source of information relating to which processes should be monitored using the "Process Monitoring" facility.

Stall Messages Screen

This screen shows a summary of database users' stall activity. A user stalls whenever Oracle Rdb issues a system call or long-duration operation on behalf of the user's process. For example, a stall occurs while a user waits for a lock or for completion of a physical disk read or write operation. A stall can also occur when switching after-image journals and none are available.

SCREEN LOCATION

This screen resides in the "Process Information" menu.

SCREEN EXAMPLE

The following is an example of the "Stall Messages" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 10:29:32.26
Rate: 0.50 Seconds               Stall Messages            Elapsed: 00:02:34.71
Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1    Mode: Online
--------------------------------------------------------------------------------

Process.ID Since...... T Stall.reason........................... Lock.ID.
3800C2B5:1 10:29:31.63 W waiting for page 1:16 (PW)              1E0066B0
3800C2B8:1 10:29:31.78 W waiting for page 30:47 (PW)             3E00B3E0
38009EB7:1 10:29:32.30 W waiting for async-write of pages 1:26 to 1:26
3800BCB9:1s10:29:32.32 - hibernating on AIJ I/O completion
3800BCB6:1 10:29:32.32 W hibernating on AIJ submission


--------------------------------------------------------------------------------
Alarm Bell Config Exit Filter Help LockID Menu >next_page <prev_page PageInfo Se
```

SCREEN FIELDS

Process   The process ID and the Oracle Rdb stream ID of the database user. Normally the stream ID will be one (1). However, if the user is attached to multiple databases or has explicitly detached and attached to different database sessions during the same image activation, the stream ID will uniquely identify the database session. A process ID with an "**R**" appended indicates a server for a remote process.

Since   By default, the time at which the current stall started. The "Config" on-screen menu option allows you to display the elapsed stall time or the actual stall time.

T   The current transaction state. The states are the following:

State	Description
R	indicates a read-only transaction
W	indicates a read/write transaction.
"-"	indicates that no transaction is active, or if the commit-to-journal feature is enabled, the transaction type cannot be determined.

Stall Reason   The reason for the stall. For example, "waiting for. . . " messages indicate a stalled lock request, along with the requested lock mode.

For more information on the stall messages, please refer to Appendix E.

lock ID   The optional lock ID field is displayed only when the stall is the result of a lock request. When other types of stalls occur, such as stalls due to I/O activity, the lock ID field is cleared from the screen.

When displayed, the lock ID field shows the lock identification of the resource that is stalled. You can use the lock identification number as input to the RMU Show Locks command to obtain information about processes that own, are blocking, or are waiting for locks.

ON-SCREEN MENU
OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Alarm   By default, the "Stall Messages" screen shows all stalls, including those of millisecond duration. When a high-performance, high-volume online transaction processing (OLTP) application issues a large number of I/Os on a high-speed disk device, a DBA may find it impossible to differentiate between the many short millisecond stalls of the OLTP application and the longer, more important stalls that may be encountered by other applications using the database.

By typing "**A**" to select the Alarm option from the "Stall Messages" on-screen menu, you can specify a duration, in seconds, that a process must stall before it appears on the "Stall Messages" screen. For example, if you specify an alarm interval of 5 seconds, then only stalls of 5 seconds or longer duration will appear on the "Stall Messages" screen. If you specify a value of 0 as the alarm interval, the default, all stalls will appear on the "Stall Messages" screen.

Note that this "Alarm" on-screen menu option differs slightly from the "Checkpoint Information" screen.

Bell   By typing "**B**" once to select the "Bell" on-screen menu option, you can activate the alarm bell option and the option will be highlighted. Entering B again will deactivate the alarm bell and the option will not be highlighted.

The alarm bell, even if activated, will be rung only if the "alarm" on-screen menu option has also been activated.

When both the alarm and the alarm bell are activated, the alarm bell will be sounded once per screen refresh (specified by the Set rate option) if there are any displayed stalls.

Filter   By typing "**F**" to select the filter on-screen menu option, you can control the type of stall messages that are displayed. For example, you can display processes that are stalled while writing to a certain storage area.

The filter option allows you to enter a search string which is used to filter the stall messages. Only those stall messages that contain the specified search string are displayed.

The search string may contain one or both of the wildcard characters. The asterisk "*" wildcard character is mapped to zero or more characters and the percent "**%**" wildcard character is mapped to exactly one character. Note that the search string is not case sensitive.

The filter menu option is highlighted when a search string is actively filtering stall messages. To disable filtering, press the Return key at the search string prompt.

LockID   This on-screen menu option displays the "Lock Information" zoom screen.

PageInfo   This on-screen menu option displays the "Database Page" zoom screen.

S C R E E N

I N F O R M A T I O N

☑ Stall messages are not saved in the binary statistics file created by the OUTPUT qualifier. Consequently, the "Stall Messages" screen is not available when you replay a binary file using the INPUT qualifier.

This screen lists database user processes and describes the most recent active stalls executed by users on the node from which the RMU Show Statistics command was issued. Because the stall messages are sampled only at the screen update interval, most stalls are missed. If the same stall message for a process persists, it could indicate a problem. This screen is also integrated with the "Cluster Statistic Collection" facility, so cluster-wide stall messages can also be displayed.

The screen also shows when a process is writing a bugcheck dump; however, a bugcheck dump file name longer than 53 characters is truncated.

✓ The "Stall Messages" screen shows only processes that are actively stalling. Once a process finishes stalling, it disappears from the screen. Processes that are still stalling ripple up to the top of the screen. This means that the longest stalling processes always appear at the top of the screen. Newer stalls are added to the bottom of the screen. Therefore, all users on the same node share the same stall screen lines, and only the actively stalling processes show up on the stall screen. This allows you to monitor a relatively large number of stalling processes.

A database with no stalls has a blank stall display.

You can force frequent screen updates by using a negative number for the TIME qualifier in the RMU Show Statistics utility. For example, specifying "-10" for the "Set_rate" on-screen menu option refreshes the screen every 10/100 (1/10th) of a second. Note that you use a lot of system resources, particularly on the smaller CPU machines, when you specify small time intervals.

If more stalls are in progress than can fit on your screen, some active stalls might not be displayed; they may be displayed on subsequent pages of the screen. Oracle Rdb attempts to place as many active stall messages on the screen as possible. Use the next page and previous page keystrokes to navigate amongst the various pages of the screen.

✓ Use the "Start stall logging" option of the "Tools" menu to automatically log the contents of the "Stall Messages" screen to an output file for later analysis. For more information on this option, please refer to the "Log Files" section of Volume 1 of the Handbook.

Page Navigation | If there is more information than can fit on one page, the notation "Page 1 of n" appears in the header region, where *n* is the total number of pages. You can display successive pages by pressing the right angle bracket ">" key or the ⇓ Next Screen key. To display a previous page, press the left angle bracket "<" key or the ⇑ Previous Screen key.

Binary File Support | This screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

ster Statistic Collection Support | This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen | The zoom screen displays process information on its zoom screen.

CONFIGURATION
OPTIONS

You can use the "Config" on-screen menu option to configure the "Stall Messages" screen. Select this option, by typing the letter C, to display the configuration sub-menu. The configuration sub-menu provides the following options:

Display *keyword* Stall Time Display either the "actual" stall time or the "elapsed" stall time. The option description changes depending on which stall time is currently being displayed.

The default configuration option is "actual".

Set alarm interval Specify a duration, in seconds, that a process must stall before it appears on the Stall Messages screen.

This is the same as the "Alarm" on-screen menu option.

keyword alarm bell "Enable" or "Disable" the alarm bell. The option description changes depending on whether the bell is activated.

The default configuration option is "disable".

This is the same as the "Bell" on-screen menu option

Filter Stall Messages Display stall messages that contain the specified search string.

This is the same as the "Filter" on-screen menu option.

Active User Stall Messages Screen

This screen shows a summary of database users' stall activity, even if the user is not actively stalled. A user stalls whenever Oracle Rdb issues a system call or long-duration operation on behalf of the user's process. For example, a stall occurs while a user waits for a lock or for completion of a physical disk read or write operation. A stall can also occur when switching AIJ journals and none are available.

SCREEN LOCATION

This screen resides in the "Process Information" menu.

SCREEN EXAMPLE

The following is an example of the "Active User Stall Messages" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 10:37:46.90
Rate: 1.00 Second           Active User Stall Messages      Elapsed: 00:10:49.35
Page: 1 of 1     DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1     Mode: Online
-------------------------------------------------------------------------------

Process.ID Since...... T Stall.reason........................... Lock.ID.
3800BCB9:1s               hibernating on AIJ I/O completion
3800C2B5:1                locking page 5:410
38009EB7:1                locking page 5:450
3800BCB6:1 10:37:46.93 W waiting for async-write of pages 1:161 to 1:161
3800C2B8:1 10:37:46.91 W waiting for page 5:456 (PR)             4C00A1CC


-------------------------------------------------------------------------------
Config Exit Help LockID Menu >next_page <prev_page PageInfo Set_rate Write Zoom
```

SCREEN FIELDS

Process The process ID and the Oracle Rdb stream ID of the database user. Normally the stream ID will be one (1). However, if the user is attached to multiple databases or has explicitly detached and attached to different database sessions during the same image activation, the stream ID will uniquely identify the database session. A process ID with an "**R**" appended indicates a server for a remote process.

Since By default, the time at which the current stall started. The "Config" on-screen menu option allows you to display the elapsed stall time or the actual stall time. If this field is blank, the process is <u>not</u> actively stalled. Note that this field differs from the "Stall Messages" screen.

T   The current transaction state. The states are the following:

State	Description
R	indicates a read-only transaction
W	indicates a read/write transaction.
"-"	indicates that no transaction is active, or if the commit-to-journal feature is enabled, the transaction type cannot be determined.

Stall Reason   The reason for the stall. For example, "waiting for. . . " messages indicate a stalled lock request, along with the requested lock mode. If the "Since" field is blank, this was the last known stall message for the process.

For more information on the stall messages, please refer to Appendix E.

lock ID   The optional lock ID field is displayed only when the stall is the result of a lock request. When other types of stalls occur, such as stalls due to I/O activity, the lock ID field is cleared from the screen.

When displayed, the lock ID field shows the lock identification of the resource that is stalled. You can use the lock identification number as input to the RMU Show Locks command to obtain information about processes that own, are blocking, or are waiting for locks.

Note that on the "Active User Stall Messages" screen, stalled locks that are no longer stalled are still displayed. Even if the displayed lock is no longer stalled, you can still attempt to display information on that stalled lock. However, the lock that was stalled is probably released. If the information is still there then this would seem an obvious candidate for further examination.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Note that the "Filter" on-screen menu option is not available on this screen. To filter stall messages, use the "Stall Messages" screen instead.

LockID   This on-screen menu option displays the "Lock Information" zoom screen.

PageInfo   This on-screen menu option displays the "Database Page" zoom screen.

✔ The "Active User Stall Messages" screen should be the first screen to examine when investigating reports of diminished application performance. Check if there are any stalls for logical areas, as this could be indicative that the application may need to modify the manner in which logical areas are readied.

✔ Use the "Elapsed Stall Time" configuration option to easily identify the stall duration. If your application has high transaction throughput, you could experience increased stalls for the SEQBLK lock. If the stall duration starts to increase, it may be necessary to reduce the maximum number of users attached to the database, or consider moving the database rootfile to a solid-state-device (SSD).

✔ If there are frequent stalls for data pages, this may be indicative of insufficient buffers, or inappropriate specification of the "Asynchronous Pre-Fetch" feature or "Detected Asynchronous Pre-Fetch" feature attributes. If the database uses local buffers, review the "PIO Statistics– Data Writes" screen to verify that there are not too many buffer overflows occurring. Note that you cannot increase the number of buffers at runtime using the "Database Dashboard" feature, so you may have to adjust the pre-fetch attributes instead.

The "Active User Stall Messages" screen reserves an empty line for each process that is accessing the database from another node in the OpenVMS cluster. These empty lines are unavoidable because it is always possible for a process on another node in the OpenVMS cluster to attach to the database on the current node, thus using up an empty line. However, the "Active User Stall Messages" screen is fully integrated into the "Cluster Statistic Collection" facility, so it is possible to display an entry for each active process on the database regardless of what node they are running on.

If a process is active and running on the same node as the RMU Show Statistics utility, the process' PID displays and

- The process information remains on that line until it detaches from the database.

- The process stall text remains on the screen until it is replaced by a new stall message.

- An active stall is identified by the stall starting time being displayed.

- If the stall is no longer active, the stall starting time is not displayed, but the stall message text remains displayed.

It is possible to page to multiple screen displays; each process' state is preserved and refreshed when the new page is displayed. When there is more than one page of Active User Stalled Messages display output, the header section contains the page number currently displayed and the total number of pages in the display. Use the left

angle bracket (<) key to go to the previous page and the right angle bracket (>) key to go to the next page of the screen.

✓ The "Active User Stall Messages" screen has several advantages over the "Stall Messages" screen. The advantages are:

- The location of a process remains static; because it is fixed on a given page, it is always easy to locate.

- The process' last stall message (and lock ID, if applicable) are displayed, even if the process is not currently stalled; this is useful for identifying possible hot spots.

However, the "Active User Stall Messages" display does have the following disadvantages:

- It is difficult, but possible, to isolate the source of a potential deadlock or a long-duration stall; the "Stall Messages" screen is more useful for this purpose.

- It is difficult, but possible, to isolate the set of actively stalled processes from the complete set of processes doing normal database accesses.

The following table compares the "Stall Messages" screen and the "Active User Stall Messages" screen:

	Stall Messages screen	**Active User Stall Messages screen**
Processes displayed?	This on-screen menu option displays only actively stalled processes on the current node.	This on-screen menu option displays all processes attached to the database on the current node.
Process location?	Dynamic -- The position of the process reflects the duration of the stall relative to other processes.	Static -- The position of the process remains fixed in the same location until the process detaches from the database.
Indication of active stall?	The process stall text is displayed.	The process stall text starting time is displayed.
Indication of inactive stall?	The process stall text is not displayed.	The process stall text starting time is erased (message text remains).
Duration of display?	The stall message is displayed only if the stall is	The last stall message remains displayed until the process

	Stall Messages screen	**Active User Stall Messages screen**
	active.	stalls again.
Display sequence?	Processes are displayed in descending stall-duration sequence.	Processes are displayed in a fixed but arbitrary sequence

You can force frequent screen updates by using a negative number for the TIME qualifier in the RMU Show Statistics utility. For example, TIME=-10 refreshes the screen every 10/100 (1/10th) of a second. You can also use the "Set_rate" on-screen menu option to change the screen refresh rate at runtime.

Note that you use a lot of system resources, particularly on the smaller CPU machines, when you specify this time interval. If there are more stalls in progress than can fit on your screen some current stalls might not be displayed. RMU attempts to place as many active stall messages on the screen as possible.

The screen also shows when a process is writing a bugcheck dump; however, a bug-check dump file name longer than 53 characters is truncated.

If more stalls are in progress than can fit on your screen, some active stalls might not be displayed; they may be displayed on subsequent pages of the screen. Oracle Rdb attempts to place as many active stall messages on the screen as possible. Use the next page and previous page keystrokes to navigate amongst the various pages of the screen.

✔ Use the "Start stall logging" option of the "Tools" menu to automatically log the contents of the "Active User Stall Messages" screen to an output file for later analysis. For more information on this option, please refer to the "Log Files" section of Volume 1 of the Handbook.

Page Navigation If there is more information than can fit on one page, the notation "Page 1 of n" appears in the header region, where *n* is the total number of pages. You can display successive pages by pressing the right angle bracket ">" key or the ⇓ Next Screen key. To display a previous page, press the left angle bracket "<" key or the ⇑ Previous Screen key.

Binary File Support This screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

ster Statistic Collection Support This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   The zoom screen displays process information on its zoom screen.

CONFIGURATION
OPTIONS

You can use the "Config" on-screen menu option to configure the "Active User Stall Messages" screen. Select this option, by typing the letter C, to display the configuration sub-menu. The configuration sub-menu provides the following options:

Display *keyword* Stall Time   Display either the "actual" stall time or the "elapsed" stall time. The option description changes depending on which stall time is currently being displayed.

The default configuration option is "actual".

Sort by Stall Type   This configuration option lets you sort the screen display by the corresponding stall "type". When this configuration option is selected, blank lines are compressed to the bottom of the screen.

There are currently 10 classes of stall messages.

Class	**Description**
Records	These are record related stalls, such as waiting for record locks to be granted.
Pages	These are page related stalls, such as waiting for storage area I/O to complete or page locks to be granted
Tables	These are table related stalls, such as waiting for logical area locks to be granted.
Storage areas	These are storage area related stalls, such as waiting for storage areas to be created, deleted, truncated or opened.
Database root-file	These are database rootfile related stalls, such as waiting for rootfile I/O to complete or "object" locks to be granted.
Recovery journals	These are journal related stalls, such as opening, initializing or extending journals, as well as waiting for journal locks to be granted. This information includes both AIJ and RUJ journals.
Transactions	These are transaction related stalls, such as waiting for 2PC transactions to commit, or waiting for checkpoints to complete.
Hot standby	These are hot standby related stalls.
Database	These are database related stalls, such as waiting for the database freeze to complete.

Class	Description
Miscellaneous	These are generic stalls, such as waiting for a bugcheck dump to complete.

Process Accounting Screen

The "Process Accounting" screen provides continuously updated accounting information about local processes. This screen is an alternative to the OpenVMS SHOW PROCESS /CONTINUOUS utility. The screen provides equivalent information, except that all active database processes on a specific node can be monitored at the same time.

The "Process Accounting" screen shows direct operating system accounting information, thereby enabling a database administrator to evaluate the system resources used by database processes. The values in the "Process Accounting" screen are for all process activity, not just the activity that occurs while in the database. Therefore, this screen is useful for monitoring the complete application behavior.

SCREEN LOCATION

This screen resides in the "Process Information" menu.

SCREEN EXAMPLE

The following is an example of the "Process Accounting" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 10:37:46.90
Rate: 3.00 Seconds              Process Accounting          Elapsed: 00:20:11.30
Page: 1 of 1            SQL_DISK1:[RICK.V70]MF_PERSONNEL.RDB;1        Mode: Online
--------------------------------------------------------------------------------

Process.ID Process.name... CPUtime.... EnqCnt. PGflts. NumDio. WSsize. VMsize.
6E2012D3:1 RICK            00:00:15.46   17809   20775     808    4471   15082
6E201887:1 SMITH           00:00:11.23   17882   17383     444    3606   14426




--------------------------------------------------------------------------------
Exit Full Help Menu >next_page <prev_page Set_rate Write Zoom !
```

SCREEN FIELDS

The "Process Accounting" screen provides the following information in both brief and full modes:

Process.ID The process ID for the current process, assigned by the operating system, and the stream ID, assigned by the database. If "D" is appended to the process ID, the process is being recovered by a Database Recovery process (DBR). If "**R**" is appended to the process ID, the process is a server for a remote process.
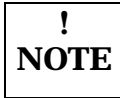
> **! NOTE**
> If the process has more than one active database session, only the first active stream ID will be displayed because the process accounting information is the same for all active database sessions.

Process Name The name of the process.

CPUtime The total accumulated CPU time since the process was logged in.

EnqCnt The remaining number of locks the process may request. This field should not approach zero. If it does approach zero, the ENQLM value should be raised for the process.

PGflts The total accumulated number of page faults.

NumDio The total accumulated count of the direct I/O operations.

Wssize The total accumulated number of active pages (512-byte pages) in the working set for the process.

Vmsize The total accumulated number of pages (512-byte pages) of virtual memory allocated by the process. This value includes the size of the database global section.

The "Process Accounting" screen provides the following information fields only in full mode:

User Name The name of the user (used when logging in to the system).

Image Name The name of the image file currently being executed by the process.

State The current process state, which will be one of the following keywords:

Keyword	**Description**
CEF	Common event flag wait
COM	Computable
COMO	Computable, out of balance set
CUR	Current process
COLPG	Collided page wait
FPG	Free page wait
HIB	Hibernate wait
HIBO	Hibernate wait, out of balance set

Keyword	**Description**
LEF	Local event flag wait
LEFO	Local event flag wait, out of balance set
MWAIT	Mutex and miscellaneous resource wait
PFW	Page fault wait
SUSP	Suspended
SUSPO	Suspended, out of balance set

PGfCnt The remaining number of pages in the paging file the process may request. This field should not approach zero. If it does approach zero, the PGFLQUOTA value should be raised for the process.

DioCnt The remaining number of direct I/O operations the process may request. This field should not approach zero. If it does approach zero, the DIOLM value should be raised for the process.

NumBio The total accumulated count of the buffered I/O operations.

BioCnt The remaining number of buffered I/O operations the process may request. This field should not approach zero. If it does approach zero, the BIOLM value should be raised for this process.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Brief You select brief mode by typing "**B**". In brief mode, one line per process is displayed, providing the following information: process ID, process name, CPU time, remaining lock quota count, page fault count, number of direct I/O operations, working set size, and virtual memory size.

The following is an example of the "Process Accounting" screen in brief mode:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 10:37:46.90
Rate: 3.00 Seconds              Process Accounting           Elapsed: 00:20:11.30
Page: 1 of 1            SQL_DISK1:[RICK.V70]MF_PERSONNEL.RDB;1         Mode: Online
--------------------------------------------------------------------------------


Process.ID Process.name... CPUtime.... EnqCnt. PGflts. NumDio. WSsize. VMsize.
6E2012D3:1 RICK            00:00:15.46  17809   20775     808    4471   15082
6E201887:1 SMITH           00:00:11.23  17882   17383     444    3606   14426




--------------------------------------------------------------------------------
Exit Full Help Menu >next_page <prev_page Set_rate Write Zoom !
```

Full   You select full mode by typing "**F**". In full mode, a second line per process is displayed that provides the following additional information: user name, image name, process state, page file quota count, direct I/O quota count, number of buffered I/O operations, and buffered I/O quota count.

The following is an example of the Process Accounting screen in full mode:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 10:37:46.90
Rate: 3.00 Seconds              Process Accounting           Elapsed: 00:22:39.16
Page: 1 of 1            SQL_DISK1:[RICK.V70]MF_PERSONNEL.RDB;1         Mode: Online
--------------------------------------------------------------------------------


Process.ID Process.name... CPUtime.... EnqCnt. PGflts. NumDio. WSsize. VMsize.
User.name... Image.name...............  State.. PGfCnt. DioCnt. NumBio. BioCnt.
6E2012D3:1 RICK            00:00:15.55  17796   20776     808    4472   15082
RICK       SQL$601                        LEF   124448     200    1464     199
6E201887:1 SMITH           00:00:11.92  17858   18378     516    5000   14954
SMITH      SQL$601                        LEF   124576     200     515     199


--------------------------------------------------------------------------------
Brief Exit Help Menu >next_page <prev_page Set_rate Write Zoom !
```

S C R E E N

I N F O R M A T I O N

✓ This screen shows dynamically changing process information only. That is, quotas and other information that are fixed for each process are not displayed because that information can be obtained in other ways. The "Process Accounting" screen has brief and full modes that control the amount of information displayed for each active database process.

✓ Note that information on the "Process Accounting" screen cannot be reset. Because the information is gathered in real time, it cannot be written to the output file and, therefore, cannot be displayed during INPUT file replay.

✓ This screen provides continuously updated OpenVMS accounting information about local processes in a cluster environment. This screen is an alternative to the OpenVMS SHOW PROCESS /CONTINUOUS utility. The screen provides equivalent information, except that all active database processes on a specific node can be monitored at the same time.

✓ The "Process Accounting" screen does not provide information about database processes on other nodes.

This screen displays operating system accounting information, thereby enabling a database administrator to evaluate the system resources used by database processes. The values in the "Process Accounting" screen are for all process activity, not just the activity that occurs while in the database. Therefore, this screen is useful for monitoring the complete application behavior.

✓ This screen displays dynamically changing process information only. That is, quotas and other information that are fixed for each process are not displayed because that information can be obtained in other ways.

Page Navigation
If there is more information than can fit on one page, the notation "Page 1 of n" appears in the header region, where *n* is the total number of pages. You can display successive pages by pressing the right angle bracket ">" key or the ⇓ Next Screen key. To display a previous page, press the left angle bracket "<" key or the ⇑ Previous Screen key.

Binary File Support
This screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

ster Statistic Collection Support
This screen is not integrated into the "Cluster Statistic Collection" facility.

Zoom Screen
The zoom screen displays process information on its zoom screen.

C O N F I G U R A T I O N
O P T I O N S

This screen does not have any configuration options.

Checkpoint Information Screen

The "Checkpoint Information" screen displays process checkpoint information. One line of information is displayed for each process attached to the database on the current node. There may be blank lines in the display as processes detach from the database; in this way, once a process has attached to the database, it maintains the same location in the screen until it detaches from the database.

This screen displays one line of information for each process attached to the database on this node. There may be blank lines in the display as processes detach from the database; in this way, once a process has attached to the database, it will maintain the same location in the screen until it detaches from the database.

The oldest active checkpoint, quiet-point, and transaction are highlighted to aid in identifying the process in each category. Note that the highlighted items may be for separate processes.

SCREEN LOCATION

This screen resides in the "Process Information" menu.

SCREEN EXAMPLE

The following is an example of the "Checkpoint Information" screen:

```
 Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 14:51:50.47
 Rate: 1.00 Second        Checkpoint Information (Unsorted)     Elapsed: 00:01:15.29
 Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;2     Mode: Online
 --------------------------------------------------------------------------------


 Process.ID  Ckpt.Vno:Ckpt.Vbn QuietVno ST CurTSN Tx.Start.Time AIJ: 1:558
 38004030:1         1       12        1 RW 0:1296    14:51:50.10 TSN: 0:1294
 38004036:1         1       11        1 RW 0:1298
 38003245:1s
 3800AC37:1         1       13        1 RW 0:1294    14:51:50.04
 38006444:1         1       14        1 RW 0:1297    14:51:50.19



