



Historical Server User's Guide

**Adaptive Server Enterprise  
Monitor™**

15.0

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# About This Book

*Adaptive Server Enterprise Monitor™ Historical Server User's Guide* describes how to use Sybase® Adaptive Server Enterprise Monitor™ Historical Server version 12.5.1 (Historical Server). Historical Server is a Sybase Open Server™ application that obtains performance statistics on Sybase SQL Server™ version 11.0 and Adaptive Server Enterprise version 11.5 and later.

## **Audience**

This book is for people responsible for:

- Configuring and managing Historical Server
- Using Historical Server to monitor Adaptive Server performance

## **How to use this book**

This book contains the following chapters:

- Chapter 1, “Introduction” provides an overview of Adaptive Server Enterprise Monitor and presents some basic Historical Server concepts.
- Chapter 2, “Configuring Historical Server” describes how to complete an initial Historical Server configuration or change a configuration, for both UNIX and Windows NT platforms.
- Chapter 3, “Starting and Stopping Historical Server” describes how to start and stop Historical Server on both UNIX and Windows NT platforms.
- Chapter 4, “Command Reference” describes the isql command interface to Historical Server.
- Chapter 5, “Data Files and Output Options” describes the files that Historical Server creates and how to access the data in them, including how to use the bcp utility to load the data into Adaptive Server tables.
- Appendix A, “Data Items” provides descriptions of the data items available through Historical Server.
- Appendix B, “Specifications for Defining Recording Session Views” describes valid combinations of data item names and statistic types for defining recording session views.

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- Appendix C, “Specifications for Defining Playback Views” describes valid combinations of data item names and statistic types for defining playback session views.
  - Appendix D, “Examples of Recording Session Views” provides examples of recording session views.

#### **Related documents**

The following documents comprise the Sybase® Adaptive Server® Enterprise documentation set:

- The release bulletin for your platform – contains last-minute information that was too late to be included in the books.  

A more recent version of the release bulletin may be available on the World Wide Web. To check for critical product or document information that was added after the release of the product CD, use the Sybase Technical Library.
- The *Installation Guide* for your platform – describes installation, upgrade, and configuration procedures for all Adaptive Server and related Sybase products.
- *What’s New in Adaptive Server Enterprise?* – describes the new features in Adaptive Server version 12.5.1, the system changes added to support those features, and the changes that may affect your existing applications.
- *ASE Replicator User’s Guide* – describes how to use the ASE Replicator feature of Adaptive Server to implement basic replication from a primary server to one or more remote Adaptive Servers.
- *Component Integration Services User’s Guide* – explains how to use the Adaptive Server Component Integration Services feature to connect remote Sybase and non-Sybase databases.
- *Configuring Adaptive Server Enterprise* for your platform – provides instructions for performing specific configuration tasks for Adaptive Server.
- *EJB Server User’s Guide* – explains how to use EJB Server to deploy and execute Enterprise JavaBeans in Adaptive Server.
- *Error Messages and Troubleshooting Guide* – explains how to resolve frequently occurring error messages and describes solutions to system problems frequently encountered by users.
- *Full-Text Search Specialty Data Store User’s Guide* – describes how to use the Full-Text Search feature with Verity to search Adaptive Server Enterprise data.



- *Glossary* – defines technical terms used in the Adaptive Server documentation.
- *Historical Server User's Guide* – describes how to use Historical Server to obtain performance information for SQL Server<sup>®</sup> and Adaptive Server.
- *Java in Adaptive Server Enterprise* – describes how to install and use Java classes as data types, functions, and stored procedures in the Adaptive Server database.
- *jConnect for JDBC Programmer's Reference* – describes the jConnect<sup>™</sup> for JDBC<sup>™</sup> product and explains how to use it to access data stored in relational database management systems.
- *Job Scheduler User's Guide* – provides instructions on how to install and configure, and create and schedule jobs on a local or remote Adaptive Server using the command line or a graphical user interface (GUI).
- *Monitor Client Library Programmer's Guide* – describes how to write Monitor Client Library applications that access Adaptive Server performance data.
- *Monitor Server User's Guide* – describes how to use Monitor Server to obtain performance statistics from SQL Server and Adaptive Server.
- *Performance and Tuning Guide* – is a series of four books that explains how to tune Adaptive Server for maximum performance:
  - *Basics* – the basics for understanding and investigating performance questions in Adaptive Server.
  - *Locking* – describes how the various locking schemas can be used for improving performance in Adaptive Server.
  - *Optimizer and Abstract Plans* – describes how the optimizer processes queries and how abstract plans can be used to change some of the optimizer plans.
  - *Monitoring and Analyzing* – explains how statistics are obtained and used for monitoring and optimizing performance.
- *Quick Reference Guide* – provides a comprehensive listing of the names and syntax for commands, functions, system procedures, extended system procedures, datatypes, and utilities in a pocket-sized book.
- *Reference Manual* – is a series of four books that contains the following detailed Transact-SQL<sup>®</sup> information:

- 
- *Building Blocks* – Transact-SQL datatypes, functions, global variables, expressions, identifiers and wildcards, and reserved words.
  - *Commands* – Transact-SQL commands.
  - *Procedures* – Transact-SQL system procedures, catalog stored procedures, system extended stored procedures, and dbcc stored procedures.
  - *Tables* – Transact-SQL system tables and dbcc tables.
  - *System Administration Guide* – provides in-depth information about administering servers and databases. This manual includes instructions and guidelines for managing physical resources, security, user and system databases, and specifying character conversion, international language, and sort order settings.
  - *System Tables Diagram* – illustrates system tables and their entity relationships in a poster format. Available only in print version.
  - *Transact-SQL User's Guide* – documents Transact-SQL, Sybase's enhanced version of the relational database language. This manual serves as a textbook for beginning users of the database management system. This manual also contains descriptions of the pubs2 and pubs3 sample databases.
  - *Using Adaptive Server Distributed Transaction Management Features* – explains how to configure, use, and troubleshoot Adaptive Server DTM features in distributed transaction processing environments.
  - *Using Sybase Failover in a High Availability System* – provides instructions for using Sybase's Failover to configure an Adaptive Server as a companion server in a high availability system.
  - *Utility Guide* – documents the Adaptive Server utility programs, such as isql and bcp, which are executed at the operating system level.
  - *Web Services User's Guide* – explains how to configure, use, and troubleshoot Web Services for Adaptive Server.
  - *XA Interface Integration Guide for CICS, Encina, and TUXEDO* – provides instructions for using the Sybase DTM XA interface with X/Open XA transaction managers.
  - *XML Services in Adaptive Server Enterprise* – describes the Sybase native XML processor and the Sybase Java-based XML support, introduces XML in the database, and documents the query and mapping functions that comprise XML Services.

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- 3 Select a product.
- 4 Specify a time frame and click Go.
- 5 Click the Info icon to display the EBF/Maintenance report, or click the product description to download the software.

**Conventions used in this manual**

The following table describes the style conventions used in this manual.

| Description  | Examples                                   |
|--|--|
| Command names, command parameters, and other keywords appear in the text in Helvetica typeface.                  | The <code>-S</code> parameter is required. |
| Variables, file names, path names, and Adaptive Server table names appear in the text in <i>italic</i> typeface. | <code>-<i>Username</i></code>              |

| Description  | Examples  |
|--|---|
| User input appears in Courier typeface.  | <code>isql -Usybase -Psa<br/>-Sserver1</code>         |
| Computer output, such as error messages and command output, appears in Courier typeface.   | <code>Unable to attach with<br/>shared memory.</code> |
| Brackets indicate that the enclosed item is <i>optional</i> . Do not type the brackets.  | <code>[no_wait]</code>                                |
| Curly braces indicate that you must choose at least one of the enclosed options. Do not type the braces.                         | <code>{0,1}</code>                                    |
| Ellipses indicate that you may repeat the preceding item multiple times in the command. Do not include ellipses in your command. | <code>[, dataItemName, dataItemStat]. . .</code>      |

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The online help for this product is also provided in HTML, which you can navigate using a screen reader.

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| Description of Adaptive Server Enterprise Monitor | 1           |
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## Description of Adaptive Server Enterprise Monitor

Adaptive Server Enterprise Monitor™ (Adaptive Server Monitor) provides a way to monitor Adaptive Server performance in real time or in a historical data-gathering mode. System administrators can use this information to identify potential resource bottlenecks, to research current problems, and to tune for better performance. Adaptive Server Monitor provides feedback for tuning at several levels:

- Adaptive Server configuration
- Database design
- SQL statements in applications and stored procedures

## Adaptive Server Monitor components

Adaptive Server Monitor consists of four components that gather or display Adaptive Server performance data:

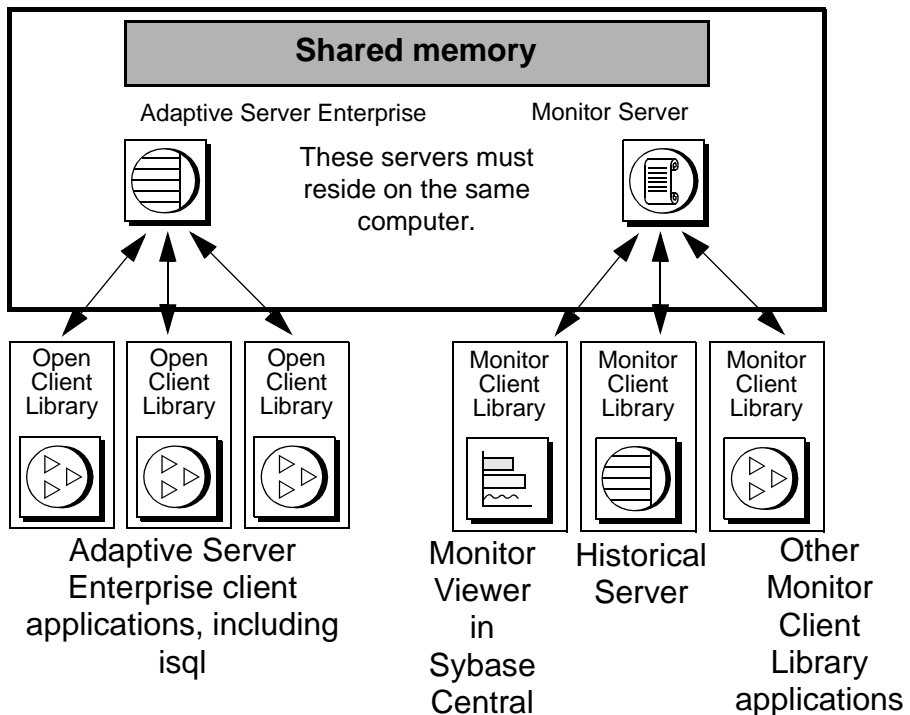
- Adaptive Server Enterprise Monitor Server (Monitor Server) – this server collects Adaptive Server performance data in real time and makes the data available to the other Adaptive Server Monitor components. Monitor Server is a Sybase Open Server application.
- Adaptive Server Enterprise Monitor Historical Server (Historical Server) – this server obtains Adaptive Server performance data from Monitor Server and saves the data in files for deferred analysis. Historical Server is a Sybase Open Server application.