 --------------------------------------------------------------------------------
 Alarm Bell Config Exit Help Menu >next_page <prev_page Refresh Set_rate Write Zo
```

SCREEN FIELDS

Process ID This is the ID of the process attached to the database. The number following the colon (**:**) differentiates multiple attaches to the same database.

Ckpt.Vno   This is the sequence number of the AIJ journal that contains the most recent check-point information for the process. Sequence numbers start with "0". If nothing is displayed, the process has not yet performed a checkpoint operation; this may occur if the Fast Commit feature is displayed, or if the process actually has not performed a checkpoint operation, as is typical of utilities.

Ckpt.Vbn   This is the block number within the identified AIJ journal that contains the most recent checkpoint information for the process. If nothing is displayed, the process has not yet performed a checkpoint operation.

This field sometimes contains the following keywords:

Keyword	Description
BACKUP	indicates that the checkpoint VBN has been moved because of an AIJ backup operation. This keyword will only occur if an extensible AIJ journal is backed up.
ACKNWLDG	indicates that the process has "acknowledged" the BACKUP indication and will perform a checkpoint operation as soon as possible. Performing the checkpoint operation will cause the block number to be re-displayed.

QuietVno   This field contains the sequence number of the AIJ journal that contains the most recent forced quiet-point for this process. A forced quiet-point occurs when a database operation, such as database backup or AIJ backup, acquires a quiet-point on the database.

ST   This field contains the transaction state. The valid values are:

Keyword	Description
RO	indicates a read-only transaction.
RW	indicates a read/write transaction.
Blank	indicates no transaction is active for user

CurTSN   This field contains the transaction sequence number for each process.

Tx.Start.Time   This field displays either the transaction start time or the transaction elapsed time, depending on the screen configuration selection. The transaction time information is

displayed for processes on the current node only, even though checkpoint information may be displayed for processes on other nodes.

If a transaction is displayed with a state of RW but does not have a start time, this represents a "pre-started" transaction. In the above screen example, TSN 0:1298 is a pre-started transaction.

AIJ: This field identifies the current AIJ end-of-file location. This field is typically used to compare against the checkpoint information to determine if the checkpoint parameters and thresholds need to be adjusted.

TSN: This field identifies the oldest known Transaction Sequence Number (TSN) on the current node; note that this may not actually be the oldest known TSN in the database if the database is accessed on multiple nodes. Also, this field may not be accurate if the "Commit to Journal" feature is enabled.

ON-SCREEN MENU
OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Alarm By default, the "Checkpoint Information" screen shows all transactions, including those of millisecond duration. When a high-performance, high-volume online transaction processing (OLTP) application issues a large number of I/Os on a high-speed disk device, a DBA may find it impossible to differentiate between the many short millisecond transactions of the OLTP application and the longer, more important transactions that may be encountered by other applications using the database.

By typing "**A**" to select the Alarm option from the "Checkpoint Information" on-screen menu, you can specify a duration, in seconds, that a transaction must exceed before it appears on the "Checkpoint Information" screen. For example, if you specify an alarm interval of 5 seconds, then only transactions of 5 seconds or longer duration will appear on the "Checkpoint Information" screen. If you specify a value of 0 as the alarm interval, the default, all transactions will appear on the "Checkpoint Information" screen.

Note that this "Alarm" on-screen menu option differs slightly from the "Stall Messages" screen.

Bell By typing "**B**" once to select the "Bell" on-screen menu option, you can activate the alarm bell option and the option will be highlighted. Entering B again will deactivate the alarm bell and the option will not be highlighted.

The alarm bell, even if activated, will be rung only if the "alarm" on-screen menu option has also been activated.

When both the alarm and the alarm bell are activated, the alarm bell will be sounded once per screen refresh (specified by the Set rate option) if there are any displayed stalls.

Refresh   Refreshes the checkpoint information when the database is accessed on multiple nodes in the cluster.

SCREEN INFORMATION

This section discusses screen-specific issues.

Page Navigation   If there is more information than can fit on one page, the notation "Page 1 of n" appears in the header region, where *n* is the total number of pages. You can display successive pages by pressing the right angle bracket ">" key or the ⇓ Next Screen key. To display a previous page, press the left angle bracket "<" key or the ⇑ Previous Screen key.

Binary File Support   This screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   The zoom screen displays process information on its zoom screen.

CONFIGURATION OPTIONS

You can use the "Config" on-screen menu option to configure the "Checkpoint Information" screen. Select this option, by typing the letter "**C**", to display the configuration sub-menu. The configuration sub-menu provides the following options:

isplay Transaction *keyword* Time   This on-screen menu option displays either the transaction "start" time, or the transaction "elapsed" time. The option description changes depending on which transaction time is currently being displayed.

The default configuration option is "start".

Unsorted Display   This on-screen menu option displays the screen in its default configuration.

Sort by oldest active checkpoint   Sorts the screen display in ascending active checkpoint sequence. This means that the oldest active checkpoint will be displayed on the first line and the most recent checkpoint will be displayed on the last line.

Sort by oldest active transaction   Sorts the screen display in ascending transaction start time sequence. This means that the oldest active transaction is displayed on the first line and the most recently started transaction is displayed on the last line.

Sort by oldest quiet-point   Sorts the screen display in ascending quiet-point sequence. This means that the oldest quiet-point will be displayed on the first line and the most recent quiet-point will be displayed on the last line.

Set alarm interval   Specify a duration, in seconds, that a process must stall before it appears on the Stall Messages screen.

This is the same as the "Alarm" on-screen menu option.

keyword alarm bell   "Enable" or "Disable" the alarm bell. The option description changes depending on whether the bell is activated.

The default configuration option is "disable".

This is the same as the "Bell" on-screen menu option.

Active User Chart Screen

This screen tracks the number of active users attached to the database over a period of time.

The "Active User Chart" screen graphically portrays the number of currently active users attached to the database over a measured period of time. The slope of the line can be used to visually identify the rate at which users attach to or detach from the database.

The screen is also useful for determining when the configured number of users is overly large for the number of users that are actually attached to the database at any given moment.

The number of active users is portrayed as a percentage of the maximum configured for the database, designated along the left-hand side of the screen.

The screen refresh sample rate is identified at the bottom of the screen. Directly above the screen refresh rate is a series of timestamps. Each timestamp represents the time for the end of each block.

The current time is designated by the cursor along the bottom horizontal axis. Everything to the right of the current time is the end of the previous pass.

The graph output consists of a single numeric digit being written once per the specified sample rate. The numeric digit corresponds to the "n^{th}" percentage of the particular percentage category.

If a digit is not displayed for a given cycle, this means that there are no actively attached processes for the database, on any node.

SCREEN LOCATION

This screen resides in the "Process Information" menu.

SCREEN EXAMPLE

The following is an example of the "Active User Chart" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 15:40:14.12
Rate: 1.00 Second                 Active User Chart            Elapsed: 00:03:12.45
Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1      Mode: Online
--------------------------------------------------------------------------------

          Max Users:     75        Active Users Total:     6  Total Percent:   8.0
                                    Active Users This Node:  6  Node Percent:    8.0
          +---------+---------+---------+---------+---------+---------+---------+
 91-100%  |         |         |         |         |         |         |         |
 81-90%   |         |         |         |         |         |         |         |
 71-80%   |         |         |         |         |         |         |         |
 61-70%   |         |         |         |         |         |         |         |
 51-60%   |         |         |         |         |         |         |         |
 41-50%   |         |         |         |         |         |         |         |
 31-40%   |         |         |         |         |         |         |         |
 21-30%   |         |         |         |         |         |         |         |
 11-20%   |         |         |         |         |         |         |         |
  1-10%   |866666666666666666668666666666666666668|6666666668666666666666666666|
          +---------+---------+---------+---------+---------+---------+---------+
     15:39:42  15:39:53  15:40:03  15:40:14  15:39:11  15:39:22  15:39:33
                       Sample interval is 1.00 Second
--------------------------------------------------------------------------------
Exit Help Menu Refresh Set_rate Write !
```
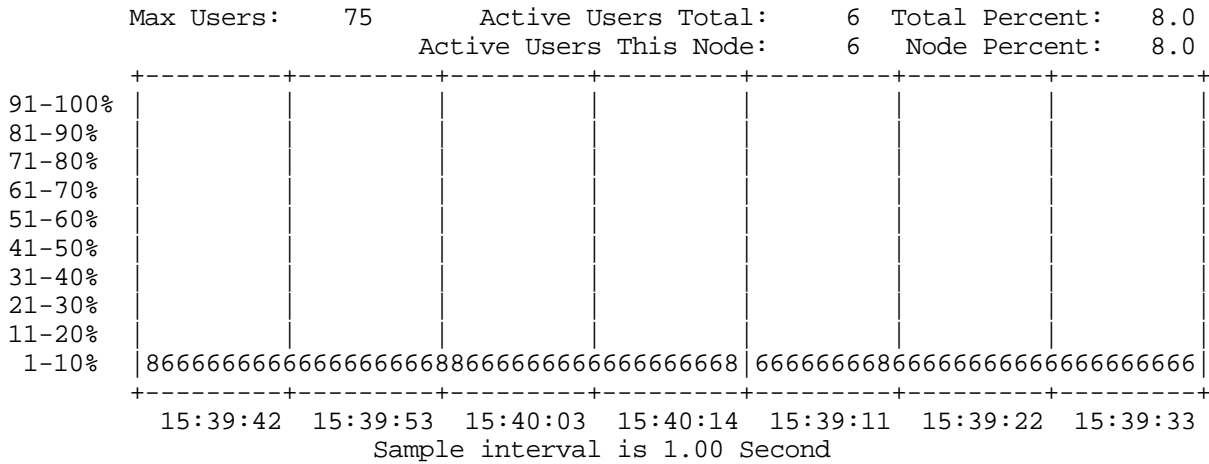
SCREEN FIELDS

Max Users	This field identifies the maximum number of users that are allowed to attach to the database. This includes all nodes on which the database is open.
Active Users Total	This field identifies the total number of users that are actively attached to the database on any node where the database is open.
Total Percent	This field identifies the total percentage of active users on all nodes.
Active Users This Node	This field identifies the total number of users that are actively attached to the database on the current node only.
Node Percent	This field identifies the total percentage of active users on the current node only.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Refresh	Refreshes the active user information when the database is accessed on multiple nodes in the cluster.

✓ Note that the rightmost timestamp displayed may not be the latest time; this occurs because the output of the screen wraps around to the leftmost edge after writing to the rightmost edge.

Page Navigation   This screen does not contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support   This screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   This screen does not have a zoom screen.

This screen does not have any configuration options.

CPU Utilization Screen

This screen displays the current CPU utilization of each database process on the node as a percentage of the total processor utilization.

This screen displays one line of information for each database process active on the node. If a process is attached to the database multiple times, the screen displays only one line of information.

If the number of displayable processes is greater than the number of displayable lines, use the right arrow or up arrow and the left arrow or right arrow to navigate through the display pages.

Note that the displayed process CPU utilization, in addition to the database-related processing, includes the CPU utilization of ALL non-database related activities that the process also performs.

In order to track the exact CPU utilization of the database-specific activity, Oracle Corporation recommends that you use Oracle Trace product.

The CPU Utilization screen is not saved by using the OUTPUT qualifier, therefore it cannot be replayed using the INPUT qualifier.

SCREEN LOCATION

This screen resides in the "Process Information" menu.

SCREEN EXAMPLE

The following is an example of the "CPU Utilization" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 15:53:46.57
Rate: 1.00 Second            CPU Utilization (sorted)         Elapsed: 00:16:44.90
Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1    Mode: Online
--------------------------------------------------------------------------------
Process.ID Process.name... CPU.Util%     10  20  30  40  50  60  70  80  90 100
                                         +---+---+---+---+---+---+---+---+---+---+
3800C4EF:1 RICK5                33%      +---+---+---+* |   |   |   |   |   |   +
38006CF1:1 RICK7                31%      +---+---+---* |   |   |   |   |   |   +
3800BEF0:1 RICK6                31%      +---+---+---* |   |   |   |   |   |   +
380020F2:1 RICK8                24%      +---+---+* |   |   |   |   |   |   |   +
3800C6F3:1sRDM_ALS701_1          4%      |* |   |   |   |   |   |   |   |   |   |
                                         |  |   |   |   |   |   |   |   |   |   |
                                         |  |   |   |   |   |   |   |   |   |   |
                                         |  |   |   |   |   |   |   |   |   |   |
                                         |  |   |   |   |   |   |   |   |   |   |
                                         |  |   |   |   |   |   |   |   |   |   |
                                         |  |   |   |   |   |   |   |   |   |   |
--------------------------------------+---+---+---+---+---+---+---+---+---+---+
Config Exit Help Menu >next_page <prev_page Set_rate Write Zoom !
```

SCREEN FIELDS

Process ID The process ID for the current process, assigned by the operating system, and the stream ID, assigned by the database. If the process has more than one active database session, only the first active stream ID will be displayed because the process accounting information is the same for all active database sessions. If "D" is appended to the process ID, the process is being recovered by a Database Recovery process (DBR). If "R" is appended to the process ID, the process is a server for a remote process.

Process name The name of the process.

CPU Util The numeric CPU utilization expressed as a percentage of the overall system capacity.

Note that the total value of this column may add up to more than 100% depending on the number of CPUs available on the hardware. For example, on a node containing three CPUs, the total CPU utilization can be up to 300%.

However, the CPU utilization of no individual process can exceed 100%.

CPU Utilization Histogram The histogram portion of the display shows the process' utilization percentage in graphical format.

The "+" on the far right side of the histogram indicates that, at some time during the display, that particular process consumed 100% CPU utilization.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

SCREEN INFORMATION

This section discusses screen-specific issues.

Page Navigation If there is more information than can fit on one page, the notation "Page 1 of n" appears in the header region, where *n* is the total number of pages. You can display successive pages by pressing the right angle bracket ">" key or the ⇓ Next Screen key. To display a previous page, press the left angle bracket "<" key or the ⇑ Previous Screen key.

Binary File Support This screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

---

ster Statistic Collection Support This screen is <u>not</u> integrated into the "Cluster Statistic Collection" facility.

Zoom Screen The zoom screen displays process information on its zoom screen.

**CONFIGURATION
OPTIONS**

By default, the processes on the "CPU Utilization" screen appear in arbitrary (unsorted) order. By selecting the "Config" on-screen menu option, you can manually configure the "CPU Utilization" screen. Choose the Config option by typing "C" to display the CPU Utilization Configuration menu. This menu offers the following options:

Unsorted Display This option displays the processes in unsorted order.

Sort by CPU Utilization This option displays the processes sorted in order of descending CPU utilization. This display configuration can be difficult to view when the display rate is less than two seconds since the process CPU utilization varies at any given time.

Oracle Corporation recommends that you use the sorted display with a display rate of two seconds or more. This will reduce CPU utilization necessary to sort the process information.

Transaction Recovery Duration Estimate Screen

This screen displays an estimate of the time it will take to roll back a transaction, or to completely recover a failed process.

! NOTE

The information provided in this screen is an *estimate* based on previous process recovery operations and other factors such as page contention and disk throughput. The actual process recovery duration of a transaction or process may be more or less than the duration identified on this screen.

Individual process failure recovery performance can vary widely depending on many factors which cannot be accounted for in the displayed estimate. These factors include lock deadlock stalls, network delays, disk contention and many other system factors such as lock re-mastering.

You can examine the past history of recovery operations by issuing the RMU Dump Header utility and reviewing the Database Recovery section.

The "Transaction Recovery Duration Estimate" screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

SCREEN LOCATION

This screen resides in the "Process Information" menu.

SCREEN EXAMPLE

The following is an example of the "Transaction Recovery Duration Estimate" screen:

```
 Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 16:11:28.37
 Rate: 1.00 Second    Transaction Recovery Duration Estimate Elapsed: 00:34:26.70
 Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1    Mode: Online
 -------------------------------------------------------------------------------

 Process.ID  RUJ.Sz Tx.Rollback DBR.Tx.Undo AIJ.Ckpt Pnd DBR.Tx.Redo DB.Freeze.Tm
 3800C4EF:1       3 00:00:00.12 00:00:00.02 39:30       1 00:00:00.79 00:00:00.85
 3800BEF0:1       4 00:00:00.16 00:00:00.02 39:19       0 00:00:00.80 00:00:00.86
 38006CF1:1       3 00:00:00.12 00:00:00.02 39:33       0 00:00:00.79 00:00:00.85
 380020F2:1       3 00:00:00.12 00:00:00.02 39:24       0 00:00:00.80 00:00:00.86




 -------------------------------------------------------------------------------
 Config Exit Help Menu >next_page <prev_page Refresh Set_rate Write Zoom !
```

Process.ID   The process identifier of a process that has the potential to roll back a transaction or require transaction recovery in the event of process failure.

RUJ.Sz   The number of blocks of RUJ information that have been written by the process.

Tx.Rollback   The estimate of the time it would require for the process to roll back the transaction. Note that this is different from the time it would take the Database Recovery process (DBR) to rollback the transaction.

DBR.Tx.Undo   The estimate of the time it would require for the Database Recovery process (DBR) to undo the transaction. The DBR transaction undo duration is typically less than it takes the process to rollback the transaction, due to various optimizations and simplifications in the Database Recovery process (DBR) recovery algorithm.

AIJ.Ckpt   If the Fast Commit feature is enabled, this is the most recent checkpoint location in the AIJ journal for the process.

Pnd   If AIJ journaling is enabled, this is the number of pending blocks of AIJ information that have been submitted, but not yet written to the AIJ journal.

DBR.Tx.Redo   If the Fast Commit feature is enabled, this is the estimate of the time it would take the Database Recovery process (DBR) to redo the previously committed transactions of the failed process to the database.

DB.Freeze.Tm   The estimate of the total time the database would be frozen if the current process were to prematurely terminate.

ON-SCREEN MENU
OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Refresh   Refreshes the active user information when the database is accessed on multiple nodes in the cluster.

SCREEN
INFORMATION

This section discusses screen-specific issues.

Page Navigation   If there is more information than can fit on one page, the notation "Page 1 of n" appears in the header region, where *n* is the total number of pages. You can display successive pages by pressing the right angle bracket ">" key or the ⇓ Next Screen key.

To display a previous page, press the left angle bracket "<" key or the ⇑ Previous Screen key.

Binary File Support This screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

ster Statistic Collection Support This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen The zoom screen displays process information on its zoom screen.

<hr>

CONFIGURATION OPTIONS

You can use the "Config" on-screen menu option to configure the "Transaction Recovery Duration Estimate" screen. Select this option, by typing the letter "**C**", to display the configuration sub-menu. The configuration sub-menu provides the following options:

Unsorted Display This option displays the screen in an unsorted order. That is, the processes are displayed in the order they appear in the database.

rt by oldest transaction rollback This option sorts the "Transaction Recovery Duration Estimate" screen by the oldest transaction rollback.

The first process displayed at the top of the screen would potentially have the longest transaction rollback operation.

Sort by oldest DBR undo This option sorts the "Transaction Recovery Duration Estimate" screen by the oldest Database Recovery process (DBR) undo.

The first process displayed at the top of the screen would potentially have the longest transaction rollback operation by the DBR process.

Sort by oldest DBR redo This option sorts the "Transaction Recovery Duration Estimate" screen by the oldest Database Recovery process (DBR) redo.

The first process displayed at the top of the screen would potentially have the longest transaction redo operation by the DBR process.

Sort by oldest database freeze This option sorts the "Transaction Recovery Duration Estimate" screen by the oldest database freeze.

The first process displayed at the top of the screen would potentially have the longest database freeze operation by the Database Recovery process (DBR). This option is the most likely to be of interest.

AIJ Backup Activity Screen

The "AIJ Backup Activity" screen displays information about each AIJ backup operation being performed on the node.

The "AIJ Backup Activity" screen is also available during cluster-wide statistic collection. This means you can monitor the activities of all AIJ backup operations occurring on any node accessing the database. However, some of the more dynamic screen fields may not be up-to-date if the AIJ backup operation occurs on a remote node.

This screen resides in the "Process Information" menu.

The following is an example of the "AIJ Backup Activity" screen:

```
 Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 19-DEC-1997 15:50:24.49
 Rate: 0.50 Seconds              AIJ Backup Activity              Elapsed: 00:03:57.99
 Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1     Mode: Online
 -------------------------------------------------------------------------------

 Process.ID  Activity... VBN...... Operation......................... Lock.ID.
 34218467:1s block bkup  7:1017    Initializing AIJ journal


 -------------------------------------------------------------------------------
 Exit Help LockID menu >next_page <prev_page Set_rate Write Zoom !
```

SCREEN FIELDS

Process.ID This field contains the process identifier of the AIJ backup process. This process may be the AIJ backup server (ABS), in which case the process identifier will contain the suffix "**s**". This process may also be the manual RMU Backup After_Journal utility, in which case the process identifier will contain the "**u**" suffix.

Additional information can be obtained about this process by using "Zoom" on-screen menu option.

Activity This field contains a description of the backup activity being performed by the AIJ backup utility.

This field may not change for an AIJ backup operation on another node of the cluster.

The following AIJ backup activities are displayed:

Activity	**Description**
Activation	The AIJ backup utility is being invoked by the monitor if it is the ABS, or startup if the manual backup utility is being used.
Bind	The AIJ backup utility is binding to the database.
Start	The AIJ backup utility is starting the backup operation.
Create bkup	The AIJ backup utility is creating a disk-based backup file.
Create temp	The AIJ backup utility is creating a temporary AIJ journal. This activity typically occurs when the Fast Commit feature is used in conjunction with extensible AIJ journals
Record bkup	The AIJ backup utility is backing up an extensible AIJ journal to disk, or any type of AIJ journal to tape, using a record-by-record transfer algorithm.
Block bkup	The AIJ backup utility is backing up a fixed-size (circular) AIJ journal to disk, using a 127-block transfer algorithm.
Finish	The AIJ backup utility is completing the backup of an AIJ journal
Quiet-point	The AIJ backup utility is attempting to acquire the quiet-point lock
Record shfl	The AIJ backup utility is performing the record shuffle operation used for extensible AIJ journals.
Unbind	The AIJ backup utility is unbinding from the database.

VBN This column identifies the current block number of the AIJ journal being backed up. The block number is normally prefixed with the AIJ sequence number, so it is easy to identify which AIJ journal is being backed up.

This field may not change for an AIJ backup operation on another node of the cluster.

Operation This column identifies the activity-specific operation being performed by the AIJ backup utility. This column contains messages similar to those displayed by "Stall Messages" screen

This field may not change for an AIJ backup operation on another node of the cluster.

The complete list of operation messages is available in Appendix E.

Lock.ID   This column identifies any lock the AIJ backup utility may be trying to acquire. This lock is typically the quiet-point lock.

More information about this lock can be obtained using "LockID" on-screen menu option.

<div style="border-top:2px solid black; border-bottom:2px solid black; width:200px;"></div>

ON-SCREEN MENU
OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

LockID   This on-screen menu option displays the "Lock Information" zoom screen.

SCREEN
INFORMATION

The following example shows an AIJ backup operation in a later stage of the backup operation:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 19-DEC-1997 15:50:24.99
Rate: 0.50 Seconds            AIJ Backup Activity          Elapsed: 00:03:58.49
Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1    Mode: Online
-----------------------------------------------------------------------------

Process.ID  Activity... VBN...... Operation......................... Lock.ID.
34218467:1s finish       7:1017    writing ROOT file (AIJFB  VBN 1228)


-----------------------------------------------------------------------------
Exit Help LockID menu >next_page <prev_page Set_rate Write Zoom !
```

Page Navigation   If there is more information than can fit on one page, the notation "Page 1 of n" appears in the header region, where *n* is the total number of pages. You can display successive pages by pressing the right angle bracket ">" key or the ⇓ Next Screen key. To display a previous page, press the left angle bracket "<" key or the ⇑ Previous Screen key.

Binary File Support   This screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   The zoom screen displays process information on its zoom screen.

CONFIGURATION

OPTIONS

This screen does <u>not</u> have any configuration options.

DBR Activity Screen

This screen displays one line of information for each Database Recovery process
(DBR) active on the node. If there is no active DBR process, the screen is empty.

If the "DBR Activity" screen is not used, the only method available to users to deter-
mine if the DBR process is running is to use the RMU Show Users utility, which only
indicates that the DBR process is running; it does not indicate what type of progress
DBR is making in the recovery operation.

The "DBR Activity" screen is also available during cluster-wide statistic collection.
This means you can monitor the activities of all database recovery operations occur-
ring on any node accessing the database. However, some of the more dynamic screen
fields may not be up-to-date if the database recovery operation occurs on a remote
node.

The "DBR Activity" screen does not identify which user process is being recovered.
This information can be obtained from the Active User Stall Messages screen.

SCREEN LOCATION

This screen resides in the "Process Information" menu.

SCREEN EXAMPLE

The following is an example of the "DBR Activity" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 10:37:46.90
Rate: 3.00 Seconds                 DBR Activity                Elapsed: 05:41:05.72
Page: 1 of 1           SQL_DISK1:[RICK.V70]MF_PERSONNEL.RDB;1        Mode: Online
-------------------------------------------------------------------------------
Process.ID  Activity... VBN.... Operation........................ Lock.ID.
12345678:1D TX redo     1:237   Reading page 1:2


-------------------------------------------------------------------------------
Exit Help LockID Menu >next_page <prev_page PageInfo Set_rate Write Zoom !
```

SCREEN FIELDS

Process.ID This field contains the process identifier of the database recovery process (DBR).
This process contain the suffix "**D**

Additional information can be obtained about this process by using "Zoom" on-screen menu option.

Activity   This field contains a description of the recovery activity being performed by the Database Recovery process (DBR).

This field may not change for a DBR process running on another node of the cluster.

The following table describes the various DBR process activities:

Activity	**Description**
Activation	The DBR process is being activated by the monitor.
Database Attach	The DBR process is attaching to the database.
AIJ Recovery	The DBR process is recovering any pending AIJ operations.
Root Update	The DBR process is recovering any pending database root information updates.
GB Recovery	The DBR process is recovering any pending global buffer transactions.
Recovery Setup	The DBR process is initializing its recovery context information.
Transaction Redo	The DBR process is redoing committed transactions that have not yet been flushed to the database.
Transaction Undo	The DBR process is undoing uncommitted transactions that have already been flushed to the database.
Buffer Flush	The DBR process is flushing its cache buffers to the database.
Database Detach	The DBR process is detaching from the database and terminating the image.

VBN   This column identifies the current block number of the AIJ journal or RUJ journal being accessed. If the block number displayed is for the AIJ journal, the block number will normally prefixed with the AIJ sequence number, so it is easy to identify which AIJ journal is being backed up.

The VBN is for the RUJ journal during the "Transaction UNDO" activity phase.

The VBN is for the AIJ journal during the "Transaction REDO" activity phase.

This field may not change for a database recovery operation on another node of the cluster.

Operation   This column identifies the activity-specific operation being performed by the Database Recovery process (DBR). This column contains messages similar to those displayed by "Stall Messages" screen

This field may not change for a database recovery operation on another node of the cluster.

The complete list of operation messages is available in Appendix E.

Lock.ID   This column identifies any lock the DBR process may be trying to acquire. This lock is typically a page lock.

> **!**
> **NOTE**
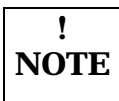
The DBR process does not acquire record locks.

More information about this lock can be obtained using "LockID" on-screen menu option.

**ON-SCREEN MENU
OPTIONS**

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

LockID   This on-screen menu option displays the "Lock Information" zoom screen.

PageInfo   This on-screen menu option displays the "Database Page" zoom screen.

**SCREEN
INFORMATION**

This section discusses screen-specific issues.

Page Navigation   If there is more information than can fit on one page, the notation "Page 1 of n" appears in the header region, where *n* is the total number of pages. You can display successive pages by pressing the right angle bracket ">" key or the ⇓ Next Screen key. To display a previous page, press the left angle bracket "<" key or the ⇑ Previous Screen key.

Binary File Support   This screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   The zoom screen displays process information on its zoom screen.

C O N F I G U R A T I O N

O P T I O N S

This screen does not have any configuration options.

Monitor Log Screen

The "Monitor Log" screen allows you to view the monitor log online, even when the disk-based logging is disabled because of disk space problems. It also indicates when monitor logging is disabled.

The "Monitor Log" screen contains the actual monitor log information for the corresponding database in exactly the same format as the disk-based log. However, the maximum log message display length is 79 characters; therefore, entries longer than79 characters are truncated.

The screen contains up to the last 160 lines of the monitor log. Blank lines are not shown in order to display as much log information as possible. On a 24x80 terminal, the display is 10 pages of information; on a48x80 terminal, the display is 4 pages of information.

The monitor log information presented is for the current database only, whereas the actual on-disk monitor log contains information from all databases, often interspersed.

The "Monitor Log" screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

The "Monitor Log" screen is not integrated into the "Cluster Statistic Collection" facility; the information displayed is for the current node only.

SCREEN LOCATION

This screen resides in the "Process Information" menu.

SCREEN EXAMPLE

The following is an example of the "Monitor Log" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 10:37:46.90
Rate: 1.00 Second                    Monitor Log                Elapsed: 02:34:40.53
Page: 1 of 7      KODD$:[DB_HOMEDIR.WORK.ALS]MF_PERSONNEL.RDB;1      Mode: Online
--------------------------------------------------------------------------------
Date/Time..............   Database Log Message...........................
   - remote monitor 1 is shutdown
   - cluster recovery completed successfully
   - cluster watcher is active
10-MAY-1995 11:49:39.35
   - received request from remote node to join
   - database "_$111$DUA46:[DB_HOMEDIR.WORK.ALS]MF_PERSONNEL.RDB;1"
   - cluster watcher waiting for MEMBIT lock
10-MAY-1995 11:49:39.39
   - lock granted to cluster watcher
   - of database "_$111$DUA46:[DB_HOMEDIR.WORK.ALS]MF_PERSONNEL.RDB;1"
   - cluster watcher is active
10-MAY-1995 11:50:24.72 - received notification of remote monitor deaccess
   - of database "_$111$DUA46:[DB_HOMEDIR.WORK.ALS]MF_PERSONNEL.RDB;1"
   - remote monitor 1 is shutdown
   - cluster recovery completed successfully
   - cluster watcher is active
   - sending normal user attach reply to 776000BA:1
   - sending normal user attach reply to 776000C2:1
10-MAY-1995 13:32:43.68 - received user image termination from 776000C2:1
   - sending normal user attach reply to 776000C2:2
10-MAY-1995 13:33:12.15 - received user image termination from 776000C2:2
10-MAY-1995 13:34:24.05 - received user image termination from 776000BA:1
10-MAY-1995 13:34:24.05 - received user attach request from 776000BA:1
   - sending normal user attach reply to 776000BA:110-MAY-1995 13:41:26.60
   - received user attach request from 776000C2:3
   - sending normal user attach reply to 776000C2:310-MAY-1995 13:41:26.60
   - received user image termination from 776000C2:3
--------------------------------------------------------------------------------
Exit Help Menu >next_page <prev_page Set_rate Write Zoom !
```

SCREEN FIELDS

Date/Time   Entries in the monitor log are comprised of major and minor events. Major events have the "date/time - description". Minor events represent additional information regarding the major event, and have the format " - description" with no date field.

Database Log Messages   This field displays the various database monitor log messages. The complete list of available monitor log messages is described in Appendix H.

ON-SCREEN MENU

OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

SCREEN INFORMATION

This section discusses screen-specific issues.

✔ The "Monitor Log" screen is <u>not</u> written to the viewable output file created by the "Options" on-screen menu option. Note that the "Options" on-screen menu option is not available for this screen.

✔ Use the "Write" on-screen menu option instead to write the current screen page to the file RMU.SCR.

✔ If the on-disk monitor log becomes disabled for any reason, the message "Monitor Log Full" is displayed on the "Monitor Log" screen.

Page Navigation   If there is more information than can fit on one page, the notation "Page 1 of n" appears in the header region, where *n* is the total number of pages. You can display successive pages by pressing the right angle bracket ">" key or the ⇓ Next Screen key. To display a previous page, press the left angle bracket "<" key or the ⇑ Previous Screen key.

Each page of the "Monitor Log" screen represents a view of the actual monitor log, in reverse order. For example, page 1 on the "Monitor Log" screen is the last page of the monitor log; page 2 is the second to last page of the monitor log, and so on. The monitor log scrolls up as new entries are written.

For example, consider the above screen example. Because this screen is positioned on page "1", the bottom line, with the date "10-May-1995 13:41:26.60", was the most recently written monitor log entry. As new monitor log entries for this database are written by the monitor, this display will scroll "up", much as an ordinary terminal display does.

Binary File Support   This screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

ster Statistic Collection Support   This screen is <u>not</u> integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   This screen does <u>not</u> have a zoom screen.

CONFIGURATION OPTIONS

This screen does <u>not</u> have any configuration options.

Defined Logicals Screen

The "Defined Logicals" screen shows all the logical names currently <u>accessible</u> to the RMU Show Statistic utility, the name of the table in which the logicals are defined, and the associated logical definition. Accessible logicals are those that can be translated by the RMU Show Statistic utility; therefore, you cannot display the process-private logicals of other users.

The displayed logical names are listed in "dictionary" alphabetical order for quick review. That is, the logical names are sorted after removing the facility name, such as RDMS$, RDM$, SQL$. This method of sorting is very useful, because in most cases the facility name prefix is not known.

The "Defined Logicals" screen has two modes: brief or full. The brief display mode is the default. The brief display mode shows only the logicals actually defined and accessible to the RMU Show Statistic utility. The full display mode shows all known logicals even if they are not defined.

The "Defined Logicals" screen shows the list of all logical names currently accessible to the RMU Show Statistic utility; the screen is unable to show logical names defined in another process' tables.

Although, the "Defined Logicals" screen displays the values of the logical names, it does not allow you to modify their definitions.

The output from the Defined Logicals screen is not written to the output file; therefore, the output cannot be replayed using an input file.

Due to screen width limitations, only the first 28 characters of the logical name are displayed.

If you are using a multi-version product, the logical names displayed do not contain the numerical suffix. For example, if the multi-version variant of Oracle Rdb Version 7.0 is used, the "70" suffix does not appear for any of the logical names in the "Defined Logicals" screen.

SCREEN LOCATION

This screen resides in the "Process Information" menu.

SCREEN EXAMPLE

The following is an example of the "Defined Logicals" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 10:37:46.90
Rate: 3.00 Seconds             Defined Logicals            Elapsed: 05:47:55.00
Page: 1 of 3            SQL_DISK1:[USER]MF_PERSONNEL.RDB;1             Mode: Online
--------------------------------------------------------------------------------

Logical.Name................. Table.Name........ Logical.Definition..........
SQL$DATABASE                  LNM$PROCESS_TABLE  SQL_PERSONNEL
RDM$MAILBOX_CHANNEL           LNM$SYSTEM_TABLE   MBA64:
RDM$MONITOR                   LNM$SYSTEM_TABLE   SYS$SYSROOT:[SYSEXE]




--------------------------------------------------------------------------------
Exit Full Help Menu >next_page <prev_page Set_rate Write !
```

SCREEN FIELDS

Logical.Name   This field displays the logical name as it must be defined.

The displayed logical names are listed in "dictionary" alphabetical order for quick review. That is, the logical names are sorted after removing the facility name, such as RDMS$, RDM$, SQL$. This method of sorting is very useful, because in most cases the facility name prefix is not known.

Table.Name   In brief mode, this field displays the name of the "logical name" table in which a defined logical resides. In full mode, this field displays the name of the "logical name" table in which a logical is expected to be defined.

Logical.Definition   This field identifies the value of a defined logical.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Brief   You select brief mode by typing "**B**", displayed as the "Brief" option on the on-screen menu. When the "Defined Logicals" screen is in brief mode, only those logical names actually defined and accessible appear. The displayed table name is the actual table where the logical name resides, and the definition is the logical name's defined value. The screen is dynamically updated as new logical names are defined on the system.

The following shows a "Defined Logicals" screen in brief mode:

```
Node: MYNODE (1/1/16)    Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 10:37:46.90
Rate: 3.00 Seconds               Defined Logicals            Elapsed: 05:47:55.00
Page: 1 of 3            SQL_DISK1:[USER]MF_PERSONNEL.RDB;1              Mode: Online
--------------------------------------------------------------------------------

Logical.Name................. Table.Name......... Log ical.Definition..........
SQL$DATABASE                  LNM$PROCESS_TABLE   SQL_PERSONNEL
RDM$MAILBOX_CHANNEL           LNM$SYSTEM_TABLE    MBA64:
RDM$MONITOR                   LNM$SYSTEM_TABLE    SYS$SYSROOT:[SYSEXE]




--------------------------------------------------------------------------------
Exit Full Help Menu >next_page <prev_page Set_rate Write !
```

Full   You select full mode by typing "**F**", displayed as the "Full" option on the on-screen menu. When the "Defined Logicals" screen is in full mode, all <u>known</u> logical names are displayed, whether the logical name is defined or not.

If the displayed logical name is defined, the table name and logical value are displayed as if the display were in brief mode. If the logical name is not defined, the table name contains the name of the table where the logical name should reside; no definition is displayed. The full mode is useful for checking the spelling of logical names and ensuring the logical name is defined in the proper table.

The following shows a "Defined Logicals" screen in full mode:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 28-JAN-1998 14:00:54.17
Rate: 1.00 Second                 Defined Logicals            Elapsed: 00:12:42.50
Page: 1 of 6     _DPA48:[DB_HOMEDIR.REGTESTS]MF_PERSONNEL.RDB;1     Mode: Online
--------------------------------------------------------------------------------

Logical.Name................. Table.Name......... Logical.Definition..........
RDMS$AUTO_READY               LNM$FILE_DEV
RDM$BIND_ABS_LOG_FILE         LNM$SYSTEM_TABLE
RDM$BIND_ABS_OVERWRITE_ALLOWE LNM$SYSTEM_TABLE
RDM$BIND_ABS_OVERWRITE_IMMEDI LNM$SYSTEM_TABLE
RDM$BIND_ABS_QUIET_POINT      LNM$SYSTEM_TABLE
RDM$BIND_ABS_PRIORITY         LNM$SYSTEM_TABLE    4
RDM$BIND_ABW_ENABLED          LNM$FILE_DEV
RDM$BIND_AIJ_ARB_COUNT        LNM$SYSTEM_TABLE
RDM$BIND_AIJ_BUFOBJ_ENABLED   LNM$SYSTEM_TABLE
RDM$BIND_AIJ_CHECK_CONTROL_RE LNM$FILE_DEV
RDM$BIND_AIJ_EMERGENCY_DIR    LNM$SYSTEM_TABLE
RDM$BIND_AIJ_IO_MAX           LNM$FILE_DEV
RDM$BIND_AIJ_IO_MIN           LNM$FILE_DEV
RDM$BIND_AIJ_STALL            LNM$FILE_DEV
RDM$BIND_AIJ_SWITCH_GLOBAL_CK LNM$FILE_DEV
RDM$BIND_AIJ_WORK_FILE        LNM$SYSTEM_TABLE
RDM$BIND_ALS_CREATE_AIJ       LNM$SYSTEM_TABLE
RDM$BIND_ALS_OUTPUT_FILE      LNM$SYSTEM_TABLE
RDM$BIND_ALS_PRIORITY         LNM$SYSTEM_TABLE    4
RDM$BIND_APF_DEPTH            LNM$FILE_DEV
RDM$BIND_APF_ENABLED          LNM$FILE_DEV
RDM$BIND_BATCH_MAX            LNM$FILE_DEV
RDM$BIND_BUFFERS              LNM$PROCESS_TABLE   500

--------------------------------------------------------------------------------
Brief Exit Help Menu >next_page <prev_page Set_rate Write !
```

SCREEN INFORMATION

This section discusses screen-specific issues.

Page Navigation If there is more information than can fit on one page, the notation "Page 1 of n" appears in the header region, where *n* is the total number of pages. You can display successive pages by pressing the right angle bracket ">" key or the ⇓ Next Screen key. To display a previous page, press the left angle bracket "<" key or the ⇑ Previous Screen key.

Binary File Support This screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

ster Statistic Collection Support This screen is not integrated into the "Cluster Statistic Collection" facility.

Zoom Screen This screen does not have a zoom screen.

CONFIGURATION

OPTIONS

This screen does <u>not</u> have any configuration options.

Lock Timeout History Screen

For each active process on the current node, the "Lock Timeout History" screen shows the process ID, the time that the process most recently timed out while waiting for a lock, the reason for the most recent timeout experienced by the process, and the number of timeouts experienced by the process since attaching to the database.

The "Stall Messages" screen provides active stall information, but when a process times out while waiting for a lock, the stall is terminated and the information is no longer available on the "Stall Messages" screen. By first examining the "Lock Dead-lock History" screen and then the "Lock Timeout History" screen, the DBA can determine which records represent database hot spots and sources of contention.

SCREEN LOCATION

This screen resides in the "Process Information" menu.

SCREEN EXAMPLE

The following is an example of the "Lock Timeout History" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 10:37:46.90
Rate: 3.00 seconds            Lock Timeout History          Elapsed: 00:00:31.75
Page: 1 of 3            SQL_DISK1:[RICK.V70]MF_PERSONNEL.RDB;1         Mode: Online
--------------------------------------------------------------------------------

Process.ID Occurred...   Lock.timeout.reason..................... #Timeout
65505487:1 08:55:21.16   Waiting for record 1:2:1 (CR)                    1


--------------------------------------------------------------------------------
Config Exit Help Menu >next_page <prev_page Set_rate Write Zoom !
```

SCREEN FIELDS

Process   The process ID and the Oracle Rdb stream ID of the database user. Normally the stream ID will be one (1). However, if the user is attached to multiple databases or has explicitly detached and attached to different database sessions during the same image activation, the stream ID will uniquely identify the database session. A process ID with an "**R**" appended indicates a server for a remote process.

Occurred   This field displays the time at which the lock timeout occurred.

Lock.Timeout.Reason   The reason for the lock timeout. For example, "waiting for. . . " messages indicates a stalled lock request, along with the requested lock mode, that timed out on the identified lock resource.

For more information on the lock timeout messages, please refer to Appendix A.

#Timeouts   This field displays the number of lock timeout operations that have occurred to this process. This field does not represent the number of lock timeouts that have occurred for the displayed resource in the "reason" field.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

SCREEN INFORMATION

Use the "Start lock timeout logging" option of the "Tools" menu to automatically log the contents of the "Lock Timeout History" screen to an output file for later analysis. For more information on this option, please refer to the "Log Files" section of Volume 1 of the Handbook.

Page Navigation   If there is more information than can fit on one page, the notation "Page 1 of n" appears in the header region, where *n* is the total number of pages. You can display successive pages by pressing the right angle bracket ">" key or the ⇓ Next Screen key. To display a previous page, press the left angle bracket "<" key or the ⇑ Previous Screen key.

Binary File Support   This screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   The zoom screen displays process information on its zoom screen.

CONFIGURATION OPTIONS

You can use the "Config" on-screen menu option to configure the "Lock Timeout History" screen. Select this option, by typing the letter C, to display the configuration sub-menu. The configuration sub-menu provides the following options:

Explode timeout messages   This configuration option causes a lock timeout history message to be displayed for every process attached to the database, even if that process did not have any lock timeouts.

This is the default configuration option.

Compress timeout messages   This configuration option causes a lock timeout history message to be displayed for <u>only</u> those processes attached to the database that have had one or more lock time-outs.

Lock Deadlock History Screen

For each active process on the current node, the Lock Deadlock History screen shows the process ID, the time that the process was most recently involved in a deadlock, the reason for the most recent deadlock, and the number of deadlocks the process has encountered since attaching to the database.

The "Stall Messages" screen provides stall information, but when a lock is deadlocked, the stall is terminated and the information is no longer available on the "Stall Messages" screen.

By using the "Lock Deadlock History" screen to examine the most recent deadlocks, a DBA can more easily identify potential database hot spots and application bottlenecks. Looking at a full screen of deadlock information can help the DBA differentiate between frequent and infrequent problems and correlate common causes of the problems.

In general, record deadlocks are undesirable and the cause of such deadlocks should be discovered and fixed. Page deadlocks are not always indicative of an application problem, but they need to be analyzed as all deadlocks represent performance problems.

SCREEN LOCATION

This screen resides in the "Process Information" menu.

SCREEN EXAMPLE

The following is an example of the "Lock Deadlock History" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 10:37:46.90
Page: 0.10 Seconds           Lock Deadlock History          Elapsed: 00:07:21.10
Page: 1 of 3             SQL_DISK1:[RICK.V70]MF_PERSONNEL.RDB;1      Mode: Online
--------------------------------------------------------------------------------

Process.ID Occurred...   Lock.deadlock.reason..................... #Timeout
65505487:1 08:55:21.16   Waiting for record 1:2:1 (CR)                   1



--------------------------------------------------------------------------------
Config Exit Help Menu >next_page <prev_page Set_rate Write Zoom !
```

SCREEN FIELDS

Process   The process ID and the Oracle Rdb stream ID of the database user. Normally the stream ID will be one (1). However, if the user is attached to multiple databases or has explicitly detached and attached to different database sessions during the same image activation, the stream ID will uniquely identify the database session. A process ID with an R appended indicates a server for a remote process.

Occurred   This field displays the time at which the lock deadlock occurred.

Lock.Deadlock.Reason   The reason for the lock deadlock. For example, "waiting for. . . " messages indicates a stalled lock request, along with the requested lock mode, that deadlocked on the identified lock resource.

For more information on the lock deadlock messages, please refer to Appendix A.

#Deadlocks   This field displays the number of lock deadlock operations that have occurred to this process. This field does not represent the number of lock deadlock that have occurred for the displayed resource in the "reason" field.

ON-SCREEN MENU
OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

SCREEN
INFORMATION

The following "Lock Deadlock History" screen shows a page deadlock. Although a page deadlock is not necessarily a bad occurrence, it could indicate a potential performance problem. Note that process 7660441F has had 36 deadlocks, although not necessarily on the indicated page. The lock deadlock reason gives the reason for only the most recent deadlock. If 36 deadlocks is a high number for the elapsed time the process has been attached to the database, the DBA should examine the process in detail. A high number of deadlocks for a process can indicate a major design problem.

```
Node: MYNODE (1/1/16)    Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 10:37:46.90
Page: 0.10 Seconds              Lock Deadlock History            Elapsed: 00:07:23.12
Page: 1 of 3              SQL_DISK1:[RICK.V70]MF_PERSONNEL.RDB;1        Mode: Online
--------------------------------------------------------------------------------

Process.ID Occurred...   Lock.deadlock.reason.................... #Deadlock
76601621:1                                                                0
7660441F:1 14:09:01.89 - waiting for page 1:258 (PR)                     36



--------------------------------------------------------------------------------
Config Exit Help Menu >next_page <prev_page Set_rate Write Zoom !
```

☑ Use the "Start lock deadlock logging" option of the "Tools" menu to automatically log the contents of the "Lock Deadlock History" screen to an output file for later analysis. For more information on this option, please refer to the "Log Files" section of Volume 1 of the Handbook.

Page Navigation   If there is more information than can fit on one page, the notation "Page 1 of n" appears in the header region, where *n* is the total number of pages. You can display successive pages by pressing the right angle bracket ">" key or the ⇓ Next Screen key. To display a previous page, press the left angle bracket "<" key or the ⇑ Previous Screen key.

Binary File Support   This screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   The zoom screen displays process information on its zoom screen.

CONFIGURATION
OPTIONS

You can use the "Config" on-screen menu option to configure the "Lock Deadlock History" screen. Select this option, by typing the letter C, to display the configuration sub-menu. The configuration sub-menu provides the following options:

Explode deadlock messages   This configuration option causes a lock deadlock history message to be displayed for every process attached to the database, even if that process did not have any lock deadlocks.

This is the default configuration option.

Compress deadlock messages   This configuration option causes a lock deadlock history message to be displayed for only those processes attached to the database that have had one or more lock deadlocks.

DBKEY Information Screen

The "DBKEY Information" screen displays, for each process attached to the database on the node, the last retrieved DBKEY for each of the following page categories: data page, snapshot page, SPAM (space area   management) page, AIP (area inventory page) page and ABM (area bitmap) page.

If the attached process provides line number information as part of the data page retrieval information, the line number is displayed. Otherwise, only the area and page number are displayed. Only the area and page number are displayed for the snapshot, SPAM, AIP, and ABM pages.

The "DBKEY Information" screen is especially useful for identifying collisions on hot pages.

The "DBKEY Information" screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

The "DBKEY Information" screen is not integrated into the "Cluster Statistic Collection" facility; therefore, only processes on the current local node are displayed.

The screen example below shows that data page 1:648 and SPAM pages 5:1 and 5:218 are commonly accessed. These are pages that warrant further analysis by the DBA.

The "PageInfo" on-screen menu option allows you to perform this analysis without having to exit the RMU Show Statistic utility.
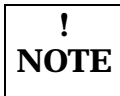
> **!**
> **NOTE**

SCREEN LOCATION

This screen resides in the "Process Information" menu.

SCREEN EXAMPLE

The following is an example of the "Lock Deadlock History" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 10:37:46.90
Rate: 3.00 Seconds              DBKEY Information          Elapsed: 00:03:24.45
Page: 1 of 1        RDBVMS_USER1:[LOGAN.V70]MF_PERSONNEL.RDB;1       Mode: Online
--------------------------------------------------------------------------------

Process.ID Data.Page..    Snap.Page..    Spam.Page..    AIP.Page..    ABM.Page..
7E80F841:2 1:648          14:27          5:1            1:483
7E8058F8:1 5:317          14:22          5:218          1:483
7E8052F6:1 1:648          14:20          5:218          1:483
7E80D440:1 5:65           14:18          5:1            1:483


--------------------------------------------------------------------------------
Exit Help Menu >next_page <prev_page PageInfo Set_rate Write Zoom !
```

SCREEN FIELDS

Process.ID   The process ID and the Oracle Rdb stream ID of the database user. Normally the stream ID will be one (1). However, if the user is attached to multiple databases or has explicitly detached and attached to different database sessions during the same image activation, the stream ID will uniquely identify the database session. A process ID with an R appended indicates a server for a remote process.

Data.Page   This field identifies the <u>last</u> data page of a storage area accessed by the process. This field may display a row line number if the process attempted to manipulate a specific row; however, typically this field displays only the storage area and page number.

Snap.Page   This field identifies the <u>last</u> snapshot page of a snapshot storage area accessed by the process. This field may display a row line number if the process attempted to manipulate a specific row; however, typically this field displays only the storage area and page number.

Spam.Page   This field identifies the <u>last</u> space management (SPAM) page of a storage area accessed by the process.

AIP.Page   This field identifies the <u>last</u> area inventory (AIP) page of a storage area accessed by the process.

ABM.Page   This field identifies the <u>last</u> area bitmap (ABM) page of a storage area accessed by the process.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

PageInfo   This on-screen menu option displays the "Database Page" zoom screen. On this screen, the "Database Page" zoom will select any of the display DBKEY information.

**SCREEN
INFORMATION**

✔ Use the "Start DBKEY logging" option of the "Tools" menu to automatically log the contents of the "DBKEY Information" screen to an output file for later analysis. For more information on this option, please refer to the "Log Files" section of Volume 1 of the Handbook.

Page Navigation   If there is more information than can fit on one page, the notation "Page 1 of n" appears in the header region, where *n* is the total number of pages. You can display successive pages by pressing the right angle bracket ">" key or the ⇓ Next Screen key. To display a previous page, press the left angle bracket "<" key or the ⇑ Previous Screen key.

Binary File Support   This screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

ster Statistic Collection Support   This screen is <u>not</u> integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   The zoom screen displays process information on its zoom screen.

**CONFIGURATION
OPTIONS**

This screen does <u>not</u> have any configuration options.

Stall Statistics Screen

The "Stall Statistics" screen helps you identify the types and frequency of stalls that are occurring on the database.

Often, when attempting to diagnose performance problems, the existing RMU Show Statistic utility "Stall Messages" and "Active User Stall Messages" screens are extremely useful for identifying the cause of present stalls. However, these screens show only the "moment in time" view of the cause of the stalls. The "Stall Statistics" screen shows you the frequency of these stalls over time.

The "Stall Statistics" screen identifies the number of stalls and their corresponding durations for a particular stall class. The screen can be configured (using the "Config" on-screen menu option) to display either the "aggregate count" information or the "aggregate duration" information.

The stall durations are collected as hundredths of seconds. Therefore, the total "page" stall duration of 554787 is really 5547.87 seconds.

Since certain types of stalls can be nested, the total stall durations may be larger than actually occurred.

SCREEN LOCATION

This screen resides in the "Process Information" menu.

SCREEN EXAMPLE

The following example shows the "Stall Statistics" screen displaying aggregate count information. In this example, there were 301,991 total stalls for the "page" class.

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 10:37:46.90
Rate: 1.00 Second     Stall Statistics (Aggregate counts)  Elapsed: 01:44:29.27
Page: 1 of 1       KODA_TEST:[DB_HOMEDIR.OE_MASTER]OE_RDB.RDB;1     Mode: Online
--------------------------------------------------------------------------------

statistic.........     rate.per.second............. total....... ave rage......
name..............     max..... cur..... avg....... count....... per.trans....
miscellaneous              0        0       0.0           0           0.0
records                   15        0       0.0         160           0.3
pages                   2706        0      48.1      301991         579.6
tables                     0        0       0.0           0           0.0
storage areas             33        0       0.0         133           0.2
database rootfile        125        0       0.3        2162           4.1
recovery journals         66        0       0.5        3405           6.5
user transactions         69        0       0.0         294           0.5
hot standby                0        0       0.0           0           0.0
database                   9        0       0.0          19           0.0


--------------------------------------------------------------------------------
Config Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Unreset Write
```

The following example shows the "Stall Statistics" screen displaying aggregate duration information.

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 10:37:46.90
Rate: 1.00 Second    Stall Statistics (Aggregate durations) Elapsed: 01:44:40.52
Page: 1 of 1       KODA_TEST:[DB_HOMEDIR.OE_MASTER]OE_RDB.RDB;1     Mode: Online
--------------------------------------------------------------------------------

statistic.........     rate.per.second............. total....... ave rage......
name..............     max..... cur..... avg....... count....... per.trans....

miscellaneous              0        0       0.0           0           0.0
records                 8720        0       4.8       30237          58.0
pages                  78453        0      88.3      554787        1064.8
tables                     0        0       0.0           0           0.0
storage areas           3400        0       0.7        4742           9.1
database rootfile       1876        0       1.5        9835          18.8
recovery journals       6652        0       9.9       62716         120.3
user transactions      31192        0      10.0       63145         121.1
hot standby                0        0       0.0           0           0.0
database                2052        0       0.1        1226           2.3


--------------------------------------------------------------------------------
Config Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Unreset Write
```

SCREEN FIELDS

miscellaneous   These are generic uncategorized stalls, such as waiting for a bugcheck dump to complete.

records These are record related stalls, such as waiting for record locks to be granted.

pages These are page related stalls, such as waiting for storage area I/O to complete or page locks to be granted.

tables These are table related stalls, such as waiting for logical area locks to be granted.

storage areas These are storage area related stalls, such as waiting for storage areas to be created, deleted, truncated or opened.

database rootfile These are database rootfile related stalls, such as waiting for rootfile I/O to complete or "object locks to be granted.

recovery journals These are journal related stalls, such as opening, initializing or extending journals, as well as waiting for journal locks to be granted.   This information includes both AIJ and RUJ journals.

user transactions These are transaction related stalls, such as waiting for 2PC transactions to commit, or waiting for checkpoints to complete.

hot standby These are hot standby related stalls.

database These are database related stalls, such as waiting for the database freeze to complete.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph This on-screen menu option displays a histogram graph instead of numbers.

Numbers This on-screen menu option displays numeric statistics instead of histogram graph.

Options This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot This on-screen menu option plots a specific field's value by time.

Unreset This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot This on-screen menu option plots a specific field's value using scatter-based display.

Yank   Places a selected statistic on the "Custom Statistics" screen.

**SCREEN
INFORMATION**

This section discusses screen-specific issues.

Page Navigation   This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support   This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   This screen does <u>not</u> have a zoom screen.

**CONFIGURATION
OPTIONS**

You can use the "Config" on-screen menu option to configure the "Lock Deadlock History" screen. Select this option, by typing the letter C, to display the configuration sub-menu. The configuration sub-menu provides the following options:

Aggregate stall counts   This configuration option displays stall occurrences instead of stall duration information.

Aggregate stall durations   This configuration option displays stall durations instead of stall occurrence information.

Active Stall Counts Screen

The "Active Stall Counts" screen displays the number of database processes that are currently stalled for each type of stall.

The "Active Stall Counts" screen is available in graphical format only.

Often, when attempting to diagnose performance problems, the existing RMU Show Statistic utility "Stall Messages" and "Active User Stall Messages" screens are extremely useful for identifying the cause of present stalls. However, these screens show only the "moment in time" view of the cause of the stalls.

SCREEN LOCATION

This screen resides in the "Process Information" menu.

SCREEN EXAMPLE

The following is an example of the "Active Stall Counts" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 29-JAN-1998 10:39:00.69
Rate: 1.00 Second                Active Stall Counts          Elapsed: 00:03:21.65
Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1     Mode: Online
--------------------------------------------------------------------------------
Stall Category   Stall.Cnt       10   20   30   40   50   60   70   80   90  100
                                 +----+----+----+----+----+----+----+----+----+----+
miscellaneous            0       |    |    |    |    |    |    |    |    |    |    |
records                  4       +-*  |    |    |    |    |    |    |    |    |    |
pages                    9       +---*|    |    |    |    |    |    |    |    |    |
tables                   0       |    |    |    |    |    |    |    |    |    |    |
storage areas            0       |    |    |    |    |    |    |    |    |    |    |
database rootfile        0       |    |    |    |    |    |    |    |    |    |    |
recovery journals        3       +*   |    |    |    |    |    |    |    |    |    |
user transactions        0       |    |    |    |    |    |    |    |    |    |    |
hot standby              0       |    |    |    |    |    |    |    |    |    |    |
database                 0       |    |    |    |    |    |    |    |    |    |    |
                                 |    |    |    |    |    |    |    |    |    |    |
                                 |    |    |    |    |    |    |    |    |    |    |
                                 |    |    |    |    |    |    |    |    |    |    |
--------------------------+----+----+----+----+----+----+----+----+----+----+
Exit Help Menu Set_rate Write !
```

SCREEN FIELDS

Stall Category   This field identifies the type of stall being measured. There are currently 10 classes of stalls:

Class	Description
records	These are record related stalls, such as waiting for record locks to be granted.
Pages	These are page related stalls, such as waiting for storage area I/O to complete or page locks to be granted.
Tables	These are table related stalls, such as waiting for logical area locks to be granted.
storage areas	These are storage area related stalls, such as waiting for storage areas to be created, deleted, truncated or opened.
database rootfile	These are database rootfile related stalls, such as waiting for rootfile I/O to complete or "object locks to be granted.
recovery journals	These are journal related stalls, such as opening, initializing or extending journals, as well as waiting for journal locks to be granted. This information includes both AIJ and RUJ journals.
user transactions	These are transaction related stalls, such as waiting for 2PC transactions to commit, or waiting for checkpoints to complete.
hot standby	These are hot standby related stalls.
Database	These are database related stalls, such as waiting for the database freeze to complete.
Miscellaneous	These are generic uncategorized stalls, such as waiting for a bugcheck dump to complete.

Stall Cnt This field identifies the number of processes that are actively stalled at that moment in time. To view the individual stall messages, please refer to the "Stall Messages" and "Active User Stall Messages" screens.

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

SCREEN INFORMATION

✓ Due to the manner in which these stalls are efficiently recorded by the runtime processes, it is occasionally possible to "lose" track of an end-of-stall condition. This results in the "Active Stall Counts" screen sometimes displaying active stalls when, in fact, there are not any. This is not a serious condition.

Page Navigation   This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support   This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   This screen does <u>not</u> have a zoom screen.

CONFIGURATION OPTIONS

This screen does <u>not</u> have any configuration options.

Process IO Overview Screen[5]

The "Process IO Overview" screen provides summary I/O information for all proc-
esses activated to collect global statistics using the "Process Monitoring" facility.

The processes displayed on this screen have previously activated their global statistics
collection. Process global statistic collection can be either implicitly activated by the
database monitor, or explicitly activated by the RMU Show Statistic utility.

SCREEN LOCATION

This screen resides in the "Process Information" menu.