- Monitors in the Adaptive Server Enterprise plug-in for Sybase Central™ (Monitor Viewer) – the monitors obtain Adaptive Server performance data from Monitor Server and display the data in real time in tables and graphs.
- Adaptive Server Enterprise Monitor Client Library (Monitor Client Library) – this application programming interface (API) to Monitor Server and Historical Server is available to users for developing monitoring applications. Historical Server and the monitors in the Adaptive Server Enterprise plug-in for Sybase Central are Monitor Client Library applications.

## Adaptive Server Monitor architecture

Figure 1-1 shows the relationships between Adaptive Server and the various components of Adaptive Server Monitor.

**Figure 1-1: Adaptive Server and Adaptive Server Monitor components**





## Adaptive Server Enterprise Monitor architecture

Adaptive Server saves performance data in a shared memory area that Monitor Server reads. Because of this shared memory technique, Monitor Server must be installed and running on the same machine as the Adaptive Server being monitored. A one-to-one relationship exists between an Adaptive Server and a Monitor Server. For more information about Monitor Server, see the *Sybase Adaptive Server Enterprise Monitor Server User's Guide*.

Monitor Client Library applications obtain Adaptive Server performance statistics from Monitor Server. These applications are clients of Monitor Server. For performance reasons, Sybase recommends running Monitor Client Library applications on machines other than the ones where pairs of Adaptive Server and Monitor Server are running. See the *Sybase Adaptive Server Enterprise Monitor Client Library Programmer's Guide* for more information.

The Adaptive Server Enterprise plug-in for Sybase Central includes a set of monitors showing different aspects of Adaptive Server resource usage at various levels of detail. Each open monitor is a separate application, with a unique client connection to Monitor Server. In Sybase Central, each Adaptive Server installation has its own Monitors folder containing the set of monitor objects.

Historical Server collects performance information from Monitor Server and saves the information in files for deferred analysis. Historical Server interfaces let users specify the data to collect and the time period desired. They also include a historical data playback feature. The interfaces are:

- A command interface in isql. For more information, see the *Sybase Adaptive Server Enterprise Monitor Historical Server User's Guide*.
- A programming interface using Monitor Client Library. For more information, see *Sybase Adaptive Server Enterprise Monitor Client Library Programmer's Guide*.

## Historical Server concepts

This section describes the following Historical Server concepts:

- Recording sessions
- Playback sessions
- Views
- Data items and statistic types

## Recording sessions

Recording sessions gather Adaptive Server performance data and store it in files for later analysis. Some attributes of a recording session are:

- Monitor Server name – by association, this defines the Adaptive Server whose performance you are monitoring.
- Sample interval – this attribute defines how often to collect performance data.
- Views, alarms, and filters – views and filters define the data you want to collect. Alarms define actions that can occur when a specified data item hits a predefined threshold value.
- Start time and end time – these specifications define the time period during which you want to collect the data.

To create a recording session, use a sequence of commands in the Historical Server isql command interface:

- `hs_create_recording_session`
- `hs_create_view`
- `hs_create_filter` (optional)
- `hs_create_alarm` (optional)
- `hs_initiate_recording`

When you create a recording session, Historical Server assigns it a session ID. You can list the session IDs of defined recording sessions using the `hs_list` command. `hs_list` can also show the complete recording session definition, including view names and the data items, alarms, and filters in the view.

Historical Server stores these recording session definitions in its control file, which resides in the Historical Server home directory. Therefore, `hs_list` can see only recording session definitions that were created by Historical Server instances using the same home directory that the current Historical Server is using. See “Configuring multiple instances of Historical Server” on page 23 for more information on configuring Historical Server home directories.

To examine the data gathered by a recording session, you can:

- Populate Adaptive Server tables with the data from recording sessions by using the Sybase bulk copy (bcp) utility. See “Bulk copy example” on page 97 for more information.
- Initiate a Historical Server playback session.

## Playback sessions

Playback sessions let you retrieve the data gathered during one or more recording sessions. You can play back data in two forms:

- Playback to a client – the results of the playback are sent to the user, who can view the results on the terminal or redirect them to a file.
- Playback to a file – the results of the playback are stored in a file. The resulting files are essentially a new recording session. You can use these files as input to yet another playback session, or as input to the `bcp` utility to populate Adaptive Server tables, or any other way that you would use recording session files.

The following attributes define a playback session:

- Input recording sessions – the input to a playback session is one or more recording sessions.
- Views, start time, and end time – these attributes define the data from the input recording sessions that you want to include in the playback session.
- Summarization level – you can specify raw playback, which shows you exactly what was recorded, or you can specify various summarization levels.

To create a playback session, use the following sequence of commands from the Historical Server command interface:

- `hs_create_playback_session`
- `hs_create_playback_view`
- `hs_initiate_playback`
- `hs_playback_sample` (used only for playback to a client)
- `hs_terminate_playback`

## Views

A recording session view defines the performance data you want Historical Server to gather. A playback session view defines which performance data from a recording session view you want Historical Server to play back.

A view consists of a view name and one or more data items. Each data has a statistic type associated with it. See “Data items and statistic types” on page 6 for more information.

When you define a recording session, you define one or more views to be included in that recording session. A recording session must have at least one view. For more information about creating recording session views, see `hs_create_view` on page 71.

Appendix D, “Examples of Recording Session Views” contains many sample recording session views.

When you define a playback session, you define which views in the previously defined recording sessions should be included in the playback session. The playback session view names must be the same as the names used for the recording sessions views. You can include all data items or a subset of the data items from the recording session view in the corresponding playback view. For more information about creating playback views, see `hs_create_playback_view` on page 67.

## Data items and statistic types

A **data item** identifies specific information that you want to include in the view. If a data item includes embedded spaces, you must surround the name with quotation marks when you use it. Some sample data items are: Page I/O, Login Name, and CPU Time.

Table A-1 on page 107 lists all available data items and describes each one.

Each data item has a **statistic type** associated with it. The statistic type defines the duration of the data item (sample or session) and whether Historical Server performs calculations on the data item.

The statistic types contain embedded spaces. You must surround them with quotation marks when you use them in the Historical Server commands.

Not all statistic types are valid with all of the data items. Table B-3 on page 152 shows valid statistic types for each data item.

The six statistic types are:

- “Value for Sample” – this statistic type returns a count of activity or some type of information that applies to the most recent sample interval. It implies no calculations.
  - Activity Counts – for data items that represent activity counts, this statistic type returns the number of occurrences of an activity during the most recent sample interval. For example, Value for Sample for Page I/O is the number of page I/Os that occurred during the most recent sample interval.

- Other information – this is the only statistic type valid for data items that represent character strings. For example, Value for Sample for Object Name returns the name of a table. This statistic type is also the only one valid for data items that represent values such as IDs and values for configured parameters, such as Process ID and Code Memory Size.
- “Value for Session” – this statistic type returns a cumulative count of activity since the start of gathering the data (since the connection was opened). No calculations are performed. For example, Value for Session for Page I/O is the number of page I/Os that occurred since the recording session started.
- “Rate for Sample” – this statistic type calculates a rate per second. It returns the average number of occurrences per second of an activity during the most recent sample interval. For example, Rate for Sample for Page I/O is the average number of page I/Os that occurred each second during the most recent sample interval.

The calculation is:

$$\frac{\text{Count for the most recent sample interval}}{\text{Number of seconds in the sample interval}}$$

- “Rate for Session” – this statistic type calculates a rate per second. It returns the average number of occurrences per second of an activity during the current recording session. For example, Rate for Session for Page I/O is the average number of page I/Os that occurred per second since the recording session started.

The calculation is:

$$\frac{\text{Count for the session}}{\text{Number of seconds in the session}}$$

- “Average for Sample” – this statistic type calculates an average value per occurrence of an activity over the most recent sample interval. Only a few data items can use this statistic type. The meaning of the returned value depends on the data item. For example, Average for Sample for Procedure Elapsed Time is the average execution time per execution of a stored procedure during the most recent sample interval.

- “Average for Session” – this statistic type calculates an average value per occurrence of an activity over the session. Only a few data items can use this statistic type. The meaning of the returned value depends on the data item. For example, Average for Session for Procedure Elapsed Time is the average execution time per execution of a stored procedure during the recording session.

Table B-3 on page 152 shows valid combinations of data items and statistic types.

| <b>Topic</b>  | <b>Page</b> |
|---|-------------|
| Historical Server configuration concepts            | 9           |
| Initial configuration on UNIX platforms             | 12          |
| Initial configuration on Windows platforms          | 15          |
| Setting Historical Server start-up parameters       | 20          |
| Configuring multiple instances of Historical Server | 23          |

## Historical Server configuration concepts

This section describes concepts that you should understand before configuring Historical Server including:

- The Historical Server control file and home directory
- The operating system start-up account
- The Historical Server superuser account

### The Historical Server control file and home directory

The Historical Server control file maintains information about recording sessions that users create. This information persists across start-ups, so users can access recording sessions that they created during previous executions of Historical Server. The control file restricts user access to private recording session files. (Recording session files can have public or private access.)

The Historical Server home directory is important for two reasons:

- It contains the Historical Server control file. When Historical Server starts, it looks for a control file in the home directory. If a control file does not exist, Historical Server creates it.

- It is the default directory location for the data files that Historical Server writes during recording sessions. The users who create the recording sessions can override this default location.

The `-D` parameter in the Historical Server start-up command specifies the home directory location. This is a required parameter.

The current execution of Historical Server can access data files from previous executions only if the current execution is using the same control file, in the same home directory, as the previous executions were using. Therefore, in most cases, you should not change the Historical Server home directory between start-ups. See “Configuring multiple instances of Historical Server” on page 23 for a discussion about using different home directories.

For more information about the files created by Historical Server, see Chapter 5, “Data Files and Output Options.”

## Accessing control file information

Use the Historical Server `hs_list` command to gain access to the information in the Historical Server control file.

## Do not edit the control file

Do not edit the control file. You might inadvertently corrupt it. Regardless of the editor you use, do not open and then save this file.

This is true especially if Historical Server is running on Windows NT. Unlike the other files created by Historical Server, the control file is not a standard-format Windows NT text file. Lines of text in the control file are terminated only with newline characters, rather than the usual carriage-return/newline pairs. The editing program may corrupt the file by embedding unwanted carriage-return/newline pairs into the text.

## The operating system start-up account

The account that starts Historical Server must satisfy these conditions:

- The same account must start Historical Server each time.



The operating system account that starts Historical Server the first time, when Historical Server creates the control file, is the only account that has subsequent access to that control file. The same account must perform all subsequent start-ups of Historical Server using the same home directory, to gain access to the control file. This restriction prevents unauthorized reading and modification of Historical Server files.

A different account can start Historical Server if the start-up command specifies a different home directory. In the new location, if no control exists, Historical Server creates one. The recording session data files in a home directory are not visible to a Historical Server using a different home directory.