SCREEN EXAMPLE

The following is an example of the "Process IO Overview" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 10:37:46.90
Rate: 3.00 Seconds             Process IO Overview           Elapsed: 00:20:11.30
Page: 1 of 1           SQL_DISK1:[RICK.V70]MF_PERSONNEL.RDB;1           Mode: Online
--------------------------------------------------------------------------------

Process.ID Sync.Reads SyncWrites Read.Stall WriteStall AsyncReads AsyncWrits
54C03506:1A      6204       7253       1596      16757          0          0
54C03505:1A      5861       6978       1436      18506          0          0
54C03507:1A      6298       7242       1552      16817          0          0
54C03508:1A      6229       7120       1564      17055          0          0




--------------------------------------------------------------------------------
Exit Help Menu >next_page <prev_page Options Set_rate Write Zoom !
```

SCREEN FIELDS

The "Process IO Overview" screen provides the following information:

Process.ID The process ID for the current process, assigned by the operating system, and the
stream ID, assigned by the database. If "**A**" is appended to the process ID, the proc-
ess had been activated and attached for global statistics collection; this is the normal
case. Server processes will be designated with the "**s**" tag.

---

[5] Available in Oracle Rdb 8.0.

Sync.Reads   This field gives the number of synchronous read QIOs (queued I/O requests) issued to the database storage area for single-file and multi-file databases and snapshot files. This operation reads database pages synchronously from the database.

SyncWrites   This field gives the number of synchronous write QIOs (queued I/O requests) issued to the database storage area for single-file and multi-file databases (.RDA) and snapshot files (.SNP). This operation writes modified database pages synchronously back to the database.

Read.Stall   This field gives the time in hundredths of a second spent reading database pages from the database rootfile (.RDB), storage area (.RDA) files and snapshot (.SNP) files. An excessively high number often indicates disk contention that might be alleviated by moving some files to other disks.

   This statistic field includes both synchronous and asynchronous I/O read stall durations.

WriteStall   This field gives the time in hundredths of a second spent writing database pages to the database rootfile (.RDB), storage area (.RDA) and snapshot (.SNP) files. An excessively high number often indicates disk contention that might be alleviated by moving some files to other disks.

   This statistic field includes both synchronous and asynchronous I/O read stall durations.

AsyncReads   This field gives the number of asynchronous read QIOs (queued I/O requests) issued to the database storage area for single-file and multi-file databases (.RDA) and snapshot (.SNP) files. This operation reads database pages asynchronously from the database.

AsyncWrits   This field gives the number of asynchronous write QIOs (queued I/O requests) issued to the database storage area for single-file and multi-file databases (.RDA) and snapshot files (.SNP). This operation writes modified database pages asynchronously back to the database.

ON-SCREEN MENU
OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

SCREEN INFORMATION

This section discusses screen-specific issues.

Binary File Support This screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

ster Statistic Collection Support This screen is <u>not</u> integrated into the "Cluster Statistic Collection" facility.

Zoom Screen The zoom screen displays process information on its zoom screen.

CONFIGURATION OPTIONS

This screen does <u>not</u> have any configuration options.

Process Journal IO Overview Screen[6]

The "Process Journal IO Overview" screen provides summary RUJ and AIJ journal I/O information for all processes activated to collect global statistics using the "Process Monitoring" facility.

The processes displayed on this screen have previously activated their global statistics collection. Process global statistic collection can be either implicitly activated by the database monitor, or explicitly activated by the RMU Show Statistic utility.

SCREEN LOCATION

This screen resides in the "Process Information" menu.

SCREEN EXAMPLE

The following is an example of the "Process Journal IO Overview" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 10:37:46.90
Rate: 3.00 Seconds          Process Journal IO Overview        Elapsed: 00:20:11.30
Page: 1 of 1          SQL_DISK1:[RICK.V70]MF_PERSONNEL.RDB;1          Mode: Online
-------------------------------------------------------------------------------

Process.ID RUJ.Reads. RUJ.Writes RUJ.Extend AIJ.Reads. AIJ.Writes AIJ.Extend
54C03506:1A         0        480          1         23          0          0
54C03505:1A         0       1504          1         23          0          0
54C03507:1A         1        477          1         23          0          0
54C03508:1A         0        497          1         23          0          0




-------------------------------------------------------------------------------
Exit Help Menu >next_page <prev_page Options Set_rate Write Zoom !
```

SCREEN FIELDS

The "Process Journal IO Overview" screen provides the following information:

Process.ID The process ID for the current process, assigned by the operating system, and the stream ID, assigned by the database. If "**A**" is appended to the process ID, the process had been activated and attached for global statistics collection; this is the normal case. Server processes will be designated with the "**s**" tag.

---

[6] Available in Oracle Rdb 8.0.

RUJ.Reads   This field gives the number of read QIOs (queued I/O requests) issued to the data-
              base recovery unit journal (.RUJ) files. This operation reads before-image records
              from the RUJ file to roll back a verb or a transaction.

              This statistic field includes both synchronous and asynchronous I/O read requests.

RUJ.Writes   This field gives the number of write QIOs (queued I/O requests) issued to the data-
              base recovery unit journal (.RUJ) files. This operation writes before-image records to
              the RUJ file in case a verb or transaction must be rolled back. Before-images must be
              written to the RUJ file before the corresponding database page can be written back to
              the database.

              This statistic field includes both synchronous and asynchronous I/O write requests.

RUJ.Extend   This field identifies the number of times an RUJ file has been extended. Ideally, this
              value should be "0" or as close to "0" as possible. Each RUJ file extension represents
              a performance bottleneck that is easily resolved.

AIJ.Reads   The number of read QIOs issued to the database after-image journal (.AIJ) file. If
              after-image journaling is not enabled for the database this statistic will be zero.

              This statistic field includes both synchronous and asynchronous I/O read requests.

AIJ.Writes   This field gives the total number of write QIOs (queued I/O requests) issued to the
              database after-image journal (.AIJ) file. If after-image journaling is not enabled for the
              database, this statistic will be zero. This operation writes after-image records to the
              after-image journal to facilitate roll-forward recovery using the RMU Recover utility.

              This statistic field includes both synchronous and asynchronous I/O write requests.

AIJ.Extend   This field identifies the number of times an after-image journal has been extended.
              Ideally, this value should be "0" or as close to "0" as possible. Each AIJ file extension
              represents a performance bottleneck that is easily resolved.

ON-SCREEN MENU
OPTIONS

              This section discusses the on-screen menu options available to this screen. Remember
              that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are
              available on all screens unless otherwise noted.

Options   This on-screen menu option displays a menu containing options for writing all of the
              screens to a text file named STATISTICS.RPT. This option should be used with care
              because it generates a very large output file.

SCREEN
INFORMATION

              This section discusses screen-specific issues.

Binary File Support   This screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

ster Statistic Collection Support   This screen is <u>not</u> integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   The zoom screen displays process information on its zoom screen.

CONFIGURATION
OPTIONS

This screen does <u>not</u> have any configuration options.

Process Lock Overview Screen[7]

The "Process Lock Overview" screen provides summary locking information for all processes activated to collect global statistics using the "Process Monitoring" facility.

The processes displayed on this screen have previously activated their global statistics collection. Process global statistic collection can be either implicitly activated by the database monitor, or explicitly activated by the RMU Show Statistic utility.

SCREEN LOCATION

This screen resides in the "Process Information" menu.

SCREEN EXAMPLE

The following is an example of the "Process Lock Overview" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 10:37:46.90
Rate: 3.00 Seconds              Process Lock Overview          Elapsed: 00:20:11.30
Page: 1 of 1            SQL_DISK1:[RICK.V70]MF_PERSONNEL.RDB;1          Mode: Online
--------------------------------------------------------------------------------

Process.ID Lock.Rqsts Prom.Rqsts Deadlocks. Blasted... Demotes... Unlocks...
54C03506:1A    107224     55522        170     22173     41118     78963
54C03505:1A     96678     50545        148     20688     37952     71582
54C03507:1A    104317     54733        172     21560     40965     77017
54C03508:1A    105354     55242        162     21571     40714     77613




--------------------------------------------------------------------------------
Exit Help Menu >next_page <prev_page Options Set_rate Write Zoom !
```

SCREEN FIELDS

The "Process Lock Overview" screen provides the following information:

Process.ID The process ID for the current process, assigned by the operating system, and the stream ID, assigned by the database. If "**A**" is appended to the process ID, the process had been activated and attached for global statistics collection; this is the normal case. Server processes will be designated with the "**s**" tag.

[7] Available in Oracle Rdb 8.0.

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Lock.Rqsts This field gives the number of lock requests, also referred to as "enqueue" lock re-
quests, for new locks. Whether the lock request succeeds or fails, it is included in this
count. The "rqsts not queued", "rqsts stalled", and "rqst deadlocks" counts provide
further detail for enqueue lock requests statistics.

prom.Rqsts This field gives the number of enqueue lock requests to promote an existing lock to a
higher lock mode. Whether or not the lock request succeeds, it is included in this
count. The "proms not queued," "proms stalled," and "prom deadlocks" counts
provide further detail for the locks promotion statistics.

Deadlocks This field gives the number of stalled enqueue lock requests to promote an existing
lock that ultimately resulted in a deadlock. Most deadlocks are tried again and resolved

Blasted This field gives the number of blocking ASTs, sometimes referred to as "blasts",
delivered to Oracle Rdb by the lock manager. A blocking AST is delivered to the
holder of a lock when a lock conflict is detected, which is a good indication of con-
tention problems. When Oracle Rdb receives a blocking AST, it often demotes or
releases a lock in an attempt to avoid unnecessary deadlocks.

The number of blocking ASTs reported is composed of two different types of
blocking ASTs: those generated externally and those generated internally.

An externally generated blocking AST occurs when a blocking AST is actually received
by the process from the operating system in response to some lock conflict with
another process. A blocking AST routine is executed and the RMU Show Statistic
utility records the blocking AST activity.

An internally generated blocking AST occurs when a lock-blocking AST routine is
executed by the process in anticipation that the same work would have to be per-
formed anyway if a blocking AST were to be received from the operating system.
This algorithm serves as an optimistic code optimization; the process, assuming it
would eventually receive a blocking AST for the particular lock, executes the blocking
AST routine. The RMU Show Statistic utility does not differentiate between these
two types of blocking ASTs.

Demotes This field gives the number of enqueue lock requests to demote an existing lock to a
lower lock mode. These requests always succeed.

Unlocks This field gives the number of deallocating lock requests to release an existing lock.
These requests always succeed.

ON-SCREEN MENU
OPTIONS

This section discusses the on-screen menu options available to this screen. Remember
that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are
available on all screens unless otherwise noted.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

SCREEN INFORMATION

This section discusses screen-specific issues.

Binary File Support   This screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

ster Statistic Collection Support   This screen is <u>not</u> integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   The zoom screen displays process information on its zoom screen.

CONFIGURATION OPTIONS

This screen does <u>not</u> have any configuration options.

Process Object Overview Screen[8]

The "Process Object Overview" screen provides summary rootfile object information for all processes activated to collect global statistics using the "Process Monitoring" facility.

The processes displayed on this screen have previously activated their global statistics collection. Process global statistic collection can be either implicitly activated by the database monitor, or explicitly activated by the RMU Show Statistic utility.

SCREEN LOCATION

This screen resides in the "Process Information" menu.

SCREEN EXAMPLE

The following is an example of the "Process Object Overview" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 10:37:46.90
Rate: 3.00 Seconds            Process Object Overview          Elapsed: 00:20:11.30
Page: 1 of 1          SQL_DISK1:[RICK.V70]MF_PERSONNEL.RDB;1          Mode: Online
--------------------------------------------------------------------------------

Process.ID Objs.Shrd. Objs.Excl. Objs.Rfrsh Objs.Updt. Objs.Write Objs.Relsd
54C03506:1A    30561      12652          0       3432       3432      43213
54C03505:1A    28158      11706          0       3157       3157      39864
54C03507:1A    29982      12304          0       3306       3306      42286
54C03508:1A    30389      12513          0       3380       3380      42902




--------------------------------------------------------------------------------
Exit Help Menu >next_page <prev_page Options Set_rate Write Zoom !
```

SCREEN FIELDS

The "Process Object Overview" screen provides the following information:

Process.ID The process ID for the current process, assigned by the operating system, and the stream ID, assigned by the database. If "**A**" is appended to the process ID, the process had been activated and attached for global statistics collection; this is the normal case. Server processes will be designated with the "**s**" tag.

---

[8] Available in Oracle Rdb 8.0.

Objs.Shrd This field displays the number of objects that are fetched for shared retrieval access.

Objs.Excl This field displays the number of objects that are fetched for exclusive access with the intention of subsequently being updated. This statistic does not indicate that the object was actually updated.

Objs.Rfrsh This field displays the number of objects whose information in the global section was detected as being stale, so the information was read again from the database root file.

Objs.Updt This field displays the number of objects whose information was modified. Only objects fetched for exclusive access can be modified.

Objs.Write This field displays the number of objects whose information was written back to the database root file.

Objs..Relsd This field displays the number of objects whose shared or exclusive access was re-leased to other processes.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Options This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

SCREEN INFORMATION

This section discusses screen-specific issues.

Binary File Support This screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

ster Statistic Collection Support This screen is <u>not</u> integrated into the "Cluster Statistic Collection" facility.

Zoom Screen The zoom screen displays process information on its zoom screen.

CONFIGURATION OPTIONS

This screen does <u>not</u> have any configuration options.

Process Record Overview Screen[9]

The "Process Record Overview" screen provides summary record access information for all processes activated to collect global statistics using the "Process Monitoring" facility.

The processes displayed on this screen have previously activated their global statistics collection. Process global statistic collection can be either implicitly activated by the database monitor, or explicitly activated by the RMU Show Statistic utility.

This screen resides in the "Process Information" menu.

The following is an example of the "Process Record Overview" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 10:37:46.90
Rate: 3.00 Seconds          Process Record Overview          Elapsed: 00:20:11.30
Page: 1 of 1           SQL_DISK1:[RICK.V70]MF_PERSONNEL.RDB;1          Mode: Online
--------------------------------------------------------------------------------


Process.ID RecFetched Rec.Marked Rec.Stored Pag.Checkd PagDiscard Rec.Erased
54C03506:1A    32846       4422       2347       3106        759          0
54C03505:1A    27990       3988       2629       3295        665          0
54C03507:1A    31819       4275       2250       2938        687          0
54C03508:1A    32511       4346       2287       3069        781          0




--------------------------------------------------------------------------------
Exit Help Menu >next_page <prev_page Options Set_rate Write Zoom !
```

The "Process Record Overview" screen provides the following information:

Process.ID The process ID for the current process, assigned by the operating system, and the stream ID, assigned by the database. If "**A**" is appended to the process ID, the process had been activated and attached for global statistics collection; this is the normal case. Server processes will be designated with the "**s**" tag.

[9] Available in Oracle Rdb 8.0.

RecFetched   This field gives the number of records fetched, including snapshot records. This field does not include records retrieved from a temporary table.

Note that this value may be more than the actual number of records returned by a query. The reason is that queries may fetch records during the search phase, and then re-fetch the selected records so that they may be returned to the user. Also, for uniform format storage areas, a sequential scan needs to fetch the "next" record on each page of the clump, even if there are no records on that page. In addition, every page in a uniform format storage area incurs an extra fetch to verify that there are no more records residing on that page.

Rec.Marked   This field gives the number of records marked. A record is marked when it is modified or it is erased, but not when it is stored. This field does not include records modified in a temporary table.

Rec.Stored   This field gives the number of records stored in the database. This field does not include records stored in temporary tables.

Pag.Checkd   This field indicates the number of pages checked in order to store a record. Ideally, very few candidate pages need to be checked when storing a record. However in certain cases, depending on record size, access method, locked space on a page, and SPAM thresholds, storing a record requires a number of page fetches.

PagDiscard   This field identifies the number of pages checked but discarded because the actual free space on that page did not meet the physical requirements needed to store a new record.

Rec.Erased   This field gives the number of records erased from the database. This field does not include records erased from temporary tables.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

SCREEN INFORMATION

This section discusses screen-specific issues.

Binary File Support   This screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

ster Statistic Collection Support This screen is <u>not</u> integrated into the "Cluster Statistic Collection" facility.

Zoom Screen The zoom screen displays process information on its zoom screen.

C O N F I G U R A T I O N
O P T I O N S

This screen does <u>not</u> have any configuration options.

Process Snapshot Overview Screen[10]

The "Process Snapshot Overview" screen provides summary record access information for all processes activated to collect global statistics using the "Process Monitoring" facility.

The processes displayed on this screen have previously activated their global statistics collection. Process global statistic collection can be either implicitly activated by the database monitor, or explicitly activated by the RMU Show Statistic utility.

SCREEN LOCATION

This screen resides in the "Process Information" menu.

SCREEN EXAMPLE

The following is an example of the "Process Snapshot Overview" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 10:37:46.90
Rate: 3.00 Seconds            Process Snapshot Overview         Elapsed: 00:20:11.30
Page: 1 of 1          SQL_DISK1:[RICK.V70]MF_PERSONNEL.RDB;1            Mode: Online
--------------------------------------------------------------------------------

Process.ID SnpRecRtrv SnpLinFtch SnpPagRead SnpRecStor SnpPagFull SnpLckCnft
5620024A:2A       243          0          0      26061          0          0




--------------------------------------------------------------------------------
Exit Help Menu >next_page <prev_page Options Set_rate Write Zoom !
```

SCREEN FIELDS

The "Process Snapshot Overview" screen provides the following information:

Process.ID   The process ID for the current process, assigned by the operating system, and the stream ID, assigned by the database. If "**A**" is appended to the process ID, the process had been activated and attached for global statistics collection; this is the normal case. Server processes will be designated with the "**s**" tag.

SnpRecRtrv   This field gives the number of records retrieved by read-only transactions.

---

[10] Available in Oracle Rdb 8.0.

SnpLinFtch   This field gives the number of lines fetched by read-only transactions. To retrieve a single record, a transaction might actually check a number of lines, some of which may be empty.

SnpPagRead   This field gives the number of snapshot pages fetched by read-only transactions. If this count is high relative to the other read fields, read-only transactions are fetching records that are being updated frequently, and the snapshot file is being used extensively.

SnpRecStor   This field gives the number of records stored in the snapshot file by update transactions. Every snapshot record stored by an update transaction implies that a snapshot page was found and utilized. In the best case, this is a single-page fetch. The "page in use," "page too full," page conflict," and "extended file" sub-fields indicate some of the extra overhead involved in finding suitable snapshot pages on which to store snapshot records.

SnpPagFull   This field gives the number of pages fetched that were unsuitable for storing snapshot records because there was not enough room on the snapshot page to include another version of a record. In this case, a new snapshot page must be fetched and linked with the full page. This allows read-only transactions to follow a chain of snapshot pages to find the correct version of a record.

SnpLckCnft   This field gives the number of times a snapshot page fetch was requested but aborted due to a lock conflict with another process. When a page fetch conflicts with another process, another target page is fetched and checked so the lock conflict does not cost a disk I/O operation.

ON-SCREEN MENU
OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

SCREEN
INFORMATION

This section discusses screen-specific issues.

Binary File Support   This screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

ster Statistic Collection Support   This screen is not integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   The zoom screen displays process information on its zoom screen.

_____

CONFIGURATION
OPTIONS

This screen does <u>not</u> have any configuration options.

Chapter

4

Journaling Information Screens

RMU Show Statistic Journaling Information Screens

The "Journaling Information" menu screens display information about the after-image journals (.AIJ) and recovery-unit journals (.RUJ), as well as other recovery-related topics.

AIJ Statistics Screen

This screen monitors both logical and physical after-image journaling activity.

This screen resides in the "Journaling Information" menu.

The following is an example of the "AIJ Statistics" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 29-JAN-1998 11:02:24.65
Rate: 1.00 Second                 AIJ Statistics              Elapsed: 00:26:45.61
Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1    Mode: Online
-------------------------------------------------------------------------------

statistic.........      rate.per.second............. total....... ave rage......
name.............      max..... cur..... avg....... count....... per.trans....
AIJ file writes          16        1       8.4        13553          1.0
    data                 14        2       7.3        11840          0.8
    control               0        0       0.0            0          0.0
    file extend           0        0       0.0            0          0.0
    switch over           0        0       0.0            0          0.0
tx. block span          171       42      84.8       136241         10.1
records written          84       16      47.0        75490          5.6
blocks written           32        3      17.8        28726          2.1
    filler bytes       6616      948    2266.1      3638622        272.1

lock rebuilds             0        0       0.0            1          0.0
    AIJ file reads       19        0       0.4          694          0.0

shuffle averted           0        0       0.0            0          0.0
suspended switch          0        0       0.0            0          0.0


-------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

AIJ file writes   This field gives the total number of write-I/Os (queued I/O requests) issued to the database after-image journal (.AIJ) file. The "data," "control," "file extend," and "switch over" counts further subdivide the statistic.

This statistic field includes both synchronous and asynchronous I/O write requests.

data — This field gives the number of write-I/Os to the database after-image journal file that contained only data records.

control — This field gives the number of write-I/Os to the database after-image journal file that contained OPEN, COMMIT, ROLLBACK, and checkpoint records. These writes may also include data records.

file extend — This field gives the number of write-I/Os issued to the database after-image journal file to initialize new disk blocks when the file is extended.

switch over — This field gives the number of times AIJ switch-over has occurred. That is, the number of times journaling has switched from one journal file to another.

tx block span — This field displays the number of blocks each transaction spans in the AIJ journal.

records written — This field gives the number of logical after-image journal records written to the after-image journal file. Because many logical records can be buffered into a single write-I/O, this number is usually much larger than the number of after-image journal writes.

No count is kept for the number of logical AIJ records read by the Database Recovery process (DBR).

blocks written — This field gives the number of disk blocks written to the after-image journal file. Because many disk blocks may be written with a single write-I/O, this number may be larger than the number of after-image journal writes. In addition, the same disk block can be written more than once, because it might not have been completely full the first time it was written.

This statistic field includes both synchronous and asynchronous I/O write requests.

filler bytes — This field gives the number of filler bytes needed to pad AIJ records to a disk block boundary. Filler bytes are bytes that contain nothing, that is, memory allocated but not used. Filler bytes are necessary to ensure the readability of the after-image journal file in the event of a system failure during a write I/O operation.

lock rebuilds — This field gives the number of times that the after-image journal lock value block had to be rebuilt. The AIJ lock value block contains the current end-of-file information about the after-image journal file. The lock value block can be lost when there is a cluster configuration change, or when a user process holding the lock terminates abnormally, with a Ctrl-Y/STOP, for example.

AIJ file reads — This field gives the number of read-I/Os executed during lock rebuilds. To rebuild the lock value block, the after-image journal file is read backwards to find the last record in the file.

This statistic field includes both synchronous and asynchronous I/O read requests.

shuffle averted   This field displays the number of times the group commit buffer has had a shuffle operation averted. The shuffle operation can be averted for a number of reasons, including setting the RDM$BIND_AIJ_SHUFFLE_DISABLED logical to the value "0".

suspended switch   This field displays the number of times the AIJ switch-over operation enters the suspended state.

A database enters the "AIJ suspended" state when the AIJ switch-over operation cannot complete because there are no available AIJ journals. During this state, the DBA can add new AIJ journals or perform database backups, but all other AIJ-related activities are temporarily suspended until an AIJ journal becomes available.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph   This on-screen menu option displays a histogram graph instead of numbers.

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot   This on-screen menu option plots a specific field's value by time.

Unreset   This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot   This on-screen menu option plots a specific field's value using scatter-based display.

Yank   Places a selected statistic on the "Custom Statistics" screen.

SCREEN INFORMATION

This section discusses screen-specific issues.

Page Navigation

This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support

This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support

This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen

This screen does <u>not</u> have a zoom screen.

C O N F I G U R A T I O N
O P T I O N S

This screen does <u>not</u> have any configuration options.

Group Commit Statistics Screen

This screen monitors transaction group commit activity.

A "group commit" is an operation whereby several transactions writing to the AIJ journal at the same approximate time are "grouped" together for efficiency, and written using a single I/O operation. This improves the AIJ performance since the expense of the I/O operation is amortized across many transactions, with a corresponding increase of transaction throughput.

Ideally, the AIJ Log Server (ALS) process is the group commit writer. However, when the ALS process is not used, one of the user processes is arbitrarily selected as the group commit writer.

SCREEN LOCATION

This screen resides in the "Journaling Information" menu.

SCREEN EXAMPLE

The following is an example of the "Group Commit Statistics" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 29-JAN-1998 11:20:26.51
Rate: 1.00 Second            Group Commit Statistics         Elapsed: 00:44:47.47
Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1     Mode: Online
--------------------------------------------------------------------------------

statistic.........      rate.per.second............. total....... ave rage......
name..............      max..... cur..... avg....... count....... per.trans....
group commits               43       12      17.9       48354          2.7
quick flushes                3        0       0.7        2111          0.1
ARB pool searches           21        7       8.5       23069          1.3
    pre-allocation          21        7       8.5       22885          1.3
    pool empty               0        0       0.0           0          0.0

cancel: preemptive          13        3       5.5       15000          0.8
    IO free format           0        0       0.0           3          0.0

submit: watchdog             0        0       0.0           0          0.0
    IO completion           16        3       6.5       17650          1.0
    cache overflows          0        0       0.0           0          0.0
    cache satisfied         14        4       5.8       15701          0.9
    control record           0        0       0.0           0          0.0
    DBR recovery             0        0       0.0           0          0.0


--------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

S C R E E N   F I E L D S

group commits — This field displays the number of group commit operations performed by the AIJ Log Server (ALS) process. Dividing the number of transactions by the number of groups gives the average group size. That is, the inverse of the transaction average display.

quick flushes — This field gives the number of times users requested their .AIJ records be flushed to the after-image journal and those records had already been flushed by the cooperative actions of another user (group commit).

ARB pool searches — This field gives the number of times the global after-image journal request block pool was searched. AIJ records are globally buffered using AIJ Request Blocks (ARB).

pre-allocation — This field gives the number of ARBs that are able to be pre-allocated, resulting in reduced transaction commit or rollback processing (increased throughput).

pool empty — This field gives the number of times that the global after-image journal request block (ARB) pool was found to be empty. In this event, the active user must force a write operation to the after-image journal file to free an ARB.

cancel: preemptive — This field displays the number of times the background group-commit operation was canceled because there was no additional data to be formatted.

IO free format — This field displays the number of times the foreground group-commit operation was canceled because there was no additional data to be formatted.

submit: watchdog — This field displays the number of times the ALS process attempted to perform a group-commit operation in anticipation of new work but found none.

io completion — This field displays the number of times the group-commit formatting was completed because the pending asynchronous I/O operation for the previous group-commit operation completed.

cache overflows — This field displays the number of times the 127-block .AIJ cache has overflowed.

cache satisfied — This field displays the number of times the group-commit formatting was completed because the cache-size constraints have been reached.

control record — This field displays the number of times the group-commit formatting was completed because of encountering a control record for which a process was waiting (and there was no I/O in progress).

DBR recovery — This field displays the number of times the group-commit formatting was completed because the current process is Database Recovery process (DBR) and the database is frozen. Ideally, this field should always be "0".

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (!) on-screen menu options are available on all screens unless otherwise noted.

Graph   This on-screen menu option displays a histogram graph instead of numbers.

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot   This on-screen menu option plots a specific field's value by time.

Unreset   This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot   This on-screen menu option plots a specific field's value using scatter-based display.

Yank   Places a selected statistic on the "Custom Statistics" screen.

SCREEN
INFORMATION

This section discusses screen-specific issues.

Page Navigation   This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support   This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   This screen does <u>not</u> have a zoom screen.

CONFIGURATION
OPTIONS

This screen does <u>not</u> have any configuration options.

AIJ Journal Information Screen

The "AIJ Journal Information" screen provides online information about all of a database's after-image journals on the current node. Most of the information displayed on the screen is obtained in real time, which means that the screen is automatically updated as AIJ database parameters are modified, or as AIJ operations such as a backup or journal switch-over are performed.

Because the "AIJ Journal Information" screen provides real-time information, the output is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

The "AIJ Journal Information" screen contains information relating to AIJ journaling in general and information on each individual journal, including reserved AIJ journal slots.

! **NOTE**	The information on the "AIJ Journal Information" screen is for the current node only. Because an after-image journal is accessed by all nodes modifying the database, the information for one node could become stale. Therefore, the "Refresh" on-screen menu option on the on-screen menu at the bottom of the "AIJ Journal Information" screen is provided. The "Refresh" on-screen menu option causes the current node's information to be synchronized with all other nodes accessing the database.

This screen provides online information about all of a database's after-image journals on the current node. Most of the information displayed on the screen is obtained in real time, which means that the display is automatically updated as AIJ database parameters are modified, or as AIJ operations such as a backup or journal switch-over are performed.

You cannot use the information contained in this screen on the "Custom Statistics" screen.

This screen is not integrated with the "Cluster Statistic Collection" facility.

SCREEN LOCATION

This screen resides in the "Journaling Information" menu.