- The account must have search (execute) and write access to the Historical Server home directory specified in the start-up command.
- The account must have search (execute) and write access to the locations of recording session data files, as specified by users who create recording sessions. The default location is the Historical Server home directory, but users can override that default on a session-by-session basis when they create recording sessions.

## The Historical Server superuser account

The `-U` parameter in the Historical Server start-up command can optionally specify a superuser for Historical Server. If this parameter is specified, the superuser can:

- Shut down Historical Server
- View or delete any historical data files

If the start-up command does not include the `-U` parameter, any user may stop Historical Server, but no user has unrestricted access to historical data files.

## Sybase Open Client/Server connections

Historical Server establishes client/server connections using either *interfaces* files (the *interfaces* file on UNIX; *sql.ini* file on Windows NT) or a directory service, as supported by Sybase Open Client/Server version 11.1.x.

The advantage of using a directory service is that you do not need to update the *interfaces* or *sql.ini* files on all of the client machines. A single directory service entry replaces these files. Changes such as moving a server to a new address or changing the server name are easier to administer.

See *Open Client/Server Configuration Guide for UNIX* or *Open Client/Server Configuration Guide for Desktop Platforms* for more information.

## Initial configuration on UNIX platforms

This section describes how to configure Historical Server on UNIX platforms.

### Assumptions on UNIX platforms

The instructions in this section are based on the following assumptions:

- Historical Server software was unloaded from the delivery media using the instructions provided with the delivery media.
- An Adaptive Server/Monitor Server pair is configured on your network.

### Configuration procedures on UNIX platforms

To configure Historical Server on a UNIX platform:

- 1 Set the \$SYBASE environment variable to the value of the Sybase installation directory where you unloaded Historical Server.
- 2 Log on using the “sybase” account or another account that has read, write, and search (execute) permissions on the \$SYBASE directory.
- 3 Set the \$PATH environment variable.

The Historical Server executable resides in *\$SYBASE/bin*. Add this path name to the \$PATH environment variable for the account that will start Historical Server.

- 4 Create a script file for Historical Server start-up.

A script file ensures that correct parameters are used for each Historical Server start-up. The script file contains the Historical Server start-up command, `histserver`, and its parameters.

To create a Historical Server script file:

- a Using any editor, create a new file. The recommended name and location for the new file is:

```
install_dir/install/run_histServerName,
```

where *histServerName* is the name of the Historical Server.

- b Edit the new file, inserting the `histserver` command and supplying parameters and values appropriate to your installation. Do *not* use carriage returns within the command; use the UNIX continuation character (`\`) to continue the command on multiple lines. Spaces between a parameter and its value are optional.

Table 2-1 on page 21 describes the command and its parameters. The parameters marked “required” in the table must appear in the script file. The ones with default values may be omitted if the default values are acceptable.

A sample script file for starting Historical Server follows:

```
histserver -Dserver1HistDir -Sserver1Hist \
  -Usa -PsaPasswd \
  -lserver1HistLog -n15 &
```

- c Use the `chmod` command to give the account that will start Historical Server execute permission on the script file.
- 5 Add connectivity information for Historical Server.

This task assigns a port or network address to Historical Server. It also ensures that Historical Server can connect to one or more Adaptive Server/Monitor Server pairs.

Add Historical Server connection information either to the *interfaces* files or to a directory service. See *Open Client/Server Configuration Guide for UNIX* for information on `dsedit`, `dscp`, `dsedit_dce`, and `dscp_dce`.

If you are relying on *interfaces* files for making client/server connections:

- a Check the server listings in the *interfaces* file used by Historical Server. For Historical Server to run, this file must contain entries for *all* of the following servers:
  - Any Adaptive Server you want to monitor

- A Monitor Server paired with each Adaptive Server
  - Historical Server
- b Use either `dsedit` (if your system is running X-Windows) or `dscp` (a command line utility) to add entries to an *interfaces* file. Follow the instructions in *Open Client/Server Configuration Guide for UNIX*. To add these entries, you must know the:
- Monitor Server and Adaptive Server names to which you want Historical Server to connect.
  - Port numbers or network addresses assigned to these servers when they were configured. To research this information, use `dsedit` or `dscp` on the machine where a server was configured to examine the appropriate *interfaces* file.

If you are relying on a directory service for making client/server connections:

- Make sure that the *libtcl.cfg* file on the machine where Historical Server was installed points to the appropriate directory service. Use an editor to check and update *libtcl.cfg* files.
- Add Historical Server to the directory service, using `dsedit_dce` (if your system is running X-Windows) or `dscp_dce` (a command line utility). You need to know the Historical Server name to complete this step.

## 6 Configure Historical Server on client machines.

This task enables clients to connect to Historical Server. Historical Server clients are users who create recording sessions or playback sessions. Each client machine must be configured appropriately.

See *Open Client/Server Configuration Guide for UNIX* for instructions on using `dsedit` and `dscp`.

If you are relying on *interfaces* files for making client/server connections:

- a Update *all* of the *interfaces* files used by Historical Server clients. The client *interfaces* files must contain entries for:
- Historical Server
  - Any Adaptive Server that you want to monitor through Historical Server
  - Monitor Server associated with each Adaptive Server listed

- b Use `dsedit` (if your system is running X-Windows) or `dscp` (a command line utility) to add entries to an *interfaces* file. To add these entries, you must know the following information:
- Historical Server name.
  - Monitor Server and Adaptive Server names that you want Historical Server to connect to.
  - Port numbers or network addresses assigned to these servers when they were configured. To research this information, use `dsedit` or `dscp` on the machine where a server was configured to examine the appropriate *interfaces* file.

If you are relying on a directory service for making client/server connections, make sure that the *libtcl.cfg* file on *all* Historical Server client machines points to the appropriate directory service. Use a text editor to check and update *libtcl.cfg* files.

## Initial configuration on Windows platforms

This section describes how to configure Historical Server on Windows machines. It includes the following topics:

- Assumptions on Windows
- Results of installation on Windows
- Configuration procedures on Windows

### Assumptions on Windows

These procedures assumes that:

- The Historical Server software was loaded from the delivery media, using the instructions provided with the delivery media.
- An Adaptive Server/Monitor Server pair is configured on your network.

## Results of installation on Windows

On the Windows platform, the Sybase installation process performs a nearly complete installation of Historical Server. The installation process:

- Copies Historical Server files to the Sybase installation directory.
- Adds parameter values for the Historical Server start-up command to the NT Registry. It uses default values for these parameters. The entries are under:

```
\\HKEY_LOCAL_MACHINE\SOFTWARE\SYBASE\SERVER\  
servername\Parameters
```

- Adds the new Historical Server to the list of services in the NT Registry. The entry is under:

```
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\  
Services
```

- Adds Historical Server connectivity information to the *sql.ini* file in the Sybase installation directory on the Historical Server machine.

## Configuration procedures on Windows

To complete Historical Server configuration:

- 1 Add connectivity information for Historical Server.

This task assigns a port or network address to Historical Server. It also ensures that Historical Server can connect to one or more Adaptive Server/Monitor Server pairs. Add connection information either to *sql.ini* files or to a directory service. See *Open Client/Server Configuration Guide for Desktop Platforms* for more information on any of the following procedures and on *ocscfg* or *dsedit*.

If you are relying on *sql.ini* files for making client/server connections, check the server listings in the *sql.ini* file. For Historical Server to run, this file must contain entries for *all* of the following servers:

- Any Adaptive Server you want to monitor.
- A Monitor Server paired with each Adaptive Server.

- Historical Server. Entries for Historical Server should exist, since the Sybase installation process adds them. However, since the Adaptive Server/Monitor Server pairs usually are running on a different machine from Historical Server, entries probably do not exist for them on the Historical Server machine. If this is the case, you must add entries for each Adaptive Server/Monitor Server pair to which Historical Server intends to connect.

Use `dsedit` to add entries to a *sql.ini* file. To add these entries, you must know the following information:

- Monitor Server and Adaptive Server names to which you want Historical Server to connect.
- Port numbers or network addresses assigned to these servers when they were configured. To research this information, use `dsedit` on the machine where a server is configured to examine the appropriate *sql.ini* or *interfaces* file.

---

**Note** The Adaptive Server name cannot be an alias name. It must be the name that Monitor Server knows it by. For example, use the value you used in the `-S` parameter in the Monitor Server start-up command.

If you edit a *sql.ini* file using a text editor instead of `dsedit`, make sure a carriage return exists at the end of the last line in the file.

---

If you are relying on a directory service for making client/server connections:

- Make sure that the *libtcl.cfg* file on the machine where Historical Server is installed points to the appropriate directory service. Use `ocscfg` to check and update *libtcl.cfg* files.
- Add Historical Server to the appropriate directory service, using `dsedit`. You must know the Historical Server name to complete this step. The default name created by the installation process is in the format *machineName\_hs*. For example, *smith\_hs*.

## 2 Configure Historical Server client machines.

This task enables clients to connect to Historical Server. Historical Server clients are users who create recording sessions or playback sessions. Each client machine must be configured appropriately.

If you are relying on *sql.ini* files for making client/server connections, then update *all* of the *sql.ini* files used by Historical Server clients. The client *sql.ini* files must contain entries for:

- Historical Server.
- The Monitor Server associated with each Adaptive Server listed.
- Any Adaptive Server that you want Historical Server to collect data for.

Use `dsedit` to add entries to a `sql.ini` file. To add these entries, you must know the following information:

- Historical Server name.
- Monitor Server and Adaptive Server names to which you want Historical Server to connect.
- Port numbers or network addresses assigned to these servers when they were configured. To research this information, use `dsedit` on the machine where a server was configured to examine the appropriate `sql.ini` file.

If you are relying on a directory service for making client/server connections, then make sure that the `libtcl.cfg` file on *all* Historical Server client machines points to the appropriate directory service.

Use `ocscfg` to check and update `libtcl.cfg` files.

### 3 Review start-up parameters in the NT Registry.

This task ensures that the default start-up parameter values that the installation process inserted into the NT Registry are suitable for your site.

When you start Historical Server using the Control Panel Services window, the server reads its start-up parameters from the NT Registry entry. If you start the server from a command line or by means of a batch file, Historical Server uses the start-up parameters from both the registry entry and from the command. If the same parameter appears in both places, the value specified in the command takes precedence over the value in the registry entry. If you do not specify any start-up parameters in the command, by default all of the NT Registry entry parameters are used.

## Changing start-up parameters

To change start-up parameters or to change the server name in the NT Registry:

- 1 Start the NT Registry Editor (`regedt32.exe`, usually in `winnt\system32`).
- 2 For NT 4.0, select the window named:

`\\HKEY_LOCAL_MACHINE`



or, for NT 3.5.1:

```
\\HKEY_USER
```

and select the correct user entry.

- 3 Save or print the existing settings before proceeding. From the registry menu, select the Save Subtree As command or the Print command.
- 4 In the tree view, highlight:

```
\SOFTWARE\SYBASE\Server\  
  svrName\Parameters
```

where *svrName* is the name of the server whose start-up parameters you want to change.

On the right side of the window, review the list of existing start-up parameters which appear in this format:

```
Argx, dataType, parameter
```

where:

- *x* is an integer in sequential order.
- *dataType* defines the type of data in the parameter value.
- *parameter* is a start-up option, preceded by a dash and followed by the parameter value.

An example containing the Historical Server -D, -U, and -P start-up parameters follows:

```
Arg0:REG_SZ:-Dc:\sybase\data\hs_data  
Arg1:REG_SZ:-Uhsuper  
Arg2:REG_SZ:-Pwdf
```

- 5 To add a new start-up parameter:
  - Select Edit | Add Value.
  - In the resulting dialog box, in the Value Name box, enter Arg*x* where *x* is the next integer not currently assigned.
  - From the Data Type drop-down list, choose REG\_SZ.
  - In the resulting String dialog box, enter the parameter and value.
- 6 To modify existing parameters:
  - Double-click the parameter line you want to change.
  - In the resulting String dialog box, change the entry.

- 7 From the Registry menu, choose Exit.

## Setting Historical Server start-up parameters

This section describes the Historical Server start-up command and parameters. The section applies to Historical Server running on both UNIX and NT platforms.

### Function

Starts Historical Server.

### Syntax

```
histserver -U<user name> -P<password> -D<output dir> -l<log file> -l<interfaces file> [-d<delimiter>] [-O<ASE name>] [-o<DATABASE name>] [-f] -u<output ASE user name> -p<outputASEpassword> [-m]
```

where:

- -O specifies the name in the interfaces file of the Adaptive Server that will be used to output the Historical Server monitoring data
- -o specifies the database name in which to store the monitoring data
- -u enters the login name for connecting to the output Adaptive Server
- -p enters the corresponding password for the output Adaptive Server
- -f specifies that you want to create output files, and is required even if you've already designated an output Adaptive Server
- -m indicates that parallel output mode should be used

The executable name is `histserver` on UNIX platforms and `histsrvr` on Windows NT.

### Parameters

Table 2-1 describes the parameters to the Historical Server start-up command.

**Table 2-1: Historical Server start-up parameters**

| Parameter   | Description   |
|---|---|
| <i>-DhomeDir</i>  | <p><b>Required.</b> This parameter specifies the home directory for this instance of Historical Server. The account that starts Historical Server must have read, write, and search (execute) permissions on the Historical Server home directory.</p> <p>The default home directory is the current working directory for the account that starts Historical Server.</p> <p>The control file used by this instance of Historical Server resides in the home directory. The control file contains information about past recording sessions and is updated during the current run as new recording sessions are established.</p> <p>The directory specified by this parameter is also the default directory into which historical data files are written during a recording session. The user who creates a recording session can override this default location without affecting the definition of the control file.</p> <p>Multiple instances of Historical Server can share the same home directory. See “Configuring multiple instances of Historical Server” on page 23 for more information.</p> <hr/> <p><b>Note</b> If any UNIX shell-specific characters, such as the C shell’s tilde (~), appear at the start of the directory’s name, you must separate the -D parameter and the directory name by one or more space characters. Otherwise, the shell cannot recognize that file name expansion is required.</p> |
| <i>-d delim</i>   | <p>Specify a default file delimiter for the view files that Historical Server generates. Delim can be:</p> <ul style="list-style-type: none"> <li>• A character. For example: <code>./histserver -d ' ' or ./histserver -d/</code></li> <li>• an escaped character. For example: <code>./histserver -d/'t'</code></li> <li>• A four digit hexadecimal number representing the ascii code of the delimiter. For example: <code>./histserver -d0x09</code></li> </ul>   |
| <i>-iinterfacesFile</i><br>(Upper or lower case “i” is valid after the dash.) | <p>Path name of the <i>interfaces</i> file to use. The file must contain connection information, including the correct names, for Historical Server and all Adaptive Server and Monitor Server pairs to which you want this Historical Server to connect. If you omit this parameter, the name and location of the default <i>interfaces</i> file is:</p> <p>UNIX: <code>\$\$SYBASE/interfaces</code></p> <p>NT: <code>SYBASE\sql.ini</code> (where <i>SYBASE</i> is the value of the <i>SYBASE</i> environment variable)</p>   |

| Parameter               | Description   |
|-------------------------|---|
| <i>-logFile</i>         | Path name of the log file in which information and error messages about the Historical Server are logged. The data collected includes start-up information, error messages, and possibly a record of alarms that were triggered. The default path name is <i>hs.log</i> in the current directory.   |
| <i>-UserName</i>        | <p>Name of Historical Server superuser. When the superuser logs in to Historical Server, that user is allowed to issue the shutdown command to terminate Historical Server, and to view or delete any data files created by Historical Server, regardless of the user who initiated the recording sessions.</p> <p>This user name is not required to correspond to either an Adaptive Server login account or to an operating system registration. See “The Historical Server superuser account” on page 11 for more information.</p> <p>If you do not specify this parameter, any user may stop Historical Server, but no user has unrestricted access to the Historical Server data files.</p>  |
| <i>-Ppassword</i>       | <p>Password of user specified with the <i>-U</i> parameter. A user who logs in to Historical Server must supply this <i>username</i> and <i>password</i> to exercise Historical Server superuser privileges. See “The Historical Server superuser account” on page 11 for more information.</p> <p><b>Note</b> If you specify the <i>-U</i> parameter on UNIX platforms, but do not specify this parameter, Historical Server prompts for a password during start-up. However, Historical Server must be started in foreground mode for you to receive the prompt. Make the following changes to the start-up script to be prompted for a password:</p> <ul style="list-style-type: none"> <li>• Remove the <i>-P</i> parameter and the ampersand (&amp;) from the start-up script file.</li> <li>• Execute the script file.</li> <li>• When prompted for a password, enter the password for the <i>username</i> you specified in the <i>-U</i> parameter.</li> <li>• Put the Historical Server process in the background.</li> </ul> |
| <i>-nmaxConnections</i> | <p>Specifies the maximum number of concurrent Open Client connections allowed to Historical Server. Valid values are 1 through 20. The default is 20.</p> <p>Open Client connections to Historical Server are <i>isql</i> connections.</p>  |

| Parameter             | Description  |
|-----------------------|--|
| <code>-ShsName</code> | Name of Historical Server as it appears in the <i>interfaces</i> file. If omitted, the Historical Server name defaults to the value of the <code>DSLISTEN</code> environment variable. If <code>DSLISTEN</code> is not set, the name “histserver” is used. |
| <code>-v</code>       | Displays Historical Server version information and exits, ignoring all other parameters.   |

## Configuring multiple instances of Historical Server

There are times when running more than one instance of Historical Server is appropriate. However, you must configure the multiple instances correctly to either allow or restrict user access to the recording sessions of the multiple instances.

This section discusses:

- When to create multiple instances of Historical Server
- Configuring an additional Historical Server on UNIX platforms
- Configuring an additional Historical Server on Windows NT

### When to create multiple instances of Historical Server

If a single instance of Historical Server is managing many concurrent recording sessions that have short sample intervals, the amount of time required to process and record the samples may interfere with the timely acquisition of new samples. If the timestamps in the recorded data files indicate that samples are not being collected at a reasonable approximation of the requested sample interval, you may choose to spread the load among two or more instances of Historical Server.

When multiple instances of Historical Server use the *same* home directory:

- Each instance must be started by the same operating system account.
- All instances that use the same home directory use the same control file.
- The sessions recorded by one instance are visible to the other instances.
- File-locking mechanisms ensure that the control file is not corrupted by concurrent accesses.

When multiple instances of Historical Server use *different* home directories:

- The Historical Server instances can be started by different user accounts.
- The Historical Server instances use different control files.
- The recording sessions of one server are not visible to the others. For example, the `hs_list` command, issued through `isql`, cannot access the recording sessions defined by another Historical Server using a different home directory.

When deciding whether multiple instances should use the same or different home directories, consider these factors:

- Visibility of data – if users of the multiple instances need access to each other’s recording session definitions, use the same home directory. If sharing is undesirable, use different home directories. All input sessions to a playback session must be in the same home directory.
- Visibility of status information – the `hs_status` command cannot distinguish between multiple instances of Historical Server using the same home directory. If this distinction is important to Historical Server administration, use different home directories.
- Contention on the control file – if a large control file receives heavy access from multiple users, different home directories may give better user response time. Actions such as creating recording sessions and listing information about recording sessions use the control file; recording sessions themselves, when they are running, do not block other users from the control file.

## Configuring an additional Historical Server on UNIX platforms

To configure an additional Historical Server on UNIX platforms:

- 1 Copy the start-up script that you created for the original Historical Server. Name the new file to reflect the name of the new Historical Server you want to start.
- 2 Edit the start-up file, changing the parameters to the start-up command as appropriate for the new instance of Historical Server. See “Setting Historical Server start-up parameters” on page 20. Pay particular attention to the `-D` parameter, which specifies the Historical Server home directory. You must decide whether you want multiple instances of Historical Server to share the same home directory or maintain separate ones.

- 3 Set up connectivity information for Historical Server, adding entries for the new Historical Server. Use a port number for the new Historical Server that is unique on its machine.
- 4 Edit the connectivity information on the client machines, adding entries for the new Historical Server.

## Configuring an additional Historical Server on Windows NT

The Server Configuration utility cannot configure a new Historical Server. To configure an additional Historical Server after initial installation:

- 1 Adding start-up parameters to the NT Registry
- 2 Updating the NT Registry services list
- 3 Adding connectivity information for Historical Server
- 4 Configuring Historical Server client machines
- 5 Creating a .bat file (optional)

### Adding start-up parameters to the NT Registry

To add Historical Server start-up parameters to the NT Registry:

- 1 Start the NT Registry Editor (*regedt32.exe*, usually in *winnnt\system32*).
- 2 For NT 4.0, select the window named:  

```
\\HKEY_LOCAL_MACHINE
```

or, for NT 3.5.1:  

```
\\HKEY_USER
```

and select the appropriate user.
- 3 Save or print the existing settings before proceeding. From the Registry menu, select the Save Subtree As command or the Print command.
- 4 In the tree view, highlight:  

```
\\SOFTWARE\\SYBASE\\Server
```
- 5 From the Edit menu, choose Add Key.
- 6 In the resulting dialog box, in the Key Name box, enter the name of the Historical Server you are adding.

Leave the Class box blank.

- 7 In the tree view, highlight:

`\SOFTWARE\SYBASE\Server\hsName`

where *hsName* is the new Historical Server name.

- 8 Select Edit | Add Value.

- 9 In the resulting dialog box, in the Value Name box, enter:

`ServerType`

From the Data Type drop-down list, choose:

`REG_SZ`

In the resulting String dialog box, enter:

`HISServer`

- 10 Make sure the entry for the new Historical Server name remains highlighted.

- 11 Select Edit | Add Key.