SCREEN EXAMPLE

The following is an example of the "AIJ Journal Information" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 10:37:46.90
Rate: 3.00 Seconds            AIJ Journal Information        Elapsed: 03:38:13.55
Page: 1 of 3          SQL_DISK1:[RICK.V70]MF_PERSONNEL.RDB;1        Mode: Online
--------------------------------------------------------------------------------
Journaling: Enabled   Shutdown:   60  Notify: Disabled  State: A ccessible
ALS: Manual      ABS: Disabled  ACE: Disabled  FC: Enabled    CTJ: Enabled
ARB.Count: 300 ARB.Avail: 298
After-Image.Journal.Name....... SeqNum AIJsize CurrEOF Status. State.......
RICK1                            Unused     512   Empty Latent  A ccessible
RICK2                            Unused     512   Empty Latent  A ccessible
RICK3                            Unused     512   Empty Latent  A ccessible
RICK4                                19     513       2 Current A ccessible
RICK5                            Unused     512   Empty Latent  A ccessible
RICK6                                18 *BACKUP NEEDED* Written A ccessible
Available AIJ slot 1
Available AIJ slot 2
Available AIJ slot 3
Available AIJ slot 4
Available AIJ slot 5
Available AIJ slot 6
Available AIJ slot 7
Available AIJ slot 8


--------------------------------------------------------------------------------
Bell Exit Help Menu >next_page <prev_page Refresh Set_rate Write Zoom !
```

SCREEN FIELDS

The following fields provided in the "AIJ Journal Information" screen header provide information that applies to all journals:

Journaling This field indicates whether or not AIJ journaling is available. The valid keywords are the following:

Keyword	**Description**
ENABLED	after-image journaling is enabled
DISABLED	after-image journaling is disabled.

Shutdown If highlighted, indicates that an AIJ switch-over is in progress and identifies the number of minutes remaining until the after-image journaling system shutdown is complete. If no switch-over is in progress, the default shutdown time, in minutes, is displayed.

!
NOTE   This field displays shutdown information for the current node only.

Notify This field indicates whether or not the system operator notification facility is active. This field does not identify the specific operator classes that are enabled. The valid keywords are the following:

Keyword	Description
ENABLED	operator notification is enabled
DISABLED	operator notification is disabled.

State This field identifies the current state of the AIJ journals. The valid keywords are the following:

Keyword	Description
ACCESSIBLE	all after-image journals are available
INACCESSIBLE	all after-image journals are unavailable.

ALS This field identifies the state of the AIJ Log Server (ALS) process. The valid keywords are the following:

Keyword	Description
AUTOMATIC	The ALS process is started automatically at database open time, but is not currently running
MANUAL	The ALS process must be manually started by the DBA, and it is not currently running
RUNNING	The ALS process is currently active

ABS This field indicates whether or not the AIJ Backup Server (ABS) is enabled. The valid keywords are the following:

Keyword	Description
ENABLED	The ABS is enabled
DISABLED	The ABS is not used
SUSPENDED	The ABS is enabled but currently suspended. This usually occurs when using the "Hot Standby" feature
DENIED	The ABS cannot be used because one or more AIJ journals

Keyword	Description
	have been over-written or are currently inaccessible

> **!**
> **NOTE**

The AIJ backup server is not always invoked even though it is enabled; output from the RMU Dump Header command provides more information in those situations where the AIJ backup server is enabled but not invoked.

ACE This field indicates whether or not the AIJ Cache on Electronic disk (ACE) feature is available. This field does not identify the name of the file that serves as the AIJ cache on the electronic disk. The valid keywords are the following:

Keyword	Description
ENABLED	The ACE journal is enabled
DISABLED	The ACE journal is not used

FC This field indicates whether or not the "Fast Commit" feature is available. Note that this field does not indicate whether or not the Fast Commit feature is <u>active</u>. The Fast Commit options are not displayed. The valid keywords are the following:

Keyword	Description
ENABLED	the "Fast Commit" feature is enabled
DISABLED	the "Fast Commit" feature is not used

CTJ This field indicates whether or not the "Commit To Journal optimization" (CTJ) feature is available. Note that this field does not indicate whether or not the commit to journal optimization feature is <u>active</u>. The valid keywords are the following:

Keyword	Description
ENABLED	The "Commit To Journal optimization" feature is enabled
DISABLED	The "Commit To Journal optimization" feature is not used

ARB.Count This field displays the number of AIJ request blocks (ARBs) that are in use for the database.

ARB.Avail · This field displays the number of AIJ request blocks (ARBs) that are available for the database.

The following information is provided for individual after-image journals:

After-image journal name · Identifies the name of the after-image journal (this is not the journal filename). If the journal is not allocated, identifies the number of the available journal slot. The current journal is highlighted for quick identification.

Sequence number · Identifies the sequence number of the journal. If the journal is unused, "Unused" is displayed.

AIJ size · Identifies the size, in blocks, of the current after-image journal. This value typically corresponds to the after-image journal allocation size for fixed-size journals. If the physical end-of-file has not yet been established, the default allocation size, in blocks, is displayed.

Current end of file · Identifies the block number of the current end-of-file of the current journal; this information is only displayed for the current journal because it is meaningless for other journals. This value corresponds to the location in the journal being written with data. If the journal is current but the logical end-of-file has not yet been established, "Unknown" is displayed. If the journal is not current, "Empty" is displayed.

Status · This on-screen menu option displays "Current" if the journal is currently being written to, "Written" if it was written to in the past, or "Latent" if it has not yet been written to. A journal that has been written to and is not current should be backed up; the warning "*BACKUP NEEDED*" is displayed to help identify when a journal needs to be backed up.

State · This on-screen menu option displays "Backing Up" when the journal is in the process of being backed up, "Overwritten" when the journal has been overwritten, "Accessible" if the journal can be written to, and "Inaccessible" when the journal cannot be written to.

ON-SCREEN MENU
OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Refresh · This option causes the current node's information to be synchronized with all other nodes accessing the database.

SCREEN
INFORMATION

This section discusses screen-specific issues.

Page Navigation If there is more information than can fit on one page, the notation "Page 1 of n" appears in the header region, where *n* is the total number of pages. You can display successive pages by pressing the right angle bracket ">" key or the ⇓ Next Screen key. To display a previous page, press the left angle bracket "<" key or the ⇑ Previous Screen key.

Binary File Support This screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

ster Statistic Collection Support This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen The zoom screen displays AIJ journal information on its zoom screen.

_____

CONFIGURATION
OPTIONS

This screen does <u>not</u> have any configuration options.

AIJ Journal Growth Trend Screen

The purpose of the "AIJ Journal Growth Trend" screen is to graphically portray the size of the current AIJ Journal over a measured period of time. The slope of the line can be used to visually describe the amount of information being written to the AIJ journal.

The AIJ Journal fullness is portrayed as a percentage of its size, designated along the left-hand side of the screen. Note that the extension of an extensible AIJ Journal results in the percentage being reset because of the new journal size.

The screen refresh sample rate is identified at the bottom of the screen. Directly above the screen refresh rate is a set of times that correspond to the "+" above the last character of the time. In the screen example below, notice that "12:47:52" is the rightmost time displayed even though it is not the latest time; this occurs because the output of the screen wraps around to the leftmost edge after writing to the rightmost edge. In the example below, "12:48:02" is the latest time, yet it is displayed as the leftmost time.

The current time is designated by the cursor along the bottom horizontal axis, portrayed with the $(\wedge)$ in the screen example below. Everything to the right of the current time is the end of the previous pass.

The graph output consists of a single numeric digit being written once per the specified sample rate. The numeric digit corresponds to the nth percentage of the particular percentage category. For instance, a "2" in the "11-20%" category indicates "12%". A "0" in the same category would indicate "20%".

If a digit is not displayed for a given cycle, this means that the AIJ journal information has not yet been initialized on the node. This event can also occur during AIJ backup or AIJ switch-over.

SCREEN LOCATION

This screen resides in the "Journaling Information" menu.

SCREEN EXAMPLE

The following is an example of the "AIJ Journal Growth Trend" screen:

```
 Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 29-JAN-1998 12:47:55.71
 Rate: 1.00 Second            AIJ Journal Growth Trend        Elapsed: 02:12:16.67
 Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1     Mode: Online
--------------------------------------------------------------------------------
                                    RICK3
           AIJ size:     1026   Current Eof:      756      Percent full:  73.6
          +--------+--------+--------+--------+--------+--------+--------+--------+
  91-100% |        |        |        |        |        |        |        |        |
  81-90%  |        |        |        |        |        |        |        |        |
  71-80%  |2333334555677    |        |        |        |        |             12|
  61-70%  |        |        |        |        |        |112234556667889900      |
  51-60%  |        |        |        |1233456678890|        |        |        |
  41-50%  |        |     12234455667888890 |        |        |        |        |
  31-40%  |        |  889900|        |        |        |        |        |        |
  21-30%  |        |        |        |        |        |        |        |        |
  11-20%  |        |        |        |        |        |        |        |        |
   1-10%  |        |        |        |        |        |        |        |        |
          +--------+--^------+--------+--------+--------+--------+--------+--------+
           12:48:02 12:46:59 12:47:10 12:47:20 12:47:31 12:47:41 12:47:52
                       Sample interval is 1.00 Second
--------------------------------------------------------------------------------
 Exit Help Menu Refresh Set_rate Write !
```
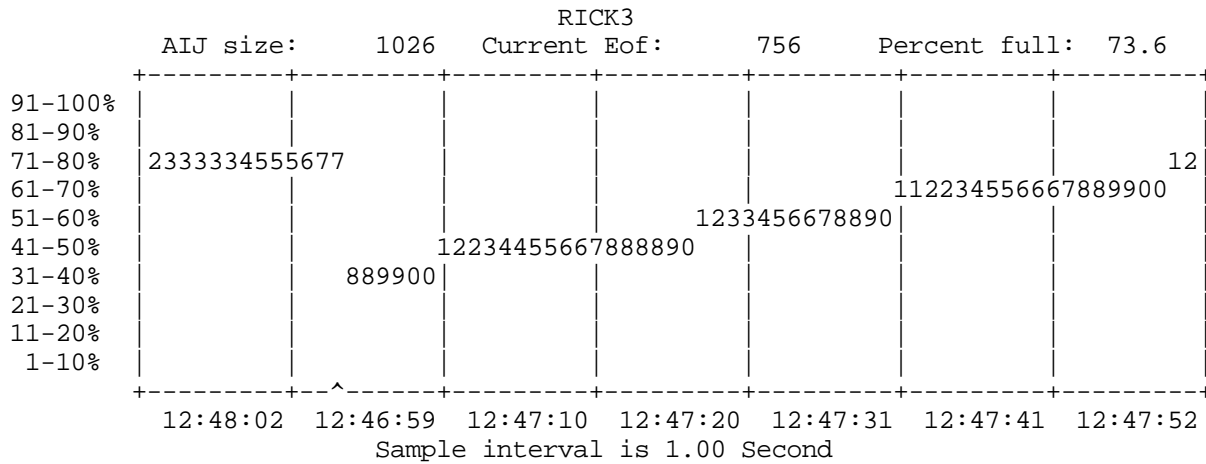
SCREEN FIELDS

AIJ Size   This field identifies the actual size of the "current" AIJ journal.

Current Eof   This field identifies the current end-of-file of the "current" AIJ journal.

Percent full   This field identifies the fullness percentage of the "current" AIJ journal.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

SCREEN INFORMATION

This section discusses screen-specific issues.

Here is another interesting example:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 27-JAN-1998 10:37:46.90
Rate: 1.00 Second              AIJ Journal Growth Trend       Elapsed: 00:08:03.25
Page: 1 of 1     KODD$:[DB_HOMEDIR.WORK.ALS]MF_PERSONNEL.RDB;4     Mode: Online
--------------------------------------------------------------------------------
                                  RICK2
          AIJ size: 2562      Current Eof: 2118       Percent full:  82.6
         +---------+---------+---------+---------+---------+---------+---------+
 91-100% |         |         |         |         |         |         |         |
  81-90% |         |         |         |         |         |         112222    |
  71-80% |         |         |    1111223333344555566667788888990000 |         |
  61-70% |344444556666777788999900         |         |         |         2223|
  51-60% |         |         |         |         |         |         |         |
  41-50% |         |         |         |         |         |         |         |
  31-40% |         |         |         |         |         |         |         |
  21-30% |         |         |         |         |         |         |         |
  11-20% |         |         |         |         |         |         |         |
   1-10% |         |         |         |         |         |         |         |
         +---------+---------+---------+---------+---------+---------+----^----+
          15:46:03  15:46:13  15:46:23  15:46:33  15:46:43  15:46:53  15:45:54
                        Sample interval is 1.00 Second
--------------------------------------------------------------------------------
Exit Help Menu Refresh Set_rate Write !
```

From this example, it can be determined that approximately every 30 seconds 10% of the current AIJ journal is written to. This information can be used to extrapolate approximately when the next AIJ journal switch-over or extension will occur.

Page Navigation
This screen does not contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support
This screen is not recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is not available when you replay a binary file using the INPUT qualifier.

ster Statistic Collection Support
This screen is not integrated into the "Cluster Statistic Collection" facility.

Zoom Screen
This screen does not have a zoom screen.

CONFIGURATION

OPTIONS

This screen does not have any configuration options.

ALS Statistics Screen

This screen contains information specific to the operation of the AIJ Log Server (ALS) process.

The "ALS Statistics" screen is recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is available when you replay a binary file using the INPUT qualifier.

The "ALS Statistics" screen is also integrated into the "Cluster Statistic Collection" facility.

SCREEN LOCATION

This screen resides in the "Journaling Information" menu.

SCREEN EXAMPLE

The following is an example of the "ALS Statistics" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 29-JAN-1998 13:55:43.22
Rate: 1.00 Second                 ALS Statistics               Elapsed: 03:20:04.18
Page: 1 of 1     DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1     Mode: Online
--------------------------------------------------------------------------------
statistic.........    rate.per.second............ total....... ave rage......
name.............     max..... cur..... avg....... count....... per.trans....
AIJ file writes          3        0      3.5       42355            1.0
    data                 3        0      3.2       38903            0.9
    control              0        0      0.0           0            0.0
    file extend          0        0      0.0           0            0.0
    switch over          0        0      0.0          85            0.0

AIJ write time           0        0      0.3        3771            0.0
ALS hiber count          7        0      6.9       83171            2.0
AIJ hiber time           5        0      4.9       59599            1.4
AIJ extend time          0        0      0.0           0            0.0
group commits            6        0      6.3       76377            1.8
  ARBs formatted         9        0      9.2      111627            2.7
  ARBs background        0        0      0.5        6987            0.1
premature IO saved       0        0      0.2        3498            0.0
cache overflows          0        0      0.0           0            0.0


--------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

SCREEN FIELDS

AIJ file writes This field gives the total number of write-I/Os (queued I/O requests) issued to the database after-image journal (.AIJ) file. The "data," "control," "file extend," and "switch over" counts further subdivide the statistic.

This statistic field includes both synchronous and asynchronous I/O write requests.

data This field gives the number of write-I/Os to the database after-image journal file that contained only data records.

control This field gives the number of write-I/Os to the database after-image journal file that contained OPEN, COMMIT, ROLLBACK, and checkpoint records. These writes may also include data records.

file extend This field gives the number of write-I/Os issued to the database after-image journal file to initialize new disk blocks when the file is extended.

switch over This field gives the number of times AIJ switch-over has occurred. In other words, this field indicates the number of times journaling has switched from one journal file to another.

AIJ Write Time This field gives the time in hundredths of a second spent writing to the after-image journal.

ALS Hiber Count This field displays the number of times the AIJ Log Server process spent hibernating while waiting for more work.

AIJ Hiber Time This field displays the amount of time in hundredths of a second that processes have spent hibernating while the AIJ log server processes their requests.

AIJ Extend Time This field gives the time in hundredths of a second spent extending the after-image journal. An excessively high number often indicates a full disk or disk fragmentation, or may be an indication of the need for a larger allocation.

Use the JOURNAL ALLOCATION IS clause of the SQLALTER DATABASE statement to specify a larger allocation.

Group Commits This field displays the number of group commit operations performed by the ALS process. Dividing the number of transactions by the number of groups gives the average group size, which is the inverse of the transaction average display.

ARBs formatted This field displays the number of AIJ Request Blocks that were formatted by the ALS process.

ARBs background This field displays the number of AIJ Request Blocks that were formatted while asynchronous I/O was being performed to the AIJ journal.

premature io saved This field displays the number of I/Os saved by waiting for more work.

Cache Overflows This field displays the number of times the 127-block .AIJ cache has overflowed.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph | This on-screen menu option displays a histogram graph instead of numbers.

Numbers | This on-screen menu option displays numeric statistics instead of histogram graph.

Options | This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause | This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset | This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot | This on-screen menu option plots a specific field's value by time.

Unreset | This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot | This on-screen menu option plots a specific field's value using scatter-based display.

Yank | Places a selected statistic on the "Custom Statistics" screen.

SCREEN INFORMATION

This section discusses screen-specific issues.

Page Navigation | This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support | This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support | This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen | This screen does <u>not</u> have a zoom screen.

This screen does <u>not</u> have any configuration options.

CONFIGURATION

OPTIONS

2PC Statistics Screen

This screen provides information about distributed transaction performance and how it differs from non-distributed transaction performance.

The "2PC Statistics" screen is recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is available when you replay a binary file using the INPUT qualifier.

The "2PC Statistics" screen is also integrated into the "Cluster Statistic Collection" facility.

SCREEN LOCATION

This screen resides in the "Journaling Information" menu.