- 12 In the Key Name box, enter:

`Parameters`

Leave the Class box blank.

- 13 In the tree view, highlight:

`\SOFTWARE\SYBASE\Server\hsName\Parameters`

where *hsName* is the new Historical Server name.

- 14 Select Edit | Add Value.

- 15 In the Value Name box, enter:

`Arg0`

From the Data Type drop-down list, choose:

`REG_SZ`

In the resulting String dialog box, enter:

`-ShsName`

where *hsName* is the Historical Server name.

- 16 Repeat steps 13 through 15 until you have entered all of the start-up parameters for Historical Server.



At a minimum, enter the following required parameters. The order does not matter; for example, -D does not have to be Arg1.

| Value name | Datatype | String  |
|------------|----------|---|
| Arg0       | REG_SZ   | - <i>ShsName</i><br>where <i>hsName</i> is the Historical Server name you used in step 5.<br>Example:<br>-SHS_SERVER1   |
| Arg1       | REG_SZ   | - <i>dataDirectoryName</i><br>where <i>dataDirectoryName</i> is the full path name of an <i>existing</i> directory where you want to store Historical Server data. All users who will create Historical Server recording sessions must have write access to this directory.<br>Example:<br>-Dc:\SYBASE\data\hs.data |
| Arg2       | REG_SZ   | - <i>installationRootDir\ini\sql.ini</i><br>Example:<br>-Ic:\SYBASE\ini\sql.ini   |
| Arg3       | REG_SZ   | - <i>installationRootDir\install\logName</i><br>where <i>logName</i> is the file name where you want to store Historical Server error messages. The server creates the file on start-up if it does not exist.<br>Example:<br>-lc:\SYBASE\install\hs.log   |

## Updating the NT Registry services list

To add Historical Server to the list of services in the NT Registry:

1 Start the NT Registry Editor (*regedt32.exe*, usually in *winnnt\system32*).

2 For NT 4.0, select the window named:

```
\\HKEY_LOCAL_MACHINE
```

or, for NT 3.5.1:

```
\\HKEY_CURRENT_USER
```

and select the correct user.

3 Save or print the existing settings before proceeding. From the registry menu, select the Save Subtree As command or the Print command.

- 4 In the tree view, highlight:

\SYSTEM\CurrentControlSet\Services

- 5 Select Edit | Add Key.

- 6 In the Key Name box, enter:

SYBHIS\_*hsName*

where *hsName* is the name of the Historical Server you just configured.

Leave the Class box blank.

- 7 In the tree view, highlight:

\SYSTEM\CurrentControlSet\Services\SYBHIS\_*hsName*

- 8 Select Edit | Add Value as many times as necessary to enter all of the following values, datatypes, and strings to the SYBHIS\_*hsName* key entry.

| Value name   | Datatype      | String   |
|--------------|---------------|--|
| DisplayName  | REG_SZ        | <i>Sybase HISServer_ hsName</i>                  |
| ErrorControl | REG_DWORD     | 01 (Select hex radio button)                     |
| Group        | REG_SZ        | (leave blank)                                    |
| ImagePath    | REG_EXPAND_SZ | <i>rootInstlDir\bin\histsrvr.exe -ShsName -C</i> |
| ObjectName   | REG_SZ        | LocalSystem                                      |
| Start        | REG_DWORD     | 03 (Select hex radio button)                     |
| Type         | REG_DWORD     | 010 (Select hex radio button)                    |

- 9 Make sure the SYBHIS\_*hsName* key entry remains highlighted.

- 10 Select Edit | Add Key.

- 11 In the Key Name box, enter:

Security

Leave the Class box blank.

- 12 In the tree view, highlight the following Security key entry:

\SOFTWARE\SYBASE\Server\*hsName*\Security

- 13 Select Edit | Add Value.

- 14 Enter the following values for value name, datatype, and binary editor:

| Value name | Datatype   | Binary editor |
|------------|------------|---------------|
| Security   | REG_BINARY | 01001480      |

- 15 Select Registry | Exit.
- 16 Restart the machine.

## Adding connectivity information for Historical Server

This task assigns a port or network address to Historical Server. It also ensures that Historical Server can connect to one or more Adaptive Server/Monitor Server pairs.

This task differs depending on whether you rely on *sql.ini* files or a directory service for making client/server connections:

- If you are relying on *sql.ini* files for making client/server connections, check the server listings in the *sql.ini* file for the Historical Server machine. For Historical Server to run, this file must contain entries for *all* of the following servers:
  - Any Adaptive Server you want to monitor
  - Monitor Server paired with each Adaptive Server
  - Historical Server

Use *dsedit* to add entries to a *sql.ini* file. To add these entries, you must know the following information:

- Monitor Server and Adaptive Server names to which you want Historical Server to connect.
- Port numbers or network addresses assigned to these servers when they were configured.

To research this information, use *dsedit* on the machine where a server was configured to examine the appropriate *sql.ini* file.

---

**Note** The Adaptive Server name cannot be an alias name. It must be the name that Monitor Server knows it by. For example, use the value you used in the *-S* parameter in the Monitor Server start-up command.

---

- If you are relying on a directory service for making client/server connections:
  - Make sure that the *libtcl.cfg* file on the machine where Historical Server was installed points to the appropriate directory service. Use *ocscfg* to check and update *libtcl.cfg* files.

- Add Historical Server to the appropriate directory service, using `dsedit`. You must know the Historical Server name to complete this step. The default name created by the installation process is in the format *machineName\_hs*. For example, *smith\_hs*.

See *Open Client/Server Configuration Guide for Desktop Platforms* for instructions on using `ocscfg` and `dsedit`.

## Configuring Historical Server client machines

This task enables clients to connect to Historical Server. Historical Server clients are users who create recording sessions or playback sessions. Each client machine must be configured appropriately.

The configuration task differs depending on whether you are using *sql.ini* files or a directory service for making client/server connections.

- If you are using *sql.ini* files for making client/server connections, then update *all* of the *sql.ini* files used by Historical Server clients. The client *sql.ini* files must contain entries for:
  - Historical Server
  - The Monitor Server associated with each Adaptive Server listed
  - Any Adaptive Server that you want Historical Server to collect data for

Use `dsedit` to add entries to a *sql.ini* file. To add these entries, you must know the following information:

- Historical Server name
- Monitor Server and Adaptive Server names to which you want Historical Server to connect
- Port numbers or network addresses assigned to these servers when they were configured

To research this information, use `dsedit` on the machine where a server is configured to examine the appropriate *sql.ini* file.

- If you are relying on a directory service for making client/server connections, make sure that the *libtcl.cfg* file on *all* Historical Server client machines points to the appropriate directory service.

Use `ocscfg` to check and update *libtcl.cfg* files.

## Creating a *.bat* file (optional)

This task allows you to start Historical Server by executing a batch file, rather than by using the services icons.

To prepare for Historical Server start-up from a batch file:

- 1 Start any text editor and open a new text file.
- 2 Enter the Historical Server start-up command, `histsrvr`, and all desired parameters. Use the full path name of the start-up command `histsrvr.exe`. See “Inferring start-up parameters from the NT Registry” on page 37 for precedence rules used by Historical Server to obtain start-up parameters. See “Setting Historical Server start-up parameters” on page 20 for explanations of start-up parameters.

An example line in the *.bat* file follows. The example has carriage returns inserted in the command. Do not put carriage returns in your *.bat* file. The entire file should be one line.

```
c:\sybase\bin\histsrvr.exe -Shs_server1  
-Dc:\sybase\data\hs_data  
-Ic:\sybase\ini\sql.ini  
-lc:\sybase\data\hs.log
```

- 3 Save the file with a *.bat* extension. Sybase recommends that you use `RUN_`*hsName.bat*. For example:

```
RUN_hs_server1.bat
```



# Starting and Stopping Historical Server

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| Starting and stopping Historical Server on Windows NT     | 36   |

## Starting and stopping Historical Server on UNIX platforms

This section describes how to start and stop Historical Server running on UNIX platforms.

### Starting Historical Server on UNIX

On UNIX, you can start a configured Historical Server in two ways:

- Execute the `histserver` command from a UNIX shell prompt. If you use this method, you must type all appropriate parameters each time.
- Execute a script file that contains the `histserver` command and all appropriate parameters. If you followed the configuration instructions in Chapter 2, “Configuring Historical Server,” you would start Historical Server using:

```
install_dir/install/RUN_histServerName
```

where *install\_dir* is the Sybase root directory and *histServerName* is the name of the Historical Server you want to start.

Regardless of which method you use:

- Verify that the Adaptive Server to be monitored and its corresponding Monitor Server are running.

- Use the same account each time you start Historical Server, if you want the new instance to have access to previously recorded sessions. See “The operating system start-up account” on page 10 for more information.
- Set the \$SYBASE environment variable to the root directory of the Sybase installation.

The \$SYBASE environment variable must contain the name of a directory that has the appropriate *locales* and *charsets* subdirectories for Historical Server. These subdirectories were created and populated automatically by the installation procedure.

The \$SYBASE environment variable also identifies the default location of the *interfaces* file. Use parameters to the histserver command to override the default location.

Historical Server displays the following message to indicate that start-up was successful:

```
Initialization is over. Ready to accept connections.
```

Historical Server writes messages to its log file during start-up. You can ignore these messages if start-up was successful. If start-up is not successful, examine the log file to research the problem.

The default path name for the Historical Server log file is *hs.log* in the current directory at the time of start-up. You can override this default path name with the `-l` parameter (the letter l) to the histserver command.

## Stopping Historical Server on UNIX

This section describes:

- Who can shut down Historical Server
- Determining current activity on Historical Server
- Deferred versus immediate shutdown
- Detailed shutdown procedures

### Who can shut down Historical Server

If the start-up command specifies a superuser account, then only the superuser account can stop Historical Server. If a superuser is not specified in the start-up command, any user can stop Historical Server.



The superuser is the one whose account was specified in the `-U` and `-P` parameters to the Historical Server start-up command.

## Determining current activity on Historical Server

Before shutting down Historical Server, check current activity on Historical Server to determine if you want to issue a deferred shutdown or an immediate shutdown. A deferred shutdown lets all current activity complete before terminating Historical Server.

Historical Server activity might include fully defined and initiated recording sessions, uninitiated recording sessions with definitions still in progress, playback sessions in progress, and playback sessions being defined. Client connections can be from multiple machines and they might be monitoring various Adaptive Servers.

To determine current activity in Historical Server, connect to Historical Server with the `isql` utility and issue the `hs_status` activity command.

## Deferred versus immediate shutdown

To close Historical Server, connect to it using the `isql` utility and issue one of the following commands:

- `hs_shutdown` – defers shutdown until all active recording sessions complete and any other active connections are closed. No new connections are accepted during this time.

A deferred shutdown may block for an extended period of time, and typing `Ctrl+C` while the `hs_shutdown` command is blocked has no effect.

- `hs_shutdown no_wait` – shuts down Historical Server immediately and terminates any connections and active recording sessions.