SCREEN EXAMPLE

The following is an example of the "2PC Statistics" screen:

```
 Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 29-JAN-1998 14:06:12.97
 Rate: 1.00 Second                  2PC Statistics              Elapsed: 03:30:33.93
 Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1    Mode: Online
 --------------------------------------------------------------------------------

 statistic.........      rate.per.second............  total.......  ave rage......
 name..............      max..... cur..... avg.......  count.......  per.trans....
 total tx count             3        0        3.2       40969           1.0
   2PC tx count             0        0        0.0           0           0.0

 total tx time x100       392        0      364.3     4605740         112.4
   reg tx time x100       392        0      364.3     4605740         112.4
   2PC tx time x100         0        0        0.0           0           0.0

 prepared time x100         0        0        0.0           0           0.0

 2PC tx resolved            0        0        0.0           0           0.0
    2PC committed           0        0        0.0           0           0.0
    2PC aborted             0        0        0.0           0           0.0


 --------------------------------------------------------------------------------
 Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

SCREEN FIELDS

total tx count — This field displays the total number of transactions that have been committed or rolled back.

2PC tx count — This field displays the total number of distributed transactions that have been committed or rolled back.

total tx time x100 — This field displays the total duration of all transactions, expressed in hundredths of a second.

reg tx time x100 — This field displays the total duration of all non-distributed transactions, expressed in hundredths of a second.

2PC tx time x100 — This field displays the total duration of all distributed transactions, expressed in hundredths of a second.

prepared time x100 — This field displays the total duration of the transaction resolution phase.

2PC tx resolved — This field displays the total number of distributed transactions resolved by the database recovery process (DBR). This field indicates the number of processes that failed while in the prepared state.

2PC committed — This field displays the total number of distributed transactions that were committed.

2PC aborted — This field displays the total number of distributed transactions that were rolled back.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph — This on-screen menu option displays a histogram graph instead of numbers.

Numbers — This on-screen menu option displays numeric statistics instead of histogram graph.

Options — This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause — This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset — This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot — This on-screen menu option plots a specific field's value by time.

Unreset This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot This on-screen menu option plots a specific field's value using scatter-based display.

Yank Places a selected statistic on the "Custom Statistics" screen.

S C R E E N
I N F O R M A T I O N

This section discusses screen-specific issues.

Page Navigation This screen does not contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen This screen does not have a zoom screen.

C O N F I G U R A T I O N
O P T I O N S

This screen does not have any configuration options.

RUJ Statistics Screen

This screen contains summary information for all active update transactions on the current node.

The "RUJ Statistics" screen is recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is available when you replay a binary file using the INPUT qualifier.

The "RUJ Statistics" screen is also integrated into the "Cluster Statistic Collection" facility.

This screen resides in the "Journaling Information" menu.

The following is an example of the "RUJ Statistics" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 29-JAN-1998 14:15:04.17
Rate: 1.00 Second                   RUJ Statistics              Elapsed: 03:39:25.13
Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1     Mode: Online
--------------------------------------------------------------------------------

statistic.........     rate.per.second.............  total....... ave rage......
name.............      max..... cur..... avg.......  count....... per.trans....
RUJ file writes             2       0       2.6        34673            0.8
    data                    2       0       2.6        34667            0.8
    control                 0       0       0.0            5            0.0
    file extend             0       0       0.0            5            0.0
records written            14       0      12.7       167737            4.0
RUJ file reads              0       0       0.0            2            0.0

blocks written              3       0       3.1        41375            1.0
        read                0       0       0.0            2            0.0

cache overflows             0       0       0.0            0            0.0
DBKEY cache hits            0       0       0.0            2            0.0
    overflows               0       0       0.0            0            0.0


--------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

RUJ file writes   This field gives the number of write-I/Os (queued I/O requests) issued to the database recovery-unit journal (.RUJ) files. This operation writes before-image records to the RUJ file in case a verb or transaction must be rolled back. Before-images must be written to the RUJ file before the corresponding database page can be written back to the database.

This statistic field includes both synchronous and asynchronous I/O write requests.

data   This field displays the total number of synchronous write I/O operations containing modified database data.

control   This field displays the total number of synchronous write I/O operations containing control (header) information.

file extend   This field displays the total number of times the recovery-unit journal files have been extended.

records written   This field displays the number of journal records written to the recovery-unit journal (.RUJ) file.

RUJ file reads   This field gives the number of read-I/Os (queued I/O requests) issued to the database recovery-unit journal (.RUJ) files. This operation reads before-image records from the RUJ file to roll back a verb or a transaction.

This statistic field includes both synchronous and asynchronous I/O read requests.

blocks written   This field gives the number of disk blocks written to the recovery-unit journal file. Because many disk blocks may be written with a single write I/O, this number may be larger than the number of recovery-unit journal writes. In addition, the same disk block can be written more than once, because it might not have been completely full the first time it was written.

This statistic field includes both synchronous and asynchronous I/O write requests.

read   This field displays the total number of 512-byte blocks that have been read from the recovery-unit journal (.RUJ)s on this node.

This statistic field includes both synchronous and asynchronous I/O read requests.

cache overflows   This field displays the number of times the recovery-unit data cache has overflowed, causing a premature synchronous write I/O operation. Overflowing the data cache indicates update-intensive transactions.

DBKEY cache hits   This field gives the number of times the same DBKEY (row) was modified within the same transaction and found in the DBKEY cache.

overflows   This field gives the number of times the DBKEY cache ran out of space and new space had to be allocated.

ON-SCREEN MENU
OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph   This on-screen menu option displays a histogram graph instead of numbers.

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot   This on-screen menu option plots a specific field's value by time.

Unreset   This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot   This on-screen menu option plots a specific field's value using scatter-based display.

Yank   Places a selected statistic on the "Custom Statistics" screen.

SCREEN
INFORMATION

This section discusses screen-specific issues.

Page Navigation   This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support   This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   This screen does <u>not</u> have a zoom screen.

CONFIGURATION
OPTIONS

This screen does <u>not</u> have any configuration options.

R M U   S H O W   S T A T I S T I C   H A N D B O O K
C H A P T E R   4   -   J O U R N A L I N G   I N F O R M A T I O N   S C R E E N S

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Fast Incremental Backup Statistics Screen

This screen displays statistics about the "Fast Incremental Backup" feature.

The "Fast Incremental Backup Statistics" screen is recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is available when you replay a binary file using the INPUT qualifier.

The "Fast Incremental Backup Statistics" screen is also integrated into the "Cluster Statistic Collection" facility.

This screen resides in the "Journaling Information" menu.

The following is an example of the "Fast Incr Backup Statistics" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 29-JAN-1998 14:23:48.47
Rate: 1.00 Second           Fast Incr Backup Statistics        Elapsed: 03:48:09.43
Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1     Mode: Online
--------------------------------------------------------------------------------

statistic.........        rate.per.second............. total....... ave rage......
name..............        max..... cur..... avg....... count....... per.trans....
FIB update attempt           0        0        0.0          0            0.0
FIB map updated              0        0        0.0          0            0.0
SPAM page updated            0        0        0.0          0            0.0
SPAM updt deferred           0        0        0.0          0            0.0


--------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

FIB update attempt This field displays the number of times the "Fast Incremental Backup" feature (FIB) operation was attempted. The attempt does not always result in the SPAM page being updated.

FIB map updated This field displays the number of times the FIB map, a per-process data structure, was updated. This data structure indicates when each process no longer needs to update a particular SPAM page.

SPAM page updated This field displays the number of times a SPAM page was immediately modified to indicate that one or more pages in the SPAM interval have been modified since the last incremental backup. Each SPAM page update results in one synchronous read I/O and one synchronous write I/O operation.

SPAM updt deferred This field displays the number of times a SPAM page did not need to be immediately modified, but might have to be modified at a later time. In most cases, this statistic closely follows the FIB update attempt statistic.

ON-SCREEN MENU
OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph This on-screen menu option displays a histogram graph instead of numbers.

Numbers This on-screen menu option displays numeric statistics instead of histogram graph.

Options This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot This on-screen menu option plots a specific field's value by time.

Unreset This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot This on-screen menu option plots a specific field's value using scatter-based display.

Yank Places a selected statistic on the "Custom Statistics" screen.

SCREEN
INFORMATION

This section discusses screen-specific issues.

Page Navigation This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   This screen does <u>not</u> have a zoom screen.

CONFIGURATION
OPTIONS

This screen does <u>not</u> have any configuration options.

Checkpoint Statistics Screen

This screen shows transaction and checkpoint activity. This screen is useful only if your database has enabled the AIJ Fast Commit feature.

Statistics are displayed for all processes on the node for a particular database. The total number of checkpoints, with a breakdown of the reasons for checkpointing, is displayed. The sum of all checkpoint intervals is also displayed, using three different metrics. You can use this information to compute the average interval between checkpoints, allowing you to decide if a checkpointing interval should be adjusted, and by how much.

Some of the columns provided by the "Checkpoint Statistics" screen measure events on a per second or per transaction basis. These columns are useful for measuring frequently occurring events such as I/O operations. Because checkpointing typically occurs at a slower rate, you will find the most meaningful checkpointing information in the "total count" column of the "Checkpoint Statistics" screen.

Oracle Corporation recommends that you refer to this column when you use checkpoint statistics to determine optimal checkpoint intervals.

SCREEN LOCATION

This screen resides in the "Journaling Information" menu.

SCREEN EXAMPLE

The following is an example of the "Checkpoint Statistics" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 29-JAN-1998 14:51:22.60
Rate: 1.00 Second               Checkpoint Statistics        Elapsed: 04:15:43.56
Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1     Mode: Online
--------------------------------------------------------------------------------

statistic.........      rate.per.second............. total....... ave rage......
name..............      max..... cur..... avg....... count....... per.trans....
transactions              3        0        2.6        40969          1.0
checkpoints               0        0        0.0          655          0.0
   AIJ growth             0        0        0.0            0          0.0
   txn limit              0        0        0.0            0          0.0
   time limit             0        0        0.0            0          0.0
   rollback               0        0        0.0            0          0.0
   AIJ backup             0        0        0.0          179          0.0
   global                 0        0        0.0          472          0.0
interval: AIJ blks       16        0       12.8       197254          4.8
interval: tx count        3        0        2.6        40668          0.9
interval: seconds         4        0        3.2        50379          1.2

checkpoint stall          1        0        0.8        13215          0.3
flushed buffers           0        0        0.1         3029          0.0


--------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

SCREEN FIELDS

transactions   The total number of transactions (both read/write and read-only transactions). This statistic represents all transactions(committed or rolled back) completed by all users of the database, including transactions that read from the database as well as transactions that modify the database.

checkpoints   The total number of checkpoints. The total checkpoints category is further broken down into categories of reasons for checkpointing. The statistics for these categories are included in the "AIJ growth," "txn limit," "time limit," "rollback," "AIJ backup," and "global" sub-fields.

This field does not include the initial checkpoint that is performed when users attach to the database.
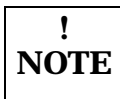
> **! NOTE**
>
> There may be more reasons for checkpoints than there are total checkpoints. For example, you might have a total count of 100 for checkpoints, but when you add the number of checkpoint reasons ("AIJ growth," "txn limit," "time limit," "rollback," "AIJ backup," and "global"), the total could be greater than 100. This occurs because a single checkpoint may be triggered by more than one event. For example, a check-point may occur because of time and AIJ file growth. Although the total count columns for the "interval: seconds" and "interval: AIJ blks" fields are both incremented by one, the total count column for "checkpoints" is only incremented by one.

AIJ growth	Checkpoint for all processes due to the after-image journal growth checkpoint limit.
txn limit	Checkpoints for all processes due to the logical-defined transaction limit.
time limit	Checkpoints for all processes due to the time interval checkpoint limit.
rollback	Checkpoints automatically triggered by rollback of transactions that updated the database.
AIJ backup	System-generated checkpoints due to periodic backups to tape of the after-image journal by the AIJ backup utility.
global	The number of system-wide checkpoints, issued from an RMU Checkpoint, RMU Backup, or RMU Backup After Journal command.
interval: AIJ blks	This field displays the sum of the intervals between checkpoints due to AIJ growth in block checkpoints for all processes. For example, if Process 1 checkpoints at virtual block number (VBN) 100, then checkpoints again at VBN 250, the AIJ block interval category is incremented by 150. If Process 2 checkpoints at VBN 125, then checkpoints again at VBN 200, the AIJ block interval is incremented by an additional 75. Statistics for the other two interval categories are displayed in the "interval: tx count" and "interval: seconds" fields.

If CHECKPOINT INTERVAL IS 1000 BLOCKS is specified with the SQL ALTER DATABASE statement, each process checkpoints when the .aij file has grown 1000 blocks since the process' last checkpoint.

Keep in mind that checkpointing influences recovery time. The main reason to consult checkpoint statistics is to find the average interval per checkpoint. You can use the information in the total count column to compute this average. For each category of checkpoint reason, use the average interval per checkpoint to help you decide if a checkpointing interval should be adjusted, and by how much.

If most of the checkpoints for a database are triggered by a particular checkpoint limit, that limit may be set too high, or the other two limits may be set too low. You can determine the average interval per checkpoint for each type of checkpoint limit. After you have this information, you can reset the limits so that each type of checkpoint limit triggers approximately the same number of checkpoints, which results in optimal performance.

To compute the average interval in AIJ blocks, divide the total count for the AIJ block interval by the total number of checkpoints minus the number caused by AIJ backups. Although checkpoints caused by AIJ backups are counted in the total number of checkpoints, they are not counted in the total of AIJ block intervals. If the total count of AIJ block intervals is 70000, the total count of checkpoints is 100, and the number of checkpoints caused by AIJ backups is 1, then the average AIJ block interval is 707:

$$70000 / (100 - 1) = 707$$

The description of the "interval: tx count" field explains how to determine the average interval for transaction checkpoints.

The description of the "interval: seconds" field explains how to determine the average interval for time checkpoints.

interval: tx count This field displays the sum of the intervals between checkpoints due to the transactions count checkpoint for all processes. For example, if Process 1 checkpoints after 20 transactions, the transactions count category is incremented by 20. If Process 2 checkpoints after 30 transactions, the transactions count category is incremented by an additional 30. Statistics for the other two interval categories are displayed in the "interval: AIJ blks" and "interval: seconds" fields.

The transactions limit for checkpoints is determined by the setting of the RDM$BIND_CKPT_TRANS_INTERVAL logical name. If RDM$BIND_CKPT_TRANS_INTERVAL is defined as a system logical set to 10,each process will checkpoint after 10 transactions unless a user redefines the logical to a different value. That is, if a user defines RDM$BIND_CKPT_TRANS_INTERVAL as a process logical and sets a value of 5, that user will checkpoint after 5transactions.

Keep in mind that checkpointing influences recovery time. The main reason to consult checkpoint statistics is to find the average interval per checkpoint. You can use the information in the total count column to compute this average. For each category of checkpoint reason, use the average interval per checkpoint to help you decide if a checkpointing interval should be adjusted, and by how much.

If most of the checkpoints for a database are triggered by a particular checkpoint limit, that limit may be set too high, or the other two limits may be set too low. You can determine the average interval per checkpoint for each type of checkpoint limit. After you have this information, you can reset the limits so that each type of checkpoint limit triggers approximately the same number of checkpoints, which results in optimal performance.

To compute the average transactions interval, divide the total count for transaction intervals by the total number of checkpoints. If the total count for transaction intervals is 800 and the total number of checkpoints is 100, then the average number of transactions between checkpoints is 8.

$$800 / 100 = 8$$

The description of the "interval: AIJ blks" field explains how to determine the average interval for after-image journal growth checkpoints.

The description of the "interval: seconds" field explains how to determine the average interval for time checkpoints.

interval: seconds\   This field displays the sum of the intervals between time in seconds checkpoints for all processes. For example, if Process 1 checkpoints after 500 seconds, the time in seconds category is incremented by 500. If Process 2 checkpoints after 600 seconds, the time in seconds category is incremented by an additional 600. Statistics for the other two interval categories are displayed in the "interval: AIJ blks" and "interval: tx count" fields.

If CHECKPOINT TIMED EVERY 600 SECONDS is specified with the SQL ALTER DATABASE statement, each process checkpoints every 10 minutes.

Keep in mind that checkpointing influences recovery time. The main reason to consult checkpoint statistics is to find the average interval per checkpoint. You can use the information in the total count column to compute this average. For each category of checkpoint reason, use the average interval per checkpoint to help you decide if a checkpointing interval should be adjusted, and by how much.

If most of the checkpoints for a database are triggered by a particular checkpoint limit, that limit may be set too high, or the other two limits may be set too low. You can determine the average interval per checkpoint for each type of checkpoint limit. After you have this information, you can reset the limits so that each type of checkpoint limit triggers approximately the same number of checkpoints, which results in optimal performance.

To compute the average time interval, divide the total count for seconds interval by the total number of checkpoints. If the total count for the seconds field is 59,300 and the total number of checkpoints is 100, the average number of seconds between each time-triggered checkpoint is 593.

$$59,300 / 100 = 593$$

The description of the "interval: AIJ blks" field explains how to determine the average interval for after-image journal growth checkpoints.

The description of the "interval: tx count" field explains how to determine the average interval for transaction checkpoints.

checkpoint stall   This field displays the checkpoint duration, expressed in hundredths of a second displayed as a whole number. For example, the value "500" is actually "5" seconds.

flushed buffers   This field displays the number of buffers flushed to disk during a checkpoint operation.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph   This on-screen menu option displays a histogram graph instead of numbers.

Numbers	This on-screen menu option displays numeric statistics instead of histogram graph.
Options	This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.
Pause	This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.
Reset	This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.
Time_plot	This on-screen menu option plots a specific field's value by time.
Unreset	This on-screen menu option restores the original statistic values after using "Reset" option.
X_plot	This on-screen menu option plots a specific field's value using scatter-based display.
Yank	Places a selected statistic on the "Custom Statistics" screen.

SCREEN INFORMATION

This section discusses screen-specific issues.

Page Navigation	This screen does not contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.
Binary File Support	This screen is available during replay of a binary file specified by the INPUT qualifier.
ster Statistic Collection Support	This screen is integrated into the "Cluster Statistic Collection" facility.
Zoom Screen	This screen does not have a zoom screen.

CONFIGURATION OPTIONS

This screen does not have any configuration options.

Recovery Statistics Screen

This screen identifies various recovery phases and shows information on how long each phase took to complete.

The "Recovery Statistics" screen is useful for identifying an excessive number of abnormal process failures. In addition, the screen is useful for determining the proper database attribute and parameter settings to maximize runtime performance and minimize recovery downtime.

> **!**
> **NOTE**
> This screen provides global information on all failed process recoveries, not on individual process recoveries.

The "Recovery Statistics" screen is recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is available when you replay a binary file using the INPUT qualifier.

The "Recovery Statistics" screen is also integrated into the "Cluster Statistic Collection" facility.

SCREEN LOCATION

This screen resides in the "Journaling Information" menu.

SCREEN EXAMPLE

The following is an example of the "Recovery Statistics" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 29-JAN-1998 15:02:47.35
Rate: 1.00 Second             Recovery Statistics        Elapsed: 04:27:08.31
Page: 1 of 1    DISK$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1    Mode: Online
--------------------------------------------------------------------------------
statistic.........    rate.per.second............. total....... ave rage......
name..............    max..... cur..... avg........ count....... per.trans....
process attaches          0        0       0.0           8          0.0
process failures          0        0       0.0           0          0.0
DB freeze len x100        0        0       0.0           0          0.0
Tx REDO count             0        0       0.0           0          0.0
  redo time x100          0        0       0.0           0          0.0
Tx UNDO count             0        0       0.0           0          0.0
  undo time x100          0        0       0.0           0          0.0
No UNDO needed            0        0       0.0           0          0.0
Tx committed              0        0       0.0           0          0.0
Tx rolled back            0        0       0.0           0          0.0
No resolve needed         0        0       0.0           0          0.0
AIJ recover x100          0        0       0.0           0          0.0
GB recover x100           0        0       0.0           0          0.0
Cache recover x100        0        0       0.0           0          0.0
RUJ file reads            0        0       0.0           2          0.0
AIJ file reads            0        0       0.1        2100          0.0


--------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

SCREEN FIELDS

process attaches   This field displays the total number of database attaches on the current node. If a single process attaches to the database multiple times, this statistic is incremented by the actual number of attaches.

process failures   This field displays the total number of processes that abnormally terminated and required database recovery.

In the case of some other node failure, this statistic might indicate process failure on the other node that was actually recovered on this node.

DB freeze len x100   This field displays the total database freeze duration, expressed in hundredths of a second. During the database freeze, no database activity is permitted; the database is "frozen". The longer the duration, the more database performance bottlenecks may result.

Tx REDO count   This field displays the total number of transactions that needed to be "redone".

Transaction redo occurs when the "Fast Commit" feature for transaction processing is enabled. The Fast Commit feature contains several parameters that can be modified to control the overall redo duration, but at the expense of runtime performance.

Transaction redo requires reading the AIJ journal from the failed process' checkpoint location and re-applying all subsequent committed database modifications for that process. This usually involves re-applying many committed transactions.

The number of transactions redone is not as important as the amount of work required per transaction. In other words, a single long transaction requires the same redo processing as many   short transactions.

 Transactions that are densely packed into a minimum AIJ interval are more efficiently redone than a transaction whose data spans a long range of AIJ blocks. In other words, long-running transactions that do only occasionally infrequent database updates may be redone more efficiently as several short transactions. This is an application issue. However, total application throughput also affects this redo performance.

Transaction redo is normally the longest portion of the process recovery operation.

redo time x100   This field displays the total time in hundredths of a second required for transactions that needed to be "redone".

Tx UNDO count   This field displays the total number of transactions that needed to be "undone".

Transaction undo requires reading the RUJ journal approximately twice, once forwards to determine the end of the current transaction, and then backwards from that location to the beginning of the RUJ file.

Transaction undo is performed only on the transaction that was currently active, if any, at the time of process failure.

undo time x100   This field displays the total time in hundredths of a second required for transactions that needed to be "undone".

no undo needed   This field displays the total number of transactions that did not need to be "undone". Occasionally, the failed process did not have any active transactions, thereby allowing the Database Recovery process (DBR) to avoid having to manually determine if a transaction needs being "undone".

Tx committed   This field displays the total number of transactions that were committed during the transaction undo phase. This normally occurs during the resolution phase of an in-progress distributed transaction. However, this event can also occur if an optimistic commit record was found in the AIJ journal that was not yet recorded in the process' recovery information.

Tx rolled back   This field displays the total number of transactions that were rolled back during the transaction undo phase. This is the normal result of transaction undo.

No resolve needed   This field displays the total number of transactions that did not need to be either committed or rolled back during the transaction undo phase. This normally occurs when the "Fast Commit" feature for transaction processing is enabled, where the RUJ file is examined to locate an active transaction, but none can be found.

AIJ recover x100   This field displays the total time in hundredths of a second required to recover the in-progress AIJ flush operation, if any. This is normally a very fast operation.

GB recover x100   This field displays the total time in hundredths of a second required to recover the global buffer information, if applicable. This is normally a very fast operation.

Cache recover x100   This field displays the total time in hundredths of a second required to recover the row cache following Row Cache Server (RCS) failure or node failure.

Depending on the number and sizes of the active row caches, this can be a lengthy operation.

RUJ file reads   This field displays the total number of read I/O operations performed on the RUJ journal during the transaction undo phase. The RUJ file is never written by the Database Recovery process (DBR).

This statistic field includes both synchronous and asynchronous I/O read requests.

AIJ file reads   This field displays the total number of read I/O operations performed on the AIJ journal during both the transaction redo and undo phases. If, during the transaction undo phase, the in-progress transaction is rolled back, a rollback record will be written to the AIJ journal.

This statistic field includes both synchronous and asynchronous I/O read requests.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph   This on-screen menu option displays a histogram graph instead of numbers.

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot   This on-screen menu option plots a specific field's value by time.

Unreset   This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot   This on-screen menu option plots a specific field's value using scatter-based display.

Yank   Places a selected statistic on the "Custom Statistics" screen.

**SCREEN
INFORMATION**

This section discusses screen-specific issues.

Page Navigation   This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support   This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   This screen does <u>not</u> have a zoom screen.

**CONFIGURATION
OPTIONS**

This screen does <u>not</u> have any configuration options.

Chapter

5

Hot Standby Information Screens

RMU Show Statistic Hot Standby Information Screens

The "Hot Standby Information" menu screens display information about the state of the "Hot Standby" feature.

Hot Standby Statistics Screen

This screen provides information about the performance and state of the Hot Standby feature.

The "Hot Standby Statistics" screen is recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is available when you replay a binary file using the INPUT qualifier.

The "Hot Standby Statistics" screen is also integrated into the "Cluster Statistic Collection" facility.

SCREEN LOCATION

This screen resides in the "Hot Standby Information" menu.

SCREEN EXAMPLE

The following is an example of the "Hot Standby Statistics" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 29-JAN-1998 15:50:48.26
Rate: 1.00 Second            Hot Standby Statistics         Elapsed: 00:08:53.89
Page: 1 of 1   KODA_TEST:[DB_HOMEDIR.REGTESTS]MF_PERSONNEL.RDB;1   Mode: Online
--------------------------------------------------------------------------------
State: Active    UserSync: Cold Current.Msg: 4       Cl Mstr.AIJ: 4:31
LagTime: 00:00:00 AutoSync: Cold Stalled.Msg: none     1 Stby.AIJ: 4:31
Stby.DB: _DPA48:[DB_HOMEDIR.REGTESTS]T_PERSONNEL.RDB;1

statistic.........      rate.per.second............. total....... ave rage......
name..............      max..... cur..... avg....... count....... per.trans....

AIJ network send          0        0       0.0          16           2.0
AIJ network recv          0        0       0.0          11           1.3
Net msg processed         0        0       0.0          11           1.3
    data                  0        0       0.0           5           0.6
    control               0        0       0.0          11           1.3
    checkpoints           0        0       0.0           4           0.5
Stall time x100           0        0       0.7         410          51.2
blocks shipped            0        0       0.0          49           6.1
      received            0        0       0.0          11           1.3
Stalled MSN found         0        0       0.0           0           0.0

Network Reconnect         0        0       0.0           0           0.0
Free Network Xmit         0        0       0.0           1           0.1


--------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

SCREEN FIELDS

The following fields provided in the "Hot Standby Statistics" screen header provide information that applies to the general state of the Hot Standby feature:

State   This field indicates the current state of the Hot Standby feature. Possible values are:

State	**Description**
Inactive	This keyword indicates that the Hot Standby feature is not being used.
DB Bind	This keyword indicates that the database is being set up for replication.
Net Bind	This keyword indicates that the network connection is being established.
Restart	This keyword indicates that the standby database is performing replication "restart" processing.
Connecting	This keyword indicates that master and standby databases are connecting together to establish the proper replication modes.
DB Synch.	This keyword indicates that the master and standby databases are being synchronized.
Activating	This keyword indicates that the AIJ Log Servers (ALS) on the master database are being activated. That is, replication is commencing.
SyncCmpltn	This keyword indicates that the master and standby databases have been synchronized and that the two databases are being verified for transactional consistency.
DECnet	This keyword indicates that the Hot Standby feature is active and using the DECnet communications protocol.
TCP/IP	This keyword indicates that the Hot Standby feature is active and using the TCP/IP communications protocol.
Active	This keyword indicates that the Hot Standby feature is active and being replicated locally. Local replication means that the master and standby databases are on the same node of the Cluster. When displaying this screen for the standby database, a number will occasionally be displayed to the right of the "Active" keyword. This number indicates the total number of "pending" messages from the master database that remain to be applied to the standby database.
Suspended	This keyword indicates that the Hot Standby feature is temporarily

State	Description
	suspended.
Resumption	This keyword indicates that a temporarily suspended master database is in the process of being resumed. Transactional activity that occurred while the Hot Standby feature was suspended is being transferred to the standby database.
Completion	This keyword indicates that the Hot Standby feature is being shut down, and that final completion processing is being performed.
Shutdown	This keyword indicates that the Hot Standby feature is being shut down.
Net Unbind	This keyword indicates that the network connection between the master and standby databases is being disconnected.
DB Unbind	This keyword indicates that the database is being removed from Hot Standby replication mode.
Recovery	This keyword indicates that the database is being recovered following a premature failure of the Hot Standby feature, usually as a result of network failure or server failure.

UserSync   This field indicates the minimum message synchronization mode to be used by the master database AIJ Log Server (ALS) when sending messages to the standby database. The keywords are the following:

Keyword	Description
Cold	cold synchronization
Warm	warm synchronization
Hot	hot synchronization
Commit	commit synchronization

Current.Msg   This field indicates the current message sequence number being used by this node.

CL   This field indicates the number of master database clients attached to the standby database. A "client" is the AIJ Log Server (ALS).

```
  !
NOTE
```
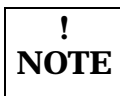
The value of this field is displayed <u>underneath</u> the field name.

Mstr.AIJ This field identifies the current AIJ end-of-file on the master database. Comparing this field to the value of the Stby.AIJ field provides an estimate of the work remaining to be applied on the standby database.

LagTime This field provides an "estimate" of the time that the standby database lags behind the master database. The concept is the following: If the master database were to fail right now, this field indicates how long it would take the standby database to catch-up to the master database's current transactional state.

Note that this field varies widely depending on the size and scope of the database transactions. When transactions are relatively short, the standby database lag time estimate should be closely in sync with the master database. Very long transactions tend to cause the standby database lag time to slowly increase and then suddenly catch-up as the long transactions are applied to the standby database.

Ideally, this value should display "00:00:00" although this is not always practical.

The database lag time can be controlled using the synchronization modes and the "Replication Governor" feature.

AutoSync This field indicates the message synchronization mode currently being used by the master database AIJ Log Server (ALS) when it sends messages to the standby database. This field always has the same or stronger synchronization mode as the **User.Sync** field. The keywords are the following:

<u>**Keyword**</u>	<u>**Description**</u>
Cold	cold synchronization
Warm	warm synchronization
Hot	hot synchronization
Commit	commit synchronization

Stalled.Msg This field indicates the <u>missing</u> message number that the standby database is waiting for. This message is almost always from a different node on the master database.

If the standby database is not waiting on a message, which is the normal case, then the value "none" is displayed for this field.

Stby.AIJ This field identifies the current AIJ end-of-file on the standby database. Comparing this field to the value of the Mstr.AIJ field provides an estimate of the work remaining to be applied on the standby database.

Stby.DB This field identifies the corresponding standby database file name.

If the current database is a standby database, then this field would be labeled **Mstr.DB** and would identify the corresponding master database.

The following fields provided in the "Hot Standby Statistics" screen body provide information that applies to active Hot Standby replication:

AIJ network send This field displays the number of network messages sent.

AIJ network recv This field displays the number of network messages received.

Net msg processed This field displays the number of network messages processed. This field is only updated on the standby database, and is intended to be used as a comparison against the "AIJ network recv" field.

data This field displays the number of <u>data</u> messages sent to the standby database or received from the master database.

control This field displays the number of <u>control</u> (non-data) messages sent to the standby database or received from the master database. Controls messages are typically requests for information about the status of the other database, used for consistency verification.

checkpoints This field displays the number of checkpoint operations performed. Note that these are Hot Standby checkpoints, not to be confused with the Fast Commit feature transactional checkpoints.

Stall time x100 This field displays the network I/O duration, in hundredths of seconds. For instance, the value "500" indicates "5" seconds.

blocks shipped This field displays the number of 512-byte blocks sent.

received This field displays the number of 512-byte blocks received.

Stalled MSN found This field displays the number of stalled messages identified.

Network Reconnect This field displays the number of times the network connection was lost between the master and standby databases. This statistic only applies to the master database. It could also indicate that the network object server (router) died prematurely.

Free Network Xmit This field displays the number of messages that have been sent for "free". That is, a group commit buffer that does not contain any transaction "commit" records can always be transmitted with a synchronization mode of "cold" since no replication of the buffer can be performed on the standby side. This is an indication of master database performance optimization.

ON-SCREEN MENU
OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph   This on-screen menu option displays a histogram graph instead of numbers.

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot   This on-screen menu option plots a specific field's value by time.

Unreset   This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot   This on-screen menu option plots a specific field's value using scatter-based display.

Yank   Places a selected statistic on the "Custom Statistics" screen.

SCREEN
INFORMATION

On the standby database, comparing the "rate.per.second" column of the "AIJ network recv" and "Net msg processed" statistics is a useful way to determine if the performance of the master database exceeds the ability of the standby database to apply the changes. The "AIJ network recv" statistic represents the rate of in-coming messages from the master database, and the "Net msg processed" statistic represents the rate at which these messages are processed. Obviously, if the in-coming rate exceeds the process rate, then the standby database will lag behind the master data-base, or the master database will need to reduce its network throughput.

Page Navigation   This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support   This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   This screen does <u>not</u> have a zoom screen.

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**CONFIGURATION
OPTIONS**

This screen does <u>not</u> have any configuration options.

Synchronization Mode Statistics Screen

This screen provides a breakdown of each type of synchronization mode. The count and stall duration for each of the four synchronization modes are displayed.

This screen is important for analyzing network bandwidth utilization and standby database resource allocation effectiveness.

SCREEN LOCATION

This screen resides in the "Hot Standby Information" menu.

SCREEN EXAMPLE

The following is an example of the "Synchronization Mode Statistics" screen:

```
Node: MYNODE (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 29-JAN-1998 15:50:59.76
Rate: 1.00 Second         Synchronization Mode Statistics     Elapsed: 00:09:05.39
Page: 1 of 1   KODA_TEST:[DB_HOMEDIR.REGTESTS]MF_PERSONNEL.RDB;1   Mode: Online
--------------------------------------------------------------------------------
statistic.........     rate.per.second............ total....... ave rage......
name..............     max..... cur..... avg....... count....... per.trans....
transactions                0       0      0.0          8            1.0

Cold sync send              0       0      0.0          5            0.6
Warm sync send              0       0      0.0          0            0.0
Hot sync send               0       0      0.0          0            0.0
Commit sync send            0       0      0.0         11            1.3

Cold stall x100             0       0      0.0          1            0.1
Warm stall x100             0       0      0.0          0            0.0
Hot stall x100              0       0      0.0          0            0.0
Commit stall x100           0       0      0.7        409           51.1


--------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

SCREEN FIELDS

transactions This field gives the number of completed database transactions. This is the count of the COMMIT and ROLLBACK statements that have executed.

cold sync send This field displays the number of cold mode messages sent to the standby database.

warm sync send This field displays the number of warm mode messages sent to the standby database.

hot sync send   This field displays the number of hot mode messages sent to the standby database.

commit sync send   This field displays the number of commit mode messages sent to the standby database.

cold stall x100   This field displays the cold message duration, in hundredths of seconds.

warm stall x100   This field displays the warm message duration, in hundredths of seconds.

hot stall x100   This field displays the hot message duration, in hundredths of seconds.

commit stall x100   This field displays the commit message duration, in hundredths of seconds.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph   This on-screen menu option displays a histogram graph instead of numbers.

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot   This on-screen menu option plots a specific field's value by time.

Unreset   This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot   This on-screen menu option plots a specific field's value using scatter-based display.

Yank   Places a selected statistic on the "Custom Statistics" screen.

SCREEN INFORMATION

✅ The purpose of this screen is to verify that the database synchronization mode you chose is effective and appropriate for the runtime performance characteristics of the database. For example, if you specified the "Cold" synchronization mode, but you

are encountering mostly "Warm" and "Hot" message sends, it could be indicative of insufficient network band-width. It could also be indicative of insufficient resources on the standby database. Try increasing the standby database number of buffers.

Page Navigation   This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support   This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   This screen does <u>not</u> have a zoom screen.

C O N F I G U R A T I O N
O P T I O N S

This screen does <u>not</u> have any configuration options.

Recovery Information Screen[11]

This screen provides statistics about the recovery of a hot standby database.

This screen is important for analyzing network throughput and the effectiveness of the standby database resource allocation.

This screen is only available on the standby database while Hot Standby is active.

SCREEN LOCATION

This screen resides in the "Hot Standby Information" menu.

SCREEN EXAMPLE

The following is an example of the "Recovery Information" screen:

```
Node: BONZAI (1/1/24)   Oracle Rdb X7.0-00 Perf. Monitor  8-JUN-1998 11:08:23.96
Rate: 1.00 Second           Recovery Information         Elapsed: 05:08:48.28
Page: 1 of 1        KODA_TEST:[R_ANDERSON.TCS_STANDBY]TCS.RDB;1       Mode: Online
--------------------------------------------------------------------------------
statistic.........    rate.per.second.............  total.......  average......
name..............    max..... cur..... avg.......  count.......  per.trans....

transactions              22       0       0.4         7571          1.0
 commit                   22       0       0.4         7571          1.0
 rollback                  0       0       0.0            0          0.0
 prepared                  0       0       0.0            0          0.0
Area ready                 0       0       0.0            7          0.0
AIJ records              781       0       3.9        73127          9.6
 erase mixed               0       0       0.0            0          0.0
 erase uniform             2       0       0.0           39          0.0
 modify mixed              0       0       0.0            0          0.0
 modify uniform          781       0       3.9        73088          9.6

SPAM updated              93       0       0.7        13017          1.7

Num failed updates         0       0       0.0            0          0.0
Ttl failed updates         0       0       0.0            0          0.0
--------------------------------------------------------------------------------
 Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

SCREEN FIELDS

---

[11] Available in Oracle Rdb 7.0.2.0.

---

transactions This field gives the number of completed database transactions. This is the count of the COMMIT and ROLLBACK statements that have executed.

commit This field displays the number of transactions that have been committed to the standby database.

rollback This field displays the number of transactions that have been rolled back prior to being applied to the standby database.

prepared This field displays the number of distributed transactions that have been successfully "prepared" in anticipation of eventually being committed to the standby database.

Area ready This field displays the number of physical storage areas that have been "readied" during the recovery operation.

AIJ records This field displays the number of AIJ records applied.

Erase mixed This field displays the number of "erase record" operations performed on a mixed-format storage area.

Erase uniform This field displays the number of "erase record" operations performed on an uniform-format storage area.

Modify mixed This field displays the number of "modify record" operations performed on a mixed-format storage area.

Modify uniform This field displays the number of "modify record" operations performed on an uniform-format storage area.

SPAM updated This field displays the number of SPAM page modifications that occurred as a result of the AIJ journal record. SPAM pages are typically modified due to a live data page changing its threshold information.

Num failed updates This field displays the number of failed updates that are currently pending REDO. In general, this field should always be zero. However, it may temporarily increase in value and subsequently return to zero.

Ttl failed updates This field displays the total number of failed updates. A failed update is a database modification that cannot be immediately applied due primarily to the order in which AIJ journal records are recorded.

ON-SCREEN MENU
OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph This on-screen menu option displays a histogram graph instead of numbers.

Numbers	This on-screen menu option displays numeric statistics instead of histogram graph.
Options	This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.
Pause	This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.
Reset	This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.
Time_plot	This on-screen menu option plots a specific field's value by time.
Unreset	This on-screen menu option restores the original statistic values after using "Reset" option.
X_plot	This on-screen menu option plots a specific field's value using scatter-based display.
Yank	Places a selected statistic on the "Custom Statistics" screen.

**S C R E E N
I N F O R M A T I O N**

✔ The purpose of this screen is to display information about the Hot Standby recovery operation, with regards to what type of recovery operations are actually being performed.

Page Navigation	This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.
Binary File Support	This screen is available during replay of a binary file specified by the INPUT qualifier.
ster Statistic Collection Support	This screen is integrated into the "Cluster Statistic Collection" facility.
Zoom Screen	This screen does <u>not</u> have a zoom screen.

**C O N F I G U R A T I O N
O P T I O N S**

This screen does <u>not</u> have any configuration options.

Chapter

6

IO Statistics Information Screens

RMU Show Statistic IO Statistics Information Screens

The "IO Statistics Information" menu screens display summary information about the I/O operations being performed by the application.

PIO Statistics—Data Fetches (Local Buffers) Screen

This screen provides statistics on how local buffer data page requests are handled by the physical-I/O (PIO) sub-system.

SCREEN LOCATION

This screen resides in the "IO Statistics Information" menu.

SCREEN EXAMPLE

The following is an example of the "PIO Statistics– Data Fetches" screen:

```
Node: BONZAI (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 30-JAN-1998 13:24:01.21
Rate: 1.00 Second          PIO Statistics--Data Fetches       Elapsed: 00:39:54.65
Page: 1 of 1    KODH$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1     Mode: Online
-----------------------------------------------------------------------------
statistic.........     rate.per.second............. total....... ave rage......
name.............      max..... cur..... avg....... count....... per.trans....

fetch for read            1033     125      140.5      336503         18.5
fetch for write           1042     324      424.1     1015673         56.0

in LB: all ok             1307     301      477.3     1143037         63.0
   LB: need lock            65       8       15.1       36331          2.0
   LB: old version          66       5        2.4        5809          0.3

not found: read            290     134       69.4      166366          9.1
         : synth            12       0        0.1         342          0.0

DAPF: success                0       0        0.0           0          0.0
DAPF: failure                0       0        0.0           0          0.0
DAPF: utilized               0       0        0.0           0          0.0
DAPF: discarded              0       0        0.0           0          0.0

-----------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

SCREEN FIELDS

fetch for read   The number of synchronous data page requests to the PIO sub-system where only read privileges are being requested for the page.