In either case, the active recording sessions are shut down in a controlled manner. The Historical Server control file and the historical data files are available to Historical Server when it is restarted.

## Detailed shutdown procedures

Shut down servers in the following order:

- Historical Server
- Monitor Server

- Adaptive Server

To stop Historical Server on a UNIX platform:

- 1 Connect to Historical Server. If you are using isql, the command is:

```
isql [ -Uhs_superuser_name -Phs_superuser_password ]  
      -Shistorical_server
```

where:

- *superuser\_name* is the name that was used with the -U parameter to the Historical Server start-up command. If -U was not used in the start-up command, any user can stop Historical Server, and the -U parameter in this isql command is optional.
  - *superuser\_password* is the password that was used with the -P parameter to the Historical Server start-up command. If -U was not used in the start-up command, any user can stop Historical Server, and this parameter is optional.
  - *historical\_server* is the name of the Historical Server you want to stop.
- 2 To determine current activity on Historical Server, issue the following command when the isql prompt appears:

```
1> hs_status activity  
2> go
```

- 3 To shut down Historical Server, issue one of the following commands:

```
1> hs_shutdown  
2> go
```

or:

```
1> hs_shutdown no_wait  
2> go
```

## Starting and stopping Historical Server on Windows NT

This section describes how to start and stop Historical Server running on Windows NT platforms. Topics are:

- Starting Historical Server on Windows NT

- Inferring start-up parameters from the NT Registry
- Verifying that Historical Server is running
- Stopping Historical Server on Windows NT

## Starting Historical Server on Windows NT

You can start Historical Server by using:

- The Windows NT Control Panel Services window.
- A batch (*.bat*) file containing the start-up command and parameters. The file name is *run\_hsName.bat*, where *hsName* is the name of the Historical Server instance. Sybase recommends that you invoke the batch file from a command line shell rather than by double-clicking on it in File Manager. The command line shell captures start-up error messages, if any occur, whereas the File Manager does not.
- The start-up command typed directly from a command line shell. The name of the Historical Server executable file for Windows NT is *histsrvr.exe*.

When you use a *.bat* file or a command line command to start Historical Server, the server process is linked to your current login account. When you log off, the server shuts down.

For production systems, Sybase recommends that you start Historical Server using the Windows NT Control Panel Services Manager. When you start a server as a service, it persists across logins.

## Inferring start-up parameters from the NT Registry

Start-up parameters for Historical Server are in the following NT Registry entry:

```
\SOFTWARE\SYBASE\SERVER\servername\Parameters
```

When you start Historical Server using the Control Panel, the server reads its start-up parameters from this NT Registry entry. If you start the server from the command line or by means of a batch file, the start-up parameters are taken from both the registry entry and from the command. If the same parameter appears in both places, the value specified in the command takes precedence over the value in the registry entry. If you do not specify any start-up parameters in the command, by default all of the NT Registry entry parameters are used.

See “Adding start-up parameters to the NT Registry” on page 25 for information on editing the NT Registry entries.

## **Verifying that Historical Server is running**

On Windows NT, check the status of Historical Server in the Windows NT Control Panel Services window.

## **Stopping Historical Server on Windows NT**

This section describes:

- Who can shut down Historical Server on Windows NT
- Determining current activity on Windows NT
- Deferred versus immediate shutdown on Windows NT
- Detailed shutdown procedures on Windows NT
- Shutdown methods to avoid on Windows NT

## **Who can shut down Historical Server on Windows NT**

If a superuser account is specified at start-up, only the superuser account can stop Historical Server. If a superuser is not specified in the start-up command, any user can stop Historical Server. Administrators with privileges to use the Control Panel Services window can also shut down Historical Server.

The superuser account is specified in the -U and -P parameters to the Historical Server start-up command.

## Determining current activity on Windows NT

Before shutting down Historical Server, check current activity on Historical Server to determine if you want to issue a deferred shutdown or an immediate shutdown. A deferred shutdown lets all current activity complete before terminating Historical Server.

Historical Server activity might include fully defined and initiated recording sessions, uninitiated recording sessions with definitions still in progress, playback sessions in progress, and playback sessions being defined. Client connections can be from multiple machines and they might be monitoring various Adaptive Servers.

To determine current activity in Historical Server, connect to Historical Server with the `isql` utility and issue the `hs_status` activity command.

## Deferred versus immediate shutdown on Windows NT

To close Historical Server, connect to it using the `isql` utility and issue one of the following commands:

- `hs_shutdown` – defers shutdown until all active recording sessions complete and any other active connections are closed. No new connections are accepted during this time.

A deferred shutdown may block for an extended period of time, and typing `Ctrl+C` while the `hs_shutdown` command is blocked inside the `isql` has no effect.

- `hs_shutdown no_wait` – shuts down Historical Server immediately and terminates any connections and active recording sessions.

In either case, the active recording sessions are shut down in a controlled manner. The Historical Server control file and the historical data files are available to Historical Server when it is restarted.

## Detailed shutdown procedures on Windows NT

Shut down servers in the following order:

- Historical Server
- Monitor Server
- Adaptive Server

To stop Historical Server on Windows NT, use any of these methods:

- Click the Stop button on the Windows NT Control Panel Services window.
- Issue the `hs_shutdown` command from `isql`.
- If start-up was launched from the command line or by means of a batch file, then Historical Server is associated with the login that started it. In these cases, Historical Server shuts down if you close the window in which it was started or if you log off of the system.

If the controlled shutdown of Historical Server takes longer than a predetermined time interval (five seconds for closing the window or twenty seconds for logoff), the system displays a pop-up dialog box at regular intervals, asking you whether or not to terminate the process.

---

**Warning!** Unless you respond with Wait each time the dialog box is presented, Historical Server shuts down in an uncontrolled way, risking data loss and file corruption.

---

To stop Historical Server using `isql`:

- 1 Connect to Historical Server using `isql`:

```
isql -Uhs_superuser_name -Phs_superuser_password
      -Shistorical_server
```

where:

- *superuser\_name* is the name that was used with the `-U` parameter to the Historical Server start-up command. If `-U` was not used in the start-up command, any user can stop Historical Server, and this parameter is optional.
  - *superuser\_password* is the password that was used with the `-P` parameter to the Historical Server start-up command. If `-U` was not used in the start-up command, any user can stop Historical Server, and this parameter is optional.
  - *historical\_server* is the name of the Historical Server you want to stop.
- 2 To determine current activity on Historical Server, issue the following command when the `isql` prompt appears:

```
1> hs_status activity
2> go
```

- 3 When the `isql` prompt appears, issue one of the following commands:

```
1> hs_shutdown
```

```
2> go
```

or:

```
1> hs_shutdown no_wait
```

```
2> go
```

### Shutdown methods to *avoid* on Windows NT

In some cases, shutting down your system without first shutting down Historical Server can cause uncontrolled shutdown. Unless Historical Server is experiencing a very high level of recording activity, its controlled shutdown should take less than 20 seconds. If 20 seconds or more are used for the controlled shutdown, however, the system may intervene and terminate Historical Server in an uncontrolled way.

---

**Warning!** To be safe, Sybase recommends that you manually stop Historical Server before you shut down the system.

Using the Kill Process button causes an uncontrolled shutdown.

---

If Microsoft Visual C++ Process Viewer tool is installed on your system, Sybase recommends that you do *not* use the Kill Process button in the Process Viewer window.





This chapter describes the Historical Server command interface.

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## Command summary

Table 4-1 summarizes the Historical Server commands.

**Table 4-1: Historical Server commands**

| Activity                              | Commands  |
|---------------------------------------|---|
| Creating recording sessions           | <p>Use these commands to create a recording session:</p> <ul style="list-style-type: none"> <li>• <code>hs_create_recording_session</code> – defines the characteristics of a recording session.</li> <li>• <code>hs_create_view</code> – defines a view, which is a collection of data to record.</li> <li>• <code>hs_create_filter</code> – specifies filtering criteria on a data item.</li> <li>• <code>hs_create_alarm</code> – specifies a threshold value for a data item that triggers an alarm action.</li> <li>• <code>hs_initiate_recording</code> – ends recording session definition and enables recording to begin at its predefined start time.</li> <li>• <code>hs_terminate_recording</code> – stops a recording session.</li> </ul> |
| Viewing recording session definitions | <ul style="list-style-type: none"> <li>• <code>hs_list</code> – lists all of the views defined for a recording session and their data items.</li> </ul>   |

| Activity                        | Commands   |
|---------------------------------|--|
| Creating a playback session     | <p>Use these commands to create a playback session:</p> <ul style="list-style-type: none"> <li>• <code>hs_create_playback_session</code> – defines the characteristics of a playback session</li> <li>• <code>hs_create_playback_view</code> – specifies one or more views from the input recording sessions to include in the playback session.</li> <li>• <code>hs_initiate_playback</code> – ends playback session definition. Also starts playback to a file.</li> <li>• <code>hs_playback_sample</code> – plays back a sample to a client.</li> <li>• <code>hs_terminate_playback</code> – stops a playback session.</li> </ul> |
| Administering Historical Server | <p>Use these commands to manage Historical Server:</p> <ul style="list-style-type: none"> <li>• <code>hs_delete_data</code> – deletes the files containing the recorded data for specified recording sessions.</li> <li>• <code>hs_status</code> – displays the current status of Historical Server.</li> <li>• <code>hs_shutdown</code> – stops Historical Server.</li> </ul>   |

## Command syntax

The syntax for Historical Server commands is:

```
hs_XXX arg1, arg2, arg3, ..., argn
```

where *XXX* is the command name. For example, a typical command is `hs_create_recording_session`.

Parameters must be separated by commas. You can omit parameters that are optional or that have default values; however, you must use the value `NULL` for those parameters as a placeholder if other parameter values follow them. For example, the following command uses the default value for most parameters:

```
hs_create_playback_session null, null, raw, null,
null, client, null, null, null, null, 7
```

Command names, command keywords, the word `null`, data items, and statistic types are all case-insensitive. File names, view names, and other user-supplied names are case-sensitive.

If a parameter value contains embedded spaces (such as those in data items, statistic types, and date-time specifications), you must surround the value with quotes. Matched pairs of single-quote or double-quotes are valid delimiters.

If the parameter value contains an embedded quote that is the same as the character used to delimit the entire value, supply a pair of the quotes within the parameter value. Historical Server compresses the pair of quotes to a single character.

The word null within quotes is not a keyword.

You can enter Historical Server commands on multiple lines.

## Command status and errors

All Historical Server commands return a status value of either zero or one.

- Zero indicates a successful execution.
- One indicates an error condition. If a status of one (“1”) is returned, an error message and its appropriate error code, severity level, and state are returned to the client.

Historical Server is an Open Server application that uses Client-Library™ to communicate with one or more pairs of Adaptive Server and Monitor Server. Any of these components may detect and report error conditions.