If Oracle Rdb reads any area inventory pages (AIP) and area bit map (ABM) pages while fetching the data page, the requests for the AIP and ABM pages are included in the total count field.

The sum of the fetch for read and fetch for write fields equals the total number of synchronous data page requests to the PIO sub-system.

fetch for write The number of data page requests to the PIO sub-system where update as well as read privileges are being requested for the page.

If Oracle Rdb reads any AIP and ABM pages while fetching the data page, the requests for the AIP and ABM pages are included in the total count field.

The sum of the fetch for read and fetch for write fields equals the total number of data page requests to the PIO sub-system.

in LB: all ok The correct version of the requested page was found in the user's local buffer pool and the user already held the needed locks on that page.

This line and the next four lines categorize data page requests to the PIO sub-system in terms of what work the sub-system had to do to satisfy the request. The sum of this line and the next four lines should be equal to the sum of the first two lines.

The three lines with the LB heading further categorize those data page fetch requests to the PIO sub-system where the requested page was found in the user's local buffer pool.

LB: need lock The correct version of the requested page was found in the user's local buffer pool but additional locking was required (that is, the user did not have the page locked in the needed mode).

LB: old version The requested page was found in the user's local buffer pool but it was an obsolete version of the page (that is, the page has been changed by another user since it was read into this user's local buffer). Thus, the page must be read again from disk. In addition, locks will need to be obtained for this page.

not found: read Because the requested page was not found in the buffer pool, it was read in from disk. This required obtaining appropriate locks on the page.

This line and the "not found: synth" line further categorize data page fetch requests to the PIO sub-system in which the requested page did not reside in the user's buffer pool.

synth Because the requested page was not found in the buffer pool, it was synthesized into the pool without being read from disk. This required obtaining appropriate locks on the page.

A requested page that is synthesized is either:

- "Read" from a WORM storage area

- "Read" from a uniform format area and the clump is unallocated

In both cases, the page does not actually have to be read from disk because the page contents are known (that is, Oracle Rdb can determine what a formatted unused page looks like). Therefore, rather than actually reading the page from disk,

Oracle Rdb synthesizes the page(produces a properly formatted unused page). Page and buffer locking must still occur to keep other users from accessing the same page.

DAPF: success   This field indicates the number of times the "Detected Asynchronous Pre-Fetch" (DAPF) feature operation initiated a buffer fetch attempt that was successful in fetching the buffer. This is possible only if an EX lock can be obtained for the whole buffer. A successful DAPF fetch may actually issue an asynchronous read or simply ensure that a buffer that was already in the buffer pool now moves to the front of the LRU queue. In the latter case, the buffer then becomes least likely to be thrown out of the buffer pool.

DAPF: failure   The number of times a DAPF-initiated buffer fetch attempt failed due to locking conflicts. If an EX lock cannot be obtained on the whole buffer, then the fetch attempt will fail.

DAPF: utilized   If a buffer is fetched by DAPF, it is marked DAPF FETCHED. If the buffer is accessed again, then this statistic is incremented to indicate that pre-fetching the buffer by DAPF was worthwhile. The statistic is incremented only the first time the buffer is accessed.

DAPF: discarded   If a DAPF-fetched buffer is thrown out of the buffer pool without being accessed, then this statistic is incremented to indicate that fetching the buffer was not worthwhile.

ON-SCREEN MENU
OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph   This on-screen menu option displays a histogram graph instead of numbers.

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot This on-screen menu option plots a specific field's value by time.

Unreset This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot This on-screen menu option plots a specific field's value using scatter-based display.

Yank Places a selected statistic on the "Custom Statistics" screen.

**S C R E E N
I N F O R M A T I O N**

This section discusses screen-specific issues.

Page Navigation This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen This screen does <u>not</u> have a zoom screen.

**C O N F I G U R A T I O N
O P T I O N S**

This screen does <u>not</u> have any configuration options.

PIO Statistics—Data Fetches (Global Buffers) Screen

This screen provides statistics on how global buffer data page requests are handled by the physical-I/O (PIO) sub-system.

This screen resides in the "IO Statistics Information" menu.

SCREEN EXAMPLE

The following is an example of the "PIO Statistics– Data Fetches" screen:

```
Node: BONZAI (1/1/2)   Oracle Rdb X7.0-00 Perf. Monitor 30-JAN-1998 13:35:33.27
Rate: 1.00 Second         PIO Statistics--Data Fetches      Elapsed: 00:04:10.48
Page: 1 of 1    KODH$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1    Mode: Online
-------------------------------------------------------------------------------

statistic.........     rate.per.second............. total....... ave rage......
name.............     max..... cur..... avg....... count....... per.trans....

fetch for read          1285      220      53.6        13449         15.1
fetch for write          522      431      87.7        21986         24.8
in AS: all ok            921      611     126.0        31580         35.6
   AS: lock for GB         0        0       0.0            0          0.0
   AS: need lock         181       29      10.6         2662          3.0
   AS: old version         0        0       0.0            0          0.0
in GB: need lock         176       11       4.2         1064          1.2
   GB: old version         0        0       0.0            0          0.0
   GB: transferred         0        0       0.0            0          0.0
not found: read           24        0       0.5          126          0.1
        : synth            2        0       0.0           13          0.0
DAPF: success              0        0       0.0            0          0.0
DAPF: failure              0        0       0.0            0          0.0
DAPF: utilized             0        0       0.0            0          0.0
DAPF: discarded            0        0       0.0            0          0.0


-------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

SCREEN FIELDS

fetch for read The number of synchronous data page requests to the PIO sub-system where only read privileges are being requested for the page.

If Oracle Rdb reads any area inventory pages (AIP) and area bit map (ABM) pages while fetching the data page, the requests for the AIP and ABM pages are included in the total count field.

The sum of the fetch for read and fetch for write fields equals the total number of synchronous data page requests to the PIO sub-system.

fetch for write   The number of data page requests to the PIO sub-system where update as well as read privileges are being requested for the page.

If Oracle Rdb reads any AIP and ABM pages while fetching the data page, the requests for the AIP and ABM pages are included in the total count field.

The sum of the fetch for read and fetch for write fields equals the total number of data page requests to the PIO sub-system.

in AS: all ok   The correct version of the requested page was found in the user's allocate set and the user already held the needed locks on that page.

This line and the next eight lines categorize data page requests to the PIO sub-system in terms of what work the sub-system had to do to satisfy the request. The sum of this line and the next eight lines should be equal to the sum of the first two lines.

The four lines with the AS: heading further categorize those data page fetch requests to the PIO sub-system where the requested page was found in the user's allocate set.

AS: lock for GB   The page was found in the user's allocate set and the user held sufficient locks to satisfy the request. But because of global buffers, additional locking was needed to verify that the version was correct. The version was, in fact, correct, so the extra locking overhead was due solely to the fact that global buffers were being used.

AS: need lock   The correct version of the requested page was found in the user's allocate set but additional locking was required (that is, the user did not have the page locked in the needed mode).

AS: old version   The requested page was found in the user's allocate set but it was an obsolete version of the page (that is, the page has been changed by another user since it was added to the requester's allocate set). Thus, the page must be read again from disk. In addition, locks will need to be obtained for this page.

in GB: need lock   The correct version of the page was found in the global buffer pool. It was necessary to bring this page into the user's allocate set and to obtain a lock on the page.

This line and the "**GB: old version**" line further categorize data page fetch requests to the PIO sub-system in which the requested page was not found in the user's allocate set but was found in the global buffer pool.

GB: old version   The page was found in the global buffer pool but it was the wrong version; i.e. the buffer is stale. Thus, a lock had to be obtained, the page had to be read in from disk to a global buffer, and that buffer had to be brought into the user's allocate set.

GB: transferred   The count of the number of data pages that were transferred from one process to another without being written to the disk.

This field is active only when the "transfer via memory" feature is enabled.

DAPF: success   The number of times a DAPF-initiated buffer fetch attempt was successful in fetching the buffer. This is possible only if an EX lock can be obtained for the whole buffer. A successful DAPF fetch may actually issue an asynchronous read or simply ensure that a buffer that was already in the buffer pool now moves to the front of the LRU queue. In the latter case, the buffer then becomes least likely to be thrown out of the buffer pool.

DAPF: failure   The number of times a DAPF-initiated buffer fetch attempt failed due to locking conflicts. If an EX lock cannot be obtained on the whole buffer, then the fetch attempt will fail.

DAPF: utilized   If a buffer is fetched by DAPF, it is marked DAPF FETCHED. If the buffer is accessed again, then this statistic is incremented to indicate that pre-fetching the buffer by DAPF was worthwhile. The statistic is incremented only the first time the buffer is accessed.

DAPF: discarded   If a DAPF-fetched buffer is thrown out of the buffer pool without being accessed, then this statistic is incremented to indicate that fetching the buffer was not worthwhile.

ON-SCREEN MENU
OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph   This on-screen menu option displays a histogram graph instead of numbers.

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot This on-screen menu option plots a specific field's value by time.

Unreset This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot This on-screen menu option plots a specific field's value using scatter-based display.

Yank Places a selected statistic on the "Custom Statistics" screen.

SCREEN INFORMATION

This section discusses screen-specific issues.

Page Navigation This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen This screen does <u>not</u> have a zoom screen.

CONFIGURATION OPTIONS

This screen does <u>not</u> have any configuration options.

PIO Statistics—SPAM Fetches (Local Buffers) Screen

This screen provides statistics on how local buffer SPAM page requests are handled
by the physical-I/O (PIO) sub-system.

SCREEN LOCATION

This screen resides in the "IO Statistics Information" menu.

SCREEN EXAMPLE

The following is an example of the "PIO Statistics– SPAM Fetches" screen:

```
Node: BONZAI (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 30-JAN-1998 13:24:04.36
Rate: 1.00 Second           PIO Statistics--SPAM Fetches      Elapsed: 00:39:57.80
Page: 1 of 1    KODH$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1     Mode: Online
-------------------------------------------------------------------------------

statistic.........     rate.per.second............. total....... ave rage......
name.............     max..... cur..... avg....... count....... per.trans....
fetch for read           537       28      20.8        50020             2.7
fetch for write           29        0       3.0         7274             0.4

in LB: all ok            562        9      15.5        37296             2.0
   LB: need lock          11        1       1.4         3368             0.1
   LB: old version         5        0       0.2          603             0.0

not found: read           45       18       6.6        16030             0.8
         : synth           0        0       0.0            0             0.0

DAPF: success              0        0       0.0            0             0.0
DAPF: failure              0        0       0.0            0             0.0
DAPF: utilized             0        0       0.0            0             0.0
DAPF: discarded            0        0       0.0            0             0.0


-------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

SCREEN FIELDS

fetch for read   The number of SPAM page requests to the PIO subsystem where only read privileges
are being requested for the page.

The sum of the fetch for read and fetch for write fields equals the total number of
SPAM page requests to the PIO subsystem.

fetch for write The number of SPAM page requests to the PIO subsystem where update as well as read privileges are being requested for the page.

The sum of the fetch for read and fetch for write fields equals the total number of SPAM page requests to the PIO subsystem.

in LB: all ok The correct version of the requested page was found in the user's local buffer pool and the user already held the needed locks on that page.

This line and the next four lines categorize SPAM page requests to the PIO subsystem in terms of what work the subsystem had to do to satisfy the request. The sum of this line and the next four lines should be equal to the sum of the first two lines.

The three lines with the "LB:" heading further categorize those SPAM page fetch requests to the PIO subsystem where the requested page was found in the user's local buffer pool.

LB: need lock The correct version of the requested page was found in the user's local buffer pool but additional locking was required (that is, the user did not have the page locked in the needed mode).

LB: old version The requested page was found in the user's local buffer pool but it was an obsolete version of the page (that is, the page has been changed by another user since it was read into this user's local buffer). Thus, the page must be read again from disk. In addition, locks will need to be obtained for this page.

not found: read Because the requested page was not found in the buffer pool, it was read in from disk. This required obtaining appropriate locks on the page.

This line and the "not found: synth" line further categorize SPAM page fetch requests to the PIO subsystem in which the requested page did not reside in the user's buffer pool.

synth Because the requested page was not found in the buffer pool, it was synthesized into the pool without being read from disk. This requires obtaining appropriate locks on the page.

A requested page that is synthesized is either:

- "Read" from a WORM storage area

- "Read" from a uniform format area and the clump is unallocated

In both of these cases, the page does not actually have to be read from disk because the page contents are known (that is, Oracle Rdb can determine what a formatted unused page looks like). Therefore, rather than actually reading the page from disk, Oracle Rdb synthesizes the page(produces a properly-formatted unused page). Page and buffer locking must still occur to keep other users from accessing the same page.

DAPF: success The number of times a DAPF-initiated buffer fetch attempt was successful in fetching the buffer. This is possible only if an EX lock can be obtained for the whole buffer. A successful DAPF fetch may actually issue an asynchronous read or simply ensure that a buffer that was already in the buffer pool now moves to the front of the LRU queue. In the latter case, the buffer then becomes least likely to be thrown out of the buffer pool.

DAPF: failure The number of times a DAPF-initiated buffer fetch attempt failed due to locking conflicts. If an EX lock cannot be obtained on the whole buffer, then the fetch attempt will fail.

DAPF: utilized If a buffer is fetched by DAPF, it is marked DAPF FETCHED. If the buffer is accessed again, then this statistic is incremented to indicate that pre-fetching the buffer by DAPF was worthwhile. The statistic is incremented only the first time the buffer is accessed.

DAPF: discarded If a DAPF-fetched buffer is thrown out of the buffer pool without being accessed, then this statistic is incremented to indicate that fetching the buffer was not worthwhile.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph This on-screen menu option displays a histogram graph instead of numbers.

Numbers This on-screen menu option displays numeric statistics instead of histogram graph.

Options This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot This on-screen menu option plots a specific field's value by time.

Unreset This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot This on-screen menu option plots a specific field's value using scatter-based display.

Yank Places a selected statistic on the "Custom Statistics" screen.

S C R E E N **I N F O R M A T I O N**	This section discusses screen-specific issues.
Page Navigation	This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.
Binary File Support	This screen is available during replay of a binary file specified by the INPUT qualifier.
ster Statistic Collection Support	This screen is integrated into the "Cluster Statistic Collection" facility.
Zoom Screen	This screen does <u>not</u> have a zoom screen.

C O N F I G U R A T I O N **O P T I O N S**	This screen does <u>not</u> have any configuration options.

PIO Statistics—SPAM Fetches (Global Buffers) Screen

This screen provides statistics on how global buffer SPAM page requests are handled by the physical-I/O (PIO) sub-system.

This screen resides in the "IO Statistics Information" menu.

The following is an example of the "PIO Statistics– SPAM Fetches" screen:

```
Node: BONZAI (1/1/2)    Oracle Rdb X7.0-00 Perf. Monitor 30-JAN-1998 13:35:36.39
Rate: 1.00 Second          PIO Statistics--SPAM Fetches      Elapsed: 00:04:13.60
Page: 1 of 1    KODH$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1    Mode: Online
--------------------------------------------------------------------------------

statistic.........       rate.per.second............. total....... ave rage......
name.............        max..... cur..... avg....... count....... per.trans....
fetch for read            26        5        0.4        108           0.1
fetch for write            9        0        0.3         83           0.0
in AS: all ok             21        4        0.5        131           0.1
   AS: lock for GB          0        0        0.0          0           0.0
   AS: need lock            2        0        0.0         24           0.0
   AS: old version          0        0        0.0          0           0.0
in GB: need lock            5        0        0.1         33           0.0
   GB: old version          0        0        0.0          0           0.0
   GB: transferred          0        0        0.0          0           0.0
not found: read             2        0        0.0          3           0.0
        : synth             0        0        0.0          0           0.0
DAPF: success               0        0        0.0          0           0.0
DAPF: failure               0        0        0.0          0           0.0
DAPF: utilized              0        0        0.0          0           0.0
DAPF: discarded             0        0        0.0          0           0.0


--------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

fetch for read The number of SPAM page requests to the PIO subsystem where only read privileges are being requested for the page.

The sum of the fetch for read and fetch for write fields equals the total number of SPAM page requests to the PIO subsystem.

fetch for write   The number of SPAM page requests to the PIO subsystem where update as well as read privileges are being requested for the page.

The sum of the fetch for read and fetch for write fields equals the total number of SPAM page requests to the PIO subsystem.

in AS: all ok field

The correct version of the requested page was found in the user's allocate set and the user already held the needed locks on that page.

This line and the next eight lines categorize SPAM page requests to the PIO subsystem in terms of what work the subsystem had to do to satisfy the request. The sum of this line and the next eight lines should be equal to the sum of the first two lines.

The four lines with the "AS:" heading further categorize those SPAM page fetch requests to the PIO subsystem where the requested page was found in the user's allocate set.

AS: lock for GB   The page was found in the user's allocate set and the user held sufficient locks to satisfy the request. But because of global buffers, additional locking was needed to verify that the version was correct. The version was, in fact, correct, so the extra locking overhead was due solely to the fact that global buffers were being used.

AS: need lock   The correct version of the requested page was found in the user's allocate set but additional locking was required (that is, the user did not have the page locked in the needed mode).

AS: old version   The requested page was found in the user's allocate set but it was an obsolete version of the page (that is, the page has been changed by another user since it was added to the requester's allocate set). Thus, the page must be read again from disk. In addition, locks will need to be obtained for this page.

in GB: need lock   The correct version of the page was found in the global buffer pool. It was necessary to bring this page into the user's allocate set and to obtain a lock on the page.

This line and the "**GB: old version**" line further categorize SPAM page fetch requests to the PIO subsystem in which the requested page was not found in the user's allocate set but was found in the global buffer pool.

GB: old version   The page was found in the global buffer pool but it was the wrong version. Thus, a lock had to be obtained, the page had to be read in from disk to a global buffer, and that buffer had to be brought into the user's allocate set.

GB: transferred   The count of the number of SPAM pages that were transferred from one process to another without being written to the disk. This field is active only when the "transfer via memory" feature is enabled.

DAPF: success   The number of times a DAPF-initiated buffer fetch attempt was successful in fetching the buffer. This is possible only if an EX lock can be obtained for the whole buffer. A successful DAPF fetch may actually issue an asynchronous read or simply ensure that a buffer that was already in the buffer pool now moves to the front of the LRU queue. In the latter case, the buffer then becomes least likely to be thrown out of the buffer pool.

DAPF: failure   The number of times a DAPF-initiated buffer fetch attempt failed due to locking conflicts. If an EX lock cannot be obtained on the whole buffer, then the fetch attempt will fail.

DAPF: utilized   If a buffer is fetched by DAPF, it is marked DAPF FETCHED. If the buffer is accessed again, then this statistic is incremented to indicate that pre-fetching the buffer by DAPF was worthwhile. The statistic is incremented only the first time the buffer is accessed.

DAPF: discarded   If a DAPF-fetched buffer is thrown out of the buffer pool without being accessed, then this statistic is incremented to indicate that fetching the buffer was not worthwhile.

ON-SCREEN MENU
OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph   This on-screen menu option displays a histogram graph instead of numbers.

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot   This on-screen menu option plots a specific field's value by time.

Unreset   This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot   This on-screen menu option plots a specific field's value using scatter-based display.

Yank   Places a selected statistic on the "Custom Statistics" screen.

SCREEN INFORMATION

This section discusses screen-specific issues.

Page Navigation   This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support   This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   This screen does <u>not</u> have a zoom screen.

CONFIGURATION OPTIONS

This screen does <u>not</u> have any configuration options.

PIO Statistics—SPAM Access Screen

This screen displays statistics about why the SPAM page was accessed. You can identify excessive SPAM fetches by comparing the "record store fet" field to the "record store upd" and "record stored" fields.

The "SPAM Access" screen is recorded in the binary output file produced using the OUTPUT qualifier. Consequently, this screen is available when you replay a binary file using the INPUT qualifier.

The "SPAM Access" screen is integrated into the "Cluster Statistic Collection" facility.

SCREEN LOCATION

This screen resides in the "IO Statistics Information" menu.

SCREEN EXAMPLE

The following is an example of the "PIO Statistics– SPAM Access" screen:

```
 Node: BONZAI (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 30-JAN-1998 13:24:06.47
 Rate: 1.00 Second           PIO Statistics--SPAM Access        Elapsed: 00:39:59.91
 Page: 1 of 1    KODH$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1    Mode: Online
 --------------------------------------------------------------------------------

 statistic........      rate.per.second............  total....... ave rage......
 name.............      max..... cur..... avg.......  count....... per.trans....
 fetch for read          537       28      20.8         50077          2.7
  uniform area scan      128        0       0.0           207          0.0
  record store fet       408       33      26.2         62957          3.4
  record modify fet        0        0       0.0             0          0.0
  record erase fet         0        0       0.0             0          0.0
 fetch for write          29        2       3.0          7276          0.4
  record store upd        16        1       1.3          3333          0.1
  record modify upd        4        0       0.1           386          0.0
  record erase upd         0        0       0.0             0          0.0
 fetch for update         29        2       3.0          7276          0.4
  clump allocate           8        0       0.0           228          0.0
  fast incr. bkup          0        0       0.0             0          0.0
  threshold update        10        1       1.4          3491          0.1
 record stored            34        4      11.2         27056          1.4
 record marked            57        5      15.5         37338          2.0
 record erased             0        0       0.0             0          0.0


 --------------------------------------------------------------------------------
 Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

SCREEN FIELDS

fetch for read   This field displays the total number of times the SPAM page was fetched for retrieval. The SPAM page is fetched for four sub-categories: uniform area scan, record store, record modify and record erase.

uniform area scan   This field displays the total number of times the SPAM page was fetched for retrieval during a uniform area scan operation. This is primarily used to check if SPAM thresholds need to be adjusted.

record store fet   This field displays the total number of times the SPAM page was fetched for retrieval during a record store operation. This is primarily used to check if SPAM thresholds need to be adjusted. Typically, this is the most common reason for accessing a SPAM page.

record modify fet   This field displays the total number of times the SPAM page was fetched for retrieval during a record modification operation. This is primarily used to check if SPAM thresholds need to be adjusted. The value of this field is typically "0" since SPAM pages are only occasionally fetched for retrieval during a record modification operation.

record erase fet   This field displays the total number of times the SPAM page was fetched for retrieval during a record erase operation. This is primarily used to check if SPAM thresholds need to be adjusted. The value of this field is typically "0" since SPAM pages are only occasionally fetched for retrieval during a record erase operation.

fetch for write   This field displays the total number of times the SPAM page was fetched for update. This field is always the same as the "fetch for update" field.

record store upd   This field displays the total number of times the SPAM page was fetched for update during a record store operation. This is primarily used to modify the SPAM thresholds.

record modify upd   This field displays the total number of times the SPAM page was fetched for update during a record modification operation. This is primarily used to modify the SPAM thresholds.

record erase upd   This field displays the total number of times the SPAM page was fetched for update during a record erase operation. This is primarily used to modify the SPAM thresholds.

fetch for update   This field displays the total number of times the SPAM page was fetched for update. This field is always the same as the "fetch for write" field.

clump allocate   This field displays the total number of times the SPAM page was updated for a clump allocation operation.

fast incr bkup   This field displays the total number of times the SPAM page was updated for a "Fast Incremental Backup" feature modification. A large value in this field may indicate that

the "Fast Incremental Backup" feature is not providing any benefit and may actually degrading runtime through-put.

threshold update   This field displays the total number of times the SPAM page was updated to change a data page's threshold information.

record stored   This field displays the number of records stored in the database.

record marked   This field displays the number of records marked. A record is marked when it is modified or it is erased, but not when it is stored.

record erased   This field displays the number of records erased from the database.

ON-SCREEN MENU
OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph   This on-screen menu option displays a histogram graph instead of numbers.

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot   This on-screen menu option plots a specific field's value by time.

Unreset   This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot   This on-screen menu option plots a specific field's value using scatter-based display.

Yank   Places a selected statistic on the "Custom Statistics" screen.

SCREEN
INFORMATION

This section discusses screen-specific issues.

Page Navigation   This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support   This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   This screen does <u>not</u> have a zoom screen.

CONFIGURATION
OPTIONS

This screen does <u>not</u> have any configuration options.

PIO Statistics—Data Writes Screen

This screen provides information concerning data file writes and buffer unmarking activity (buffer writes to the disk).

SCREEN LOCATION

This screen resides in the "IO Statistics Information" menu.

SCREEN EXAMPLE

The following is an example of the "PIO Statistics– Data Writes" screen:

```
Node: BONZAI (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 30-JAN-1998 13:24:07.61
Rate: 1.00 Second          PIO Statistics--Data Writes        Elapsed: 00:40:01.05
Page: 1 of 1    KODH$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1    Mode: Online
--------------------------------------------------------------------------------

statistic.........      rate.per.second.............  total....... ave rage......
name.............      max..... cur..... avg.......  count....... per.trans....

unmark buffer               66      11     29.8        71595           3.9
  transaction               29       0      0.0           31           0.0
  pool overflow             63       0     23.2        55839           3.0
  blocking AST               0       0      0.0            0           0.0
  lock quota                 0       0      0.0            0           0.0
  lock conflict             53      11      6.2        14916           0.8
  user unbind                2       0      0.0            3           0.0
  batch rollback             0       0      0.0            0           0.0
  new area mode              0       0      0.0            0           0.0
  larea change               7       0      0.0           31           0.0
  incr backup                0       0      0.0            0           0.0
  no AIJ access              0       0      0.0            0           0.0
  truncate snaps             0       0      0.0            0           0.0
  checkpoint                44       0      0.3          777           0.0
  AIJ backup                 0       0      0.0            0           0.0

--------------------------------------------------------------------------------
 Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

SCREEN FIELDS

---

unmark buffer This field is incremented by one each time a modified buffer is written back to disk. Its value should be equal to the sum of the14 following fields. These fields as well as the SPAM page field provide further detail about buffer unmark activity. Write operations of buffers that contain SPAM pages are included in the total although they are also counted separately by the SPAM page field.

Note that unmarking one buffer may entail more than one I/O.

transaction	This field is incremented by one for each modified buffer that is written back to disk as a result of a COMMIT or ROLLBACK statement.
pool overflow	This field is incremented by one for each modified buffer that is written back to disk as a result of a request to read in a new page from disk.
blocking AST	This field is incremented by one for each modified buffer that is written back to disk in response to a blocking AST (that is, a page in the buffer was requested by another user).
lock quota	This field is incremented by one for each modified buffer that is written back to disk due to a user reaching his lock quota.
lock conflict	This field is incremented by one for each modified buffer that is written back to disk to reduce the possibility of a deadlock when Oracle Rdb discovers a lock conflict.
user unbind	This field is incremented by one for each modified buffer that is written back to disk as a result of a user's detaching from the database. This includes database detaches that occur as part of an Oracle RMU operation.
batch rollback	This field is incremented by one for each modified buffer that is written back to disk because of a failed or rolled back batch-update transaction.
new area mode	This field is incremented by one for each modified buffer that is written back to disk as a result of a physical area being readied in a new lock mode.
larea change	This field is incremented by one for each modified buffer that is written back to disk as a part of creating, deleting, or extending a logical area.
incr backup	This field is incremented by one for each modified buffer that is written back to disk to support the requirements of the "Fast Incremental Backup" feature. These buffers are always SPAM page buffers.
no AIJ access	This field is incremented by one for each modified buffer that is written back to disk as a safety precaution after the failure of an I/O to the after-image journal. The buffers are unmarked under such circumstances only when the "Fast Commit" feature for transaction processing is enabled to ensure that all committed data is safely in the database.
truncate snaps	This field is incremented by one for each modified buffer that is written back to disk as a part of an online snapshot file truncation.
checkpoint	This field is incremented by one for each modified buffer that is written back to disk as a result of a checkpoint.
AIJ backup	This field is incremented by one for each modified buffer that is written back to disk to optimize the performance of the quiet-point backup of the after-image journal.

ON-SCREEN MENU
OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph   This on-screen menu option displays a histogram graph instead of numbers.

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot   This on-screen menu option plots a specific field's value by time.

Unreset   This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot   This on-screen menu option plots a specific field's value using scatter-based display.

Yank   Places a selected statistic on the "Custom Statistics" screen.

SCREEN
INFORMATION

This section discusses screen-specific issues.

Page Navigation   This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support   This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   This screen does <u>not</u> have a zoom screen.

CONFIGURATION
OPTIONS

This screen does <u>not</u> have any configuration options.

R M U   S H O W   S T A T I S T I C   H A N D B O O K
C H A P T E R   7   -   G L O B A L   B U F F E R   I N F O R M A T I O N   S C R E E N S

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PIO Statistics—SPAM Writes Screen

This screen provides information concerning SPAM file writes.

This screen resides in the "IO Statistics Information" menu.

The following is an example of the "PIO Statistics--SPAM Writes" screen:

```
Node: BONZAI (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 30-JAN-1998 13:24:09.91
Rate: 1.00 Second           PIO Statistics--SPAM Writes        Elapsed: 00:40:03.35
Page: 1 of 1    KODH$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1     Mode: Online
--------------------------------------------------------------------------------

statistic.........      rate.per.second............. total....... ave rage......
name..............      max..... cur..... avg....... count....... per.trans....
SPAM page                  9        3       1.3         3171            0.1


--------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

spam page   This field is incremented by one each time a modified buffer that contains a space management (SPAM) page is written back to disk. These write operations are also included in the "unmark buffer" field.