Historical Server also detects and reports error conditions, which it logs or reports or both to clients. Historical Server error codes are all five-digit numbers from 30000 through 30999. Open Server error codes are in the range between 16000 and 20000. For error codes in either of these ranges, the Historical Server assigns one of the following severity levels:

**Table 4-2: Severity levels in command errors**

| Severity | Description            |
|----------|------------------------|
| 1        | Informational message  |
| 2        | Warning message        |
| 3        | Fatal server error     |
| 4        | Fatal process error    |
| 5        | Operating system error |

Errors detected by Client-Library, Adaptive Server, and Monitor Server use their own error numbering and severity-level schemes.

## Script files as input to Historical Server

A convenient way to provide input to Historical Server is to enter the commands in a text file and use that file as input. The Historical Server input file is not an isql file, and does not necessarily conform to isql conventions. For example, Historical Server does not have a comments feature.

Appendix D, “Examples of Recording Session Views” provides examples of views that you might use as a start for your input files. These views also appear in the *views* file that was installed in the *sample/histserver* subdirectory in the installation directory. However, that the file includes explanatory text that you must remove before using the file as input to Historical Server.

## Connecting to Historical Server

This section contains the following topics:

- Assumptions before connection
- How to connect
- Required permissions for Historical Server activities
- Mutually exclusive sessions

### Assumptions before connection

Before you can connect to Historical Server:

- The Adaptive Server whose performance data you want to collect must be running.

- A Monitor Server that is monitoring the Adaptive Server must be running. See *Sybase Adaptive Server Enterprise Monitor Server User's Guide* for instructions on verifying whether an Adaptive Server/Monitor Server pair is running.
- The Historical Server must be running. See Chapter 3, “Starting and Stopping Historical Server” for instructions on verifying whether a Historical Server is running.
- Connection information must be configured correctly on both the Historical Server machine and its client machines. See Chapter 2, “Configuring Historical Server” for more information.

## How to connect

Connect to Historical Server using a utility that offers an interactive interface to Sybase servers, such as SQL Advantage or isql. Follow the standard connection procedures for the utility. For example, in SQL Advantage, choose the Connect menu item. In isql, start isql using the Historical Server name as the value of the -S parameter.

## Required permissions for Historical Server activities

Connect to Historical Server using a user login and password that has permissions for the activities you intend to perform, as described in Table 4-3. Depending on the permissions required, you might have to disconnect and reconnect with different login accounts to perform various activities.

**Table 4-3: Permissions required for Historical Server activities**

| Activity  | Permissions required to perform the activity  |
|---|---|
| Superuser activities: <ul style="list-style-type: none"> <li>• Stop Historical Server.</li> <li>• Delete Historical Server files, including recording session data files.</li> <li>• Access files from private recording sessions.</li> </ul> | Superuser permissions. To obtain superuser permissions, connect to Historical Server using the superuser account defined at start-up. The superuser account does not have to be a valid account in any Adaptive Server. |

| Activity   | Permissions required to perform the activity  |
|--|---|
| Create recording sessions.   | Valid login and password in the Adaptive Server being monitored.<br><br>Execute permission on the <code>mon_rpc_connect</code> stored procedure in the Adaptive Server being monitored. This permission is required to connect to Monitor Server. |
| Create playback sessions using public recording session files (from recording sessions whose <i>protection_level</i> parameter is <b>public</b> ).<br><br>Use <code>hs_list</code> command on public recording session files.        | Valid login and password in the Adaptive Server being monitored.  |
| Create playback sessions using private recording session files (from recording sessions whose <i>protection_level</i> parameter is <b>private</b> ).<br><br>Use the <code>hs_list</code> command on private recording session files. | The same login that created the private sessions, or superuser. In the latter case, the superuser account must be a valid login in the Adaptive Server being monitored.   |

A single Historical Server can connect to and collect data from multiple Adaptive Server/Monitor Server pairs. For example, from the same Historical Server connection, you could create two recording sessions, one gathering performance data for an Adaptive Server named `server1` using a Monitor Server named `server1_MON`, and the other gathering data for an Adaptive Server named `server2` using a Monitor Server named `server2_MON`. If you do not have a login account that is valid in both Adaptive Server instances, you would need to create these recording sessions in different connections to Historical Server, using different login accounts. The data files from the two recording sessions, however, could reside in the same directory.

The `hs_create_recording_session` command specifies the Monitor Server you want to connect to, which indirectly implies the Adaptive Server you want performance information about.

## Mutually exclusive sessions

A Historical Server connection can be involved with only one session at a time. You can either be defining a recording session, or defining and executing a playback session, but you cannot mix together commands for multiple sessions. That is, if you start a recording session definition with the `hs_create_recording_session` command, you must finish the sequence of commands to define that session (or cancel the session) before you can start to define a playback session or a new recording session.

Defining a recording session is not the same thing as a recording session in progress. The user who defines a recording session is connected to and actively communicating with Historical Server during definition of a recording session. The user does not actively communicate with Historical Server during the actual recording. Any user connections are irrelevant during recording. For example, a user might connect to Historical Server at 3 p.m., define a recording session that starts at 10 p.m., and then disconnect from Historical Server. At 10 p.m., it is irrelevant whether the user is connected to Historical Server; the recording session takes place if Historical Server is running.

A playback session, however, requires the user connection during both playback definition and playback execution. To cancel playback execution and allow the user connection to perform some other communication, the user must issue the `hs_terminate_playback` command.

## Starting and ending a recording session definition

The `hs_create_recording_session` command starts a recording session definition. After issuing this command, you further define the recording session by issuing other commands to create views, filters, and alarms for the recording session.

To end the recording session definition, use either:

- `hs_initiate_recording` – signals that the definition is complete and enables the recording session to start at the session’s specified start time.
- `hs_terminate_recording` – cancels a recording session definition that is in progress.

## Starting and ending a playback session

The `hs_create_playback_session` command starts a playback definition. After issuing this command, you use other commands to define the playback session and perform the playback.

After issuing a successful `hs_create_playback_session` command, you must successfully execute a `hs_terminate_playback` command to end the playback session. This command cancels the definition and ends playback.

## Historical Server commands

The following pages describe the Historical Server commands:

- `hs_create_alarm`
- `hs_create_filter`
- `hs_create_playback_session`
- `hs_create_playback_view`
- `hs_create_recording_session`
- `hs_create_view`
- `hs_delete_data`
- `hs_initiate_playback`
- `hs_initiate_recording`
- `hs_list`
- `hs_playback_sample`
- `hs_shutdown`
- `hs_status`
- `hs_terminate_playback`
- `hs_terminate_recording`



## hs\_create\_alarm

|             |  |
|-------------|--|
| Description | Creates an alarm. An alarm is triggered when a data item value reaches a specified threshold value.  |
| Syntax      | <code>hs_create_alarm view_name, data_item_name, data_item_stat, alarm_action, alarm_action_data, alarm_value, occurrence_threshold.</code>  |
| Parameters  | <p><i>view_name</i><br/>name of the view that contains the data item to which the alarm applies.</p> <p><i>data_item_name</i><br/>data item to which the alarm applies. If the data item contains embedded spaces, surround it with quotation marks.</p> <p><i>data_item_stat</i><br/>statistic type for <i>data_item_name</i>. The <i>data_item_name</i> and <i>data_item_stat</i> combination must exist in the view definition. Surround the statistic type with quotation marks.</p> <p><i>alarm_action</i><br/>action to take when an alarm condition occurs. Values are:</p> <ul style="list-style-type: none"> <li>• <code>log</code> – logs messages when the alarm condition occurs. You specify the log file name in the <i>alarm_action_data</i> parameter.</li> <li>• <code>execute</code> – executes a program or script file when the alarm condition occurs. You specify the file to execute in the <i>alarm_action_data</i> parameter.</li> </ul> <p><i>alarm_action_data</i><br/>specifies information required to carry out the <i>alarm_action</i>:</p> |

| If alarm_action is | Then alarm_action_data is  |
|--------------------|--|
| log                | Name of the file where Historical Server should log the alarm messages. The default is the Historical Server log file. If you specify a file that does not exist, Historical Server creates it. If you specify an existing file, the user who started Historical Server must have write permission for the file. |

| If alarm_action is | Then alarm_action_data is   |
|--------------------|---|
| execute            | Name of the file to execute, optionally followed by a list of parameters separated by spaces. The file must exist and the user who started Historical Server must have execute permission for it. |

---

**Warning!** When an alarm condition occurs and *alarm\_action* is *execute*, the specified file is executed by the account that started Historical Server, not by the account that created the alarm. This means that the access privileges of the person who starts Historical Server are available to the users who define alarms. A user who normally cannot execute a file may be able to execute it through an Historical Server alarm.

---

*alarm\_value*

triggering value for the alarm.

*occurance\_threshold*

number of times the threshold condition occurs before Hisotrical Server performs the threshold action..

Examples

- 1 This example creates an alarm for a view named Page I/O. The view contains the Page I/O data item with a Value for Session statistic type. The data is logged to the *page\_io\_alarm\_file* file when a trigger value of 50 or greater is achieved.

```
hs_create_alarm PageIO,"Page I/O",
"Value for Session",log,page_io_alarm_file,50
```

- 2 This example creates an alarm for a view named Page I/O. This alarm causes the */user/script1* script to be executed and passes the value 100 as its first parameter when a trigger value of 100 or greater is achieved on the Page I/O data item over six consecutive refreshes..

```
hs_create_alarm PageIO,"Page I/O",
"Value for Session",execute,
"/user/script1 100",100,6
```

Usage

- If *alarm\_action* is *execute*, when the alarm condition occurs, the script or program executes in the background. The commands within the script or program are executed in the foreground and displayed if applicable.

For example, if you want the clock to display in an alarm condition, you should put *clock.exe* into a script file and specify the script file name when creating the alarm, rather than specifying *clock.exe* when creating the alarm.

- When an alarm condition occurs and *alarm\_action* is log, Historical Server writes three lines to the log file. The first line contains:
  - Timestamp of the sample that triggered the alarm
  - Name of the data item on which the alarm was set
  - Statistic type of that data item
  - Value of the data item that triggered the alarm
  - Threshold value of the alarm
- The second line in the log file contains:
  - Session ID
  - View name
  - Alarm ID
- The third line in the log file contains:
  - Name of the Adaptive Server being monitored
  - Names and values of all key data items in the view for the row of sample data that triggered the alarm
- When an alarm condition occurs and *alarm\_action* is execute, Historical Server runs the script or program specified in the *alarm\_action\_data* parameter. Historical Server invokes the program or file using the arguments specified in *alarm\_action\_data*, followed by additional positional arguments that can be accessed within the program. The positional arguments appended to the call by Historical Server represent the following information:
  - Session ID
  - Alarm ID
  - Sample timestamp
  - Data item on which the alarm was set
  - Statistic type of that data item
  - Value of the data item that triggered the alarm

- Threshold value of the alarm
- Name of the Adaptive Server being monitored
- Number of key data items in the view
- For each key data item:
  - Name of the data item
  - Value of that data item for the row of sample data that triggered the alarm
- When an alarm condition occurs and *alarm\_action* is execute, the specified file is executed by the account that started Historical Server, not by the account that created the alarm. This means that the access privileges of the person who starts Historical Server are available to users who define alarms.