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph   This on-screen menu option displays a histogram graph instead of numbers.

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot   This on-screen menu option plots a specific field's value by time.

Unreset   This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot   This on-screen menu option plots a specific field's value using scatter-based display.

Yank   Places a selected statistic on the "Custom Statistics" screen.

SCREEN INFORMATION

This section discusses screen-specific issues.

Page Navigation   This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support   This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   This screen does <u>not</u> have a zoom screen.

CONFIGURATION OPTIONS

This screen does <u>not</u> have any configuration options.

PIO Statistics—File Access Screen

This screen provides information concerning file access. The stall times are displayed in hundredths of a second.

This screen is very important for analyzing process startup performance problems.

This screen resides in the "IO Statistics Information" menu.

The following is an example of the "PIO Statistics—File Access" screen:

```
Node: BONZAI (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 30-JAN-1998 13:24:12.04
Rate: 1.00 Second           PIO Statistics--File Access       Elapsed: 00:40:05.48
Page: 1 of 1    KODH$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1    Mode: Online
--------------------------------------------------------------------------------

statistic.........     rate.per.second............. total....... ave rage......
name..............     max..... cur..... avg....... count....... per.trans....

area ready count         109       24       30.2       72648           4.0
normal file open           5        0        0.0          18           0.0
 normal stall x100        16        0        0.0          55           0.0
quick file open            9        0        0.0          30           0.0
  quick stall x100         2        0        0.0           7           0.0


--------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

area ready count This field displays the number of times a storage area is readied for read-only or read/write access. Readying a storage area may result in a file access (open) operation, but not always.

normal file open This field displays the number of times a storage area is opened using the normal operating system mechanism.

This typically indicates the number of different storage areas that are accessed.

normal stall x100 This field displays the total duration of the normal file-open operation, in hundredths of seconds.

quick file open — This field displays the number of times a "quick open" is used to open the storage area file. This typically occurs for subsequent opens by any user of a storage area file already opened by another user, even on another node of the cluster.

quick stall X100 — This field displays the total duration of the quick file-open operation, in hundredths of seconds.

ON-SCREEN MENU
OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (?), Menu, Set_rate, Write and (!) on-screen menu options are available on all screens unless otherwise noted.

Graph — This on-screen menu option displays a histogram graph instead of numbers.

Numbers — This on-screen menu option displays numeric statistics instead of histogram graph.

Options — This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause — This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset — This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot — This on-screen menu option plots a specific field's value by time.

Unreset — This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot — This on-screen menu option plots a specific field's value using scatter-based display.

Yank — Places a selected statistic on the "Custom Statistics" screen.

SCREEN
INFORMATION

This section discusses screen-specific issues.

Page Navigation — This screen does not contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support — This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support — This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen — This screen does not have a zoom screen.

CONFIGURATION OPTIONS

This screen does <u>not</u> have any configuration options.

Asynchronous IO Statistics Screen

This screen provides information concerning asynchronous reads and writes to the database files. The stall times are displayed in hundredths of a second.

SCREEN LOCATION

This screen resides in the "IO Statistics Information" menu.

SCREEN EXAMPLE

The following is an example of the "Asynchronous IO Statistics" screen:

```
Node: BONZAI (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 30-JAN-1998 13:24:14.20
Rate: 1.00 Second            Asynchronous IO Statistics        Elapsed: 00:40:07.64
Page: 1 of 1    KODH$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1    Mode: Online
--------------------------------------------------------------------------------

statistic.........      rate.per.second............. total....... ave rage......
name.............       max..... cur..... avg....... count....... per.trans....

data read request          0        0        0.0           0           0.0
data read IO               0        0        0.0           0           0.0

spam read request          0        0        0.0           0           0.0
spam read IO               0        0        0.0           0           0.0

read stall count           0        0        0.0           0           0.0
read stall time            0        0        0.0           0           0.0

write IO                  42       16       14.4       34700           1.9
write stall count         19        6        4.4       10616           0.5
write stall time          93       31       18.0       43545           2.3


--------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

SCREEN FIELDS

data read request The number of requests issued to the PIO subsystem to read data pages asynchronously.

data read IO The number of asynchronous read I/O operations done by the PIO sub-system to get data pages from the disk.

spam read request The number of requests issued to the PIO subsystem to read SPAM pages asynchronously.

---

spam read IO   The number of asynchronous read I/O operations done by the PIO sub-system to get SPAM pages from the disk.

read stall count   The total number of times the PIO sub-system had to wait for the completion of asynchronous read I/O operations.

read stall time   The total time in hundredths of a second spent waiting for asynchronous read requests to complete. A high number means the number of buffers being pre-fetched is too low. You can specify that more buffers be pre-fetched by specifying a higher value with the RDM$BIND_APF_DEPTH logical name.

write IO   The number of asynchronous writes done by the PIO sub-system to write data and SPAM pages to the disk.

write stall count   The total number of times the PIO subsystem had to wait for the completion of asynchronous write I/O. This statistic includes both asynchronous batch write operations as well as asynchronous I/O initiated during a transaction commit operation when the "Fast Commit" feature is not active.

write stall time   The total time in hundredths of a second spent waiting for asynchronous write requests to complete. An excessively high number often indicates that the number of clean buffers being maintained at the end of a process's least recently used queue of buffers for replacement is too low. You can increase the number of clean buffers being maintained at the end of a process's least recently used queue of buffers for replacement by specifying a higher value with the RDM$BIND_CLEAN_BUF_CNT logical name.

**ON-SCREEN MENU
OPTIONS**

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph   This on-screen menu option displays a histogram graph instead of numbers.

Numbers   This on-screen menu option displays numeric statistics instead of histogram graph.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause   This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset   This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot   This on-screen menu option plots a specific field's value by time.

Unreset This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot This on-screen menu option plots a specific field's value using scatter-based display.

Yank Places a selected statistic on the "Custom Statistics" screen.

**S C R E E N
I N F O R M A T I O N**

This section discusses screen-specific issues.

Page Navigation This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen This screen does <u>not</u> have a zoom screen.

**C O N F I G U R A T I O N
O P T I O N S**

This screen does <u>not</u> have any configuration options.

IO Stall Time (seconds x100) Screen

This screen shows a summary of I/O stall activity. All times are displayed in hundredths of a second.

This screen is important for analyzing disk device controller utilization as well as backplane and inter-connect effectiveness.

This screen resides in the "IO Statistics Information" menu.

The following is an example of the "IO Stall Time (Seconds x100)" screen:

```
Node: BONZAI (1/1/16)   Oracle Rdb X7.0-00 Perf. Monitor 30-JAN-1998 13:24:16.30
Rate: 1.00 Second            IO Stall Time (seconds x100)      Elapsed: 00:40:09.74
Page: 1 of 1    KODH$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1     Mode: Online
--------------------------------------------------------------------------------

statistic.........      rate.per.second............. total....... ave rage......
name.............       max..... cur..... avg....... count....... per.trans....

root read time               6        0       0.0          48          0.0
root write time             61        0       0.6        1514          0.0

data read time             113       85      21.8       52608          2.8
data write time            218      126      59.2      142731          7.8
data extend time            45        0       0.0         203          0.0

RUJ read time                0        0       0.0           0          0.0
RUJ write time              15        0       0.2         591          0.0
RUJ extend time             26        0       0.0          67          0.0
AIJ read time               45       29       0.8        1965          0.1
AIJ write time              81       10       4.7       11404          0.6
AIJ hiber time               0        0       0.0           0          0.0
AIJ extend time              0        0       0.0           0          0.0
Database bind time          32        0       0.0         105          0.0


--------------------------------------------------------------------------------
Exit Graph Help Menu Options Pause Reset Set_rate Time_plot Write X_plot Yank !
```

root read time This field gives the time in hundredths of a second spent reading the database root (.RDB) file.

This statistic field includes both synchronous and asynchronous I/O read stall durations.

root write time   This field gives the time in hundredths of a second spent writing to the database root (.RDB) file.

This statistic field includes both synchronous and asynchronous I/O write stall durations.

data read time   This field gives the time in hundredths of a second spent reading database pages from the database rootfile (.RDB), storage area (.RDA) files and snapshot (.SNP) files. An excessively high number often indicates disk contention that might be alleviated by moving some files to other disks.

This statistic field includes both synchronous and asynchronous I/O read stall durations.

data write time   This field gives the time in hundredths of a second spent writing database pages to the database rootfile (.RDB), storage area (.RDA) and snapshot (.SNP) files. An excessively high number often indicates disk contention that might be alleviated by moving some files to other disks.

This statistic field includes both synchronous and asynchronous I/O write stall durations.

data extend time   This field gives the time in hundredths of a second spent extending the database rootfile (.RDB), storage area (.RDA) and snapshot (.SNP) files. A very high number often indicates a full disk or disk fragmentation.

RUJ read time   This field gives the time in hundredths of a second spent reading records from the recovery-unit journals (.RUJ) during verb or transaction rollback. An excessively high number often indicates disk contention that might be alleviated by moving some files to other disks.

This statistic field includes both synchronous and asynchronous I/O read stall durations.

RUJ write time   This field gives the time in hundredths of a second spent writing records to the recovery-unit journals (.RUJ). An excessively high number often indicates disk contention that might be alleviated by moving some files to other disks.

This statistic field includes both synchronous and asynchronous I/O write stall durations.

RUJ extend time   This field gives the time in hundredths of a second spent extending the recovery-unit journals (.RUJ). An excessively high number often indicates a full disk or disk fragmentation.

AIJ read time This field gives the time in hundredths of a second spent reading records from the after-image journal. AIJ reads almost always occur as the result of opening the after-image journal, or performing failed process recovery.

This statistic field includes both synchronous and asynchronous I/O read stall durations.

AIJ write time This field gives the time in hundredths of a second spent writing to the after-image journal.

This statistic field includes both synchronous and asynchronous I/O write stall durations.

AIJ hiber time This field shows the stall time spent hibernating for the AIJ I/O to complete.

AIJ extend time This field gives the time in hundredths of a second spent extending the after-image journal. An excessively high number often indicates a full disk or disk fragmentation, or may be an indication of the need for a larger allocation.

Use the JOURNAL ALLOCATION IS clause of the SQL ALTER DATABASE statement to specify a larger allocation does that journal extension operations are avoided.

database bind time This field gives the length of time it takes users to attach to the database.

ON-SCREEN MENU
OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Graph This on-screen menu option displays a histogram graph instead of numbers.

Numbers This on-screen menu option displays numeric statistics instead of histogram graph.

Options This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

Pause This on-screen menu option temporarily pauses the presentation of the statistic information. Pressing the "Pause" on-screen menu option will resume the statistic presentation.

Reset This on-screen menu option resets temporarily resets the statistic information. Use the "Unreset" on-screen menu option to restore the original statistic information.

Time_plot This on-screen menu option plots a specific field's value by time.

Unreset   This on-screen menu option restores the original statistic values after using "Reset" option.

X_plot   This on-screen menu option plots a specific field's value using scatter-based display.

Yank   Places a selected statistic on the "Custom Statistics" screen.

**S C R E E N
I N F O R M A T I O N**

This section discusses screen-specific issues.

Page Navigation   This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support   This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   This screen does <u>not</u> have a zoom screen.

**C O N F I G U R A T I O N
O P T I O N S**

This screen does <u>not</u> have any configuration options.

Chapter

7

Global Buffer Information Screens

RMU Show Statistic Global Buffer Information Screens

The "Global Buffers Information" menu screens display information about the state of the "Global Buffer" sub-system and the cache contents.

GB Utilization Screen

This screen displays the utilization of each page in a global buffer. Because there can be many times more buffers and pages than displayable geography, this screen contains multiple pages. Use the left angle bracket < key to go to the previous page and the right angle bracket > key to go to the next page of the screen.

This screen is organized in units of buffers. Each vertical bar "|"delineates a buffer. Each character between vertical bars represents a single page. A buffer can contain fewer than the maximum number of pages, depending on the various storage area page sizes. Inadmissible pages are marked using the underscore (_) character and can be ignored.

The number of users sharing a particular page is known as the "share count". This screen is based on a display-threshold that is compared against the number of users sharing a particular page. Initially, the display threshold value is 1. The display threshold can be configured, as described below.

Page share-counts are identified as follows:

A row of "**X**"s delineates the end of the global buffer pool. All blank lines following the row of "**X**"s can be ignored.

This screen is not saved in the binary output file and cannot be selected during binary file replay.

SCREEN LOCATION

This screen resides in the "Global Buffer Information" menu.

The following is an example of the "GB Utilization" screen:

```
 Node: BONZAI (1/1/2)     Oracle Rdb X7.0-00 Perf. Monitor 30-JAN-1998 15:14:45.10
 Rate: 1.00 Second                    GB Utilization              Elapsed: 01:43:22.31
 Page: 1 of 5    KODH$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1     Mode: O nline
--------------------------------------------------------------------------------
       |   |   |   |   |   |   |   |   |   |   |   |   |XXX
       |   |   |   |   |   |   |   |   |   |   |   |   |XXX
       |   |   |   |   |   |   |   |   |   |   |   |   |XXX
       |   |   |   |   |   |   |   |   |   |   |   |   |XXX
       |   |   |   |   |   |   |   |   |   |   |   |   |XXX
       |   |   |   |   |   |   |   |   |   |   |   |   |XXX
       |   |   |   |   |   |   |   |   |   |   |   |   |XXX
       | ___|___|   |   |___|   |   |   |   |   |   |   |XXX
       |   |   |   |   |   |   |   |   |   |   |   |   |XXX
       |   |   |   |   |   |   |   |   |   |   |   |   |XXX
       |   |   |   |   |   |   |   |   |   |   |   |   |XXX
       |   | ...|   |   |   |   |   |   |   |   |   |   |XXX
       |   |   |   |   |   |   |   |   |   |   |   |   |XXX
       |   |___|   |   |   |   |   |   |   |   |___|   |XXX
       |   |   |   |   |___|___|   |   |   |   |   |   |XXX
       |   | . . |   |___|   |   |   |   | . |  . |   |XXX
       | 2 | . |   |___|   |   |   |   |   |   |   |XXX
       |   |   |   |   |   | . |   |   |   |   |   |XXX
       | . | . |   | . |   | . |   |   |   |   |   |XXX
       |   |   |   |   |   |   |   |   |   |   |   |XXX
       |   |   | . |   |   | . |   |   |   |   |XXX
       |   |   | . |   |   |   |   |   |   | . |XXX
       |   |   |   |   |   |   |   |   |   |XXX
--------------------------------------------------------------------------------
 Config Exit Help Menu >next_page <prev_page Options Set_rate Write !
```
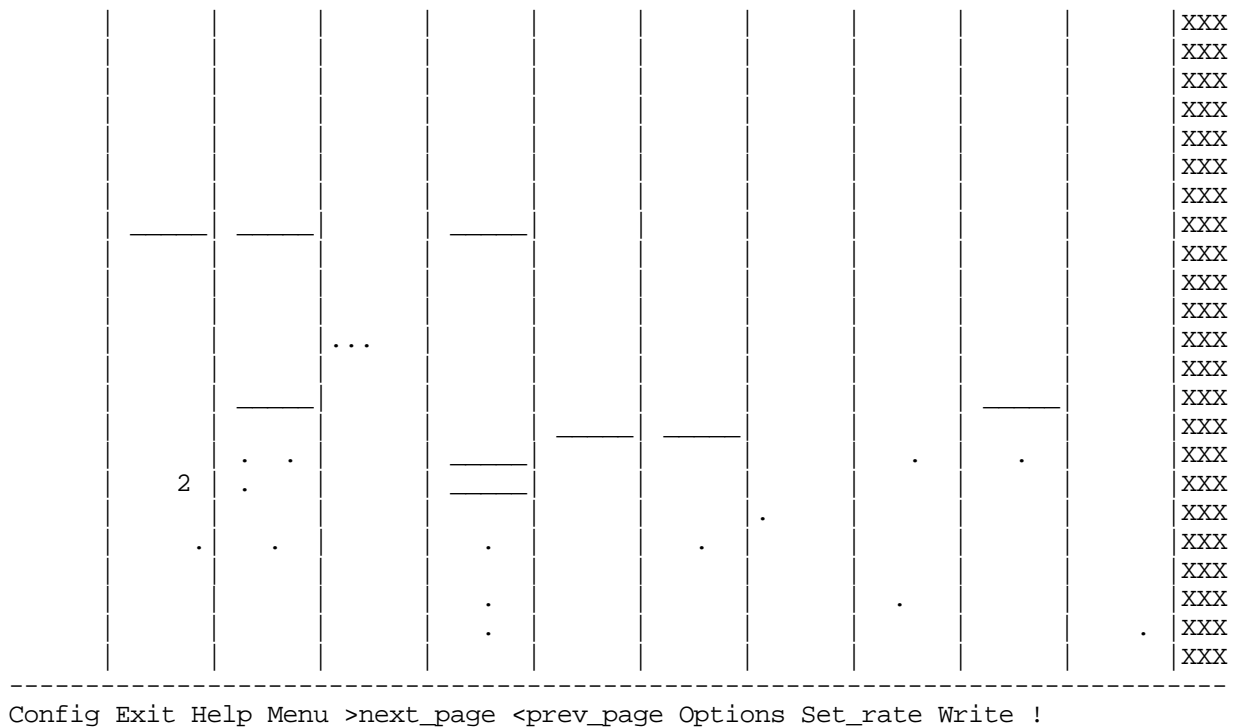
Space (" ")   A page with a share-count less than the display-threshold.

Dot (.)   A page with a share-count identical to the display-threshold.

Digit from 2 through 9   A page with share-count that exceeds the display-threshold but is less than ten, identified by the respective digit.

Asterisk (*)   A page with share-count that exceeds the display-threshold by 10 or more.

Underscore (_)   Inadmissible pages are marked using the underscore character and can be ignored. For example, a SPAM page always resides in its own buffer, such that there are no other pages in the buffer.

<div style="float:left; width:33%;">

ON-SCREEN MENU
OPTIONS

</div>

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Options

This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

SCREEN
INFORMATION

✔ As a general measure of global buffer pool utilization when using the default display-threshold, a display containing a lot of blanks is not good; this probably indicates that the global buffer pool is sized too large for the current number of users accessing the database. A display containing a lot of dots (**.**) is not good since this indicates non-sharing of pages; this probably indicates that local buffers might be a better choice. A display containing a lot of numeric digits is good, since this indicates good page sharing. A display containing a lot of asterisks (*) is very good, since this indicates tremendous page sharing.

Page Navigation

This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support

This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support

This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen

This screen does <u>not</u> have a zoom screen.

CONFIGURATION
OPTIONS

You can use the "Config" menu option to filter the "GB Utilization" screen. Select this option, by typing the letter "**C**", to display the configuration sub-menu.

The configuration sub-menu contains a single option:

Filter Utilization Display

Selecting this option will display the prompt "Enter global buffer threshold (1+) [current=1]: ". The threshold indicates the number of users sharing a page to be displayed; for instance, if you entered "5" then only those pages being accessed by 5 or more users will be displayed. Also, those pages shared by exactly 5 users would be identified using a dot (**.**) and those more than 5 would be identified using the digits 6 through 9 or the asterisk (*) if more than nine users are sharing a page.

GB Hot Page Information Screen

This screen displays a list of the "hottest", or most heavily shared, pages in the global buffer pool.

The list of hot pages can be sorted in several different ways, such as descending shared frequency and ascending storage area and page number sequence, or descending version number, which represents modification hotness.

Since there can be many times more hot pages than displayable geography, this screen contains multiple pages. Use the left angle bracket < key to go to the previous page and the right angle bracket > key to go to the next page of the screen.

The sorting sequence ensures that "page 1" contains the set of "hottest" pages while "page n" contains the coldest pages, based on the sort order.

This screen is not saved in the binary output file and cannot be selected during binary file replay.

SCREEN LOCATION

This screen resides in the "Global Buffer Information" menu.

The following is an example of the "GB Hot Page Information" screen:

```
Node: BONZAI (1/1/2)    Oracle Rdb X7.0-00 Perf. Monitor 30-JAN-1998 15:14:52.25
Rate: 1.00 Second              GB Hot Page Information          Elapsed: 01:43:29.46
Page: 1 of 3    KODH$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1    Mode: O nline
--------------------------------------------------------------------------------
Starea:Page.No  #Users   Version#  CkptVno:CkptVbn  Xfr (Sorted by frequency)
      5    1550       2       40        0        0
      1     486       1      106        0        0
      1     605       1       37        0        0
      1     626       1       20        0        0
      5       1       1      556        0        0
      5      86       1       24        0        0
      5      87       1       26        0        0
      5      88       1       25        0        0
      5      89       1       25        0        0
      5      90       1       23        0        0
      5      91       1       23        0        0
      5     114       1       22        0        0
      5     218       1      547        0        0
      5     435       1      586        0        0
      5     484       1       27        0        0
      5     487       1       27        0        0
      5     503       1       27        0        0
      5     511       1       25        0        0
      5     515       1       26        0        0
      5     528       1       26        0        0
--------------------------------------------------------------------------------
Config Exit Help Menu >next_page <prev_page Options Set_rate Write !
```

Starea:PageNo   This field identifies the storage area number and the page number in that storage area

#Users   This field indicates the number of users sharing the page

Version#   This field indicates the number of times the page has been modified

CkptVbn   This field indicates the page's current checkpoint VBN. This field is not generally useful.

XIP   This field indicates whether or not the page is being transferred to another user when an asterisk (*) is displayed; this is almost never indicated since the actual page transfer occurs extremely quickly.

Sort option   This heading line indicates the selected sort option. Use the "Config" on-screen menu option to select different sort options.

ON-SCREEN MENU
OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

SCREEN
INFORMATION

✔ Oracle recommends using a screen refresh rate of at least three seconds when viewing this screen. The global buffer information is very dynamic and constantly changing; therefore, a larger refresh rate provides a more stable view of the "stable state" global buffer pool status.

Page Navigation   This screen does not contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support   This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support   This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen   This screen does not have a zoom screen.

CONFIGURATION
OPTIONS

You can use the "Config" menu option to filter the "GB Hot Page Information" screen. Select this option, by typing the letter "**C**", to display the configuration sub-menu.

The configuration sub-menu contains the following options:[12]

Unsorted display   This option indicates that the display is not sorted, and will be displayed in no particular order. This option is useful when the sorted display is difficult to migrate, as can occur with an extremely large number of global buffers.

Sort by frequency   This option sorts the hot page information by sharing frequency. This option is useful for displaying the most frequently shared pages.

Sort by version number   This option sorts the hot page information by modification frequency. This option is useful for displaying the most frequently modified pages that remain in the global

---

[12] Available in Oracle Rdb 7.0.2.0. Prior to Oracle Rdb 7.0.2.0, the "GB Hot Page Information" screen was always sorted by sharing frequency.

buffer pool. Once a modified page is flushed from the buffer pool, its version number will be reset to "0" if it is subsequently refetched.

Sort by ascending DBKEY   This option sorts the hot page information in ascending DBKEY order. This option is useful for simply displaying the hot page information without regards to sharing or modification frequency.

Sort by descending DBKEY   This option sorts the hot page information in descending DBKEY order. This option is useful for simply displaying the hot page information without regards to sharing or modification frequency.

GB Frequency Screen

This screen graphically displays, in general terms, the effectiveness of the global buffer pool for sharing of database pages.

The histogram graphically displays the number of processes referencing each page in the global buffer pool. Because of the limited space on the histogram, each asterisk (*) may represent more than one page; the actual number of pages represented is identified in the footer information.

This screen is not saved in the binary output file and cannot be selected during binary file replay.

Note that the "GB Frequency" screen does not contain a numeric display format.

SCREEN LOCATION

This screen resides in the "Global Buffer Information" menu.

SCREEN EXAMPLE

The following is an example of the "GB Frequency Information" screen:

```
 Node: BONZAI (1/1/2)    Oracle Rdb X7.0-00 Perf. Monitor 30-JAN-1998 15:14:58.76
 Rate: 1.00 Second           GB Frequency Information         Elapsed: 01:43:35.97
 Page: 1 of 1    KODH$:[DB_HOMEDIR.WORK.STATS]MF_PERSONNEL.RDB;1    Mode: Online
 -------------------------------------------------------------------------------
 Total Global Buffers =          2000  Maximum Global Buffer Pages =     12000
 Number of Unused buffers =      1549        Number of Active pages =      2636
 Number of Unused Pages =        2561      Number of Unshared Pages =        61
         Scaled distribution of global buffer utilization (sharing)
 +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+---+
 *****|    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |
 *****|    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |
 *****|    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |
 *****|    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |
 *****|    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |
 *****|    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |
 *****|    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |
 *****|    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |
 *****|    |    |    |    |    |    |    |    |    |    |    |    |    |    |   |
 *******   *    *    *    |    |    |    |    |    |    |    |    |    |    |   |
 +----+----+----+----+----+----+----+----+----+----+----+----+----+----+----+---+
 0....1....2....3....4....5....6....7....8....9....10...11...12...13...14...15+++
                   (Each "*" represents 52 pages)
 -------------------------------------------------------------------------------
 Exit Help Menu >next_page <prev_page Options Set_rate Write !
```

SCREEN FIELDS

Total Global Buffers   This field indicates the total number of buffers in the database global buffer pool.

Maximum Global Buffer Pages   This field indicates the maximum number of pages that can reside in the global buffer pool. The actual number of pages may be less than this value because of different page sizes for different storage areas.

Number of Unused Buffers   This field indicates the number of buffers that are completely empty and do not contain ANY pages. This field should always display the value "0"; any other value indicates that the global buffer pool may be sized too large for the currently running application.

Number of Active Pages   This field indicates the actual number of pages contained in the global buffer pool; this value will probably be less than the "Maximum Global Buffer Pages" field. Active pages can include unreferenced pages.

Number of Unused Pages   This field indicates the number of pages in the global buffer pool that are not currently referenced by any process.

Number of Unshared Pages   This field indicates the number of pages in the global buffer pool referenced by exactly one process.

ON-SCREEN MENU OPTIONS

This section discusses the on-screen menu options available to this screen. Remember that the Exit, Help (**?**), Menu, Set_rate, Write and (**!**) on-screen menu options are available on all screens unless otherwise noted.

Options   This on-screen menu option displays a menu containing options for writing all of the screens to a text file named STATISTICS.RPT. This option should be used with care because it generates a very large output file.

SCREEN INFORMATION

✓ The message "(Each "*" represents *n* pages)" applies to all but the last "*" in each column. The last asterisk may contain up to the specified number of pages, but often contains less. In the above example, there are two asterisks in the "1... ." column. Since each star represents 52 pages, you might think there are 104 unshared pages (since we are examining the "1... ." column this is the number of pages shared by one process only - hence, unshared). However, from the screen header we can see that there are actually only 61 unshared pages. Therefore, the last asterisk in the "1... ." column represents only nine pages.

✔ The "*" in the "0... 1" column represents unused data pages. A high number of asterisks in this column could be indicative that you have specified too many global buffers, or specified a too-small allocate set for each user.

✔ Ideally, you want to have as many asterisks as possible in the right-most columns, and as few asterisks as possible in the left-most column.

Page Navigation This screen does <u>not</u> contain multiple pages of information and, therefore, does not contain any special navigation keystrokes.

Binary File Support This screen is available during replay of a binary file specified by the INPUT qualifier.

ster Statistic Collection Support This screen is integrated into the "Cluster Statistic Collection" facility.

Zoom Screen This screen does <u>not</u> have a zoom screen.

CONFIGURATION OPTIONS

This screen does <u>not</u> have any configuration options.

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