---

**Warning!** It is possible that a user who normally cannot execute a file can execute that file through an Historical Server alarm.

---

## hs\_create\_filter

|             |   |
|-------------|---|
| Description | Specifies filtering criteria on a data item. A filter limits the scope of collected data for a single data item in a view. Filters are optional.  |
| Syntax      | <i>hs_create_filter view_name, data_item_name, data_item_stat, filter_type, value_spec</i>  |
| Parameters  | <i>view_name</i><br>name of the view that contains the data item to filter.<br><br><i>data_item_name</i><br>data item to which the filter applies. If the data item contains embedded spaces, surround it with quotation marks.<br><br><i>data_item_stat</i><br>statistic type for <i>data_item_name</i> . The <i>data_item_name</i> and <i>data_item_stat</i> combination must exist in the view definition. Surround the statistic type with quotation marks. |

*filter\_type*

type of filter to use. Valid values are:

- **eq** – passes values that match any of a list of values. That is, a value passes the filter if it equals the first filter value, or the second filter value, or any other value in the list. Specify the list of values in the *value\_spec* parameter.
- **neq** – passes values that are not equal to any value in a list of values. That is, a value passes the filter if it is not equal to the first filter value, not equal to the second filter value, and not equal to any other value in the list. Specify the list of values in the *value\_spec* parameter.
- **range** – passes values that fall inside a range of values. Specify the ranges in the *value\_spec* parameter.
- **top** – passes a specified number of values that are the highest values received for the data item during a sample interval. For example, a top 10 filter passes the 10 rows of a sample that have the highest values for the data item.

*value\_spec*

specifies values for the filter tests. The syntax depends on the value of *filter\_type*:

---

| <b>If filter_type is</b> | <b>value_spec syntax is</b> |
|--------------------------|-----------------------------|
|--------------------------|-----------------------------|

---

|           |                                    |
|-----------|------------------------------------|
| eq or neq | <i>value1</i> [, <i>value2</i> ].. |
|-----------|------------------------------------|

See “Using wildcards” on page 57 for information about using a wildcard character (%) when *valuen* is a character string. See “Specifying filters on object name and procedure name” on page 57 for information on specifying a value for the Object Name and Procedure Name data items.

| If filter_type is | value_spec syntax is  |
|-------------------|---|
| range             | <p>To specify values greater than or equal to a low bound:<br/> <i>low,value</i></p> <p>To specify values less than or equal to a high bound:<br/> <i>high,value</i></p> <p>To specify values greater than or equal to a low bound <i>and</i> less than or equal to a high bound:<br/> <i>low,value1,high,value2</i></p> <p>See “Specifying filters on object name and procedure name” on page 57 for information on specifying a value for the Object Name and Procedure Name data items. If you are specifying both an upper and lower bound for either of these data items, each bound must have the same number of subcomponents.</p> |
| top               | <p><i>value</i></p> <p>where <i>value</i> is the number of items to be passed. It must be greater than zero.</p>  |

Examples

This example creates a filter for a view named Page I/O. The view contains the Page I/O data item with a “Value for Session” statistic type. The example limits the rows recorded for a sample to the 20 rows that have the highest total number of Page I/Os for the recording session to date.

```
hs_create_filter PageIO, "Page I/O", "Value for
Session", top, 20
```

Usage

Using multiple filters in a view

Filters limit the amount of data that Historical Server records. Each filter applies to one data item in the view. Each data item can have only one filter applied to it.

If multiple data items in a view have filters, Historical Server records data that satisfies all of the individual filters. Effectively, the Boolean AND operation is applied to the values of the various filters.

If the top filter is in effect for a data item and another filter is in effect for a second data item, some of the values passed by the top filter may be eliminated by the other filter. The result is that less than specified top *n* values are returned.

### Using wildcards

The wildcard character is the percent sign (%). When *filter\_type* is *eq* or *neq*, you can use the wildcard in *value\_spec* for data items that return character strings. The wildcard matches any string of zero or more characters. The wildcard can appear anywhere within the filter value (beginning, end, or anywhere in between). Only a single instance of the wildcard can appear in *value\_spec*.

An exception to the single instance rule for the wildcard pertains to the Object Name and Procedure Name data items. In those multi-component data items, you can use a single instance of the wildcard in each component. See “Specifying filters on object name and procedure name” on page 57 for more information.

When *filter\_type* is *range*, you cannot use the wildcard character in *value\_spec*.

### Specifying filters on object name and procedure name

The Object Name and Procedure Name data items accept multi-component values in *value\_spec* when *filter\_type* is *eq*, *neq*, and *range*. These composite filter values can use the following name forms, where *object\_name* is either a table name or a stored procedure name:

- *object\_name*
- *owner\_name.object\_name*
- *database\_name.owner\_name.object\_name*

If *filter\_type* is *eq* or *neq*, each component can contain a single instance of the wildcard character (%). The wildcard can be used in place of the entire component. For example, a *value\_spec* of *% . authors* for the *data\_item* Object Name sets a filter that returns the authors table in all databases, regardless of owner. See “Using wildcards” on page 57 for more information about the wildcard character.

If *filter\_type* is *range* with both upper and lower bounds, the two bounds must have the same number of subcomponents.

Some specific considerations for designing filters using these component data items follow:

- If *database\_name* is a component of a composite filter value for an “Object Name” data item, a “Database Name” data item also must be present in the view.

- If *owner\_name* is a subcomponent of any composite filter value for an “Object Name” data item, an “Owner Name” data item also must be present in the view.
- If *database\_name* is a subcomponent of any composite filter value for a “Procedure Name” data item, a “Procedure Name” data item also must be present in the view.
- If *owner\_name* is a component of any composite filter value for a “Procedure Name” data item, a “Procedure Owner Name” data item also must be present in the view.

## **hs\_create\_playback\_session**

|             |   |
|-------------|---|
| Description | Defines the characteristics of a playback session. This command is the first step in creating a playback session.   |
| Syntax      | <i>hs_create_playback_session start_time, end_time, summarization_interval, allow_estimation, missing_data_option, target, directory_name, protection_level, sample_interval, script_type, delete_option, session_id [ , session_id... ]</i>  |
| Parameters  | <i>start_time</i><br>specifies the date and time of the beginning of the recorded data to be played back. The default is to start playback from the beginning of the first session specified by <i>session_id</i> . Use the value NULL to accept the default.<br><br>The format for <i>start_time</i> is: |



“year/month/day hour:minute[:second] [time zone]”

Depending on the *summarization\_interval* and *missing\_data\_option* parameters, and depending on whether there is any data available at the time specified, playback might use data from a time later than that specified; however, playback does not use data from a time earlier than *start\_time*.

The *start\_time*, if specified, must be earlier than the end time of at least one of the sessions specified in *session\_id*. The following time zone options are available:

| Parameter value                | Explanation   |
|--------------------------------|---|
| EST                            | U.S. eastern time zone, standard time.  |
| EDT                            | U.S. eastern time zone, daylight saving time.   |
| CST                            | U.S. central time zone, standard time.  |
| CDT                            | U.S. central time zone, daylight saving time.   |
| MST                            | U.S. mountain time zone, standard time.   |
| MDT                            | U.S. mountain time zone, daylight saving time.  |
| PST                            | U.S. Pacific time zone, standard time.  |
| PDT                            | U.S. Pacific time zone, daylight saving time.   |
| MET                            | Middle European time zone, standard time.   |
| MET DST                        | Middle European time zone, daylight saving time.  |
| WET DST                        | Western European (Greenwich) time zone, daylight saving time.   |
| GMT                            | Greenwich mean time. This is equivalent to western European (Greenwich) time zone without regard to daylight saving time. All of the preceding time zone specifications, such as EST or EDT, can be supplied only in combination with dates and times when standard time or daylight savings time is in effect. GMT can be paired with any date and time specification. |
| GMT{+-}<br><i>hours_offset</i> | To specify any other time zone, where <i>hours_offset</i> is the number of hours that must be added to Greenwich mean time to derive the local time. The acceptable range of offset values is between +24 and -24 hours, inclusive. Fractional offsets such as +5.5 are valid.  |

The default *time\_zone* is the local time zone of Historical Server.

*end\_time*

specifies the date and time for the end of the recorded data to be played back. The default is to end playback at the end of the last session specified. Use the value NULL to accept the default.

The format of this parameter is the same as the *start\_time* format. The *end\_time*, if specified, must be later than the *start\_time* of at least one input session.

*summarization\_interval*

a *required* parameter (no default exists) that specifies the level of detail of the playback. Valid values are:

- *raw* – plays back data as it was collected, using the same sample intervals. Choose this option to view raw data as it was recorded. Also, this is the only option available for playing back snapshot data, such as current SQL statement data and status information on locks or processes. See Table C-2 on page 169 for a definitive list of the snapshot data items. (They are the ones with “no” in the “Allowed for Non-raw” column.)

This option is valid only when *target* is client.

- *actual* – plays back data using the same sample intervals as the input recording sessions.

This option allows you to specify some data item changes in the playback view. Also, Historical Server makes appropriate adjustments to the first and last samples when the recording session times do not align with the requested playback session times.

Choose this option to add or change certain data items when summarization is not required. Also, when *target* is set to file, this option provides a way to concatenate the non-snapshot data in multiple recording sessions.

This option is valid only when *target* is client.

- *entire* – plays back data for each input recording session summarized as a single sample. The sample interval is the timespan between the requested playback *start\_time* and *end\_time*.

This option allows you to specify some data item changes in the playback view. Also, Historical Server makes appropriate adjustments to the data values to accurately reflect the requested playback session start and end times.

Choose this option to consolidate recorded data, rolling up details into overviews of activity over longer time periods.

*sample\_interval*

plays back data summarized into sample intervals of the specified length. The parameter value is the sample interval length, specified as:

```
"S"
"M:S"
"H:M:S"
"D H:M:S"
```

where:

- *S* – is seconds.
- *M* – is minutes.
- *H* – is hours.
- *D* – is days.

All components are numeric and can be one or two digits. Some examples are:

```
"30" (specifies sample intervals of 30 seconds)
"10:0" (specifies sample intervals of 10 minutes)
"8:30:0" (specifies sample intervals of 8 1/2 hours)
"5 0:0:0" (specifies sample intervals of 5 days)
```

The first sample interval starts at *start\_time*, and every sample, except possibly the last one, has the specified length.

This option allows you to specify some data item changes in the playback view. Also, Historical Server makes appropriate adjustments to the data values to accurately reflect the requested playback session length and playback sample intervals.

Choose this option to summarize data into any desired granularity. This type of summary can mediate deviations in activity and is useful for observing trends over time.

The actual, entire, and user-defined interval options have the following features in common:

- Data item changes in playback views – for all three options, the playback view can use statistic types different from those in the input view, and it can include some estimated and calculated data items not in the input view. It cannot include snapshot data, such as current SQL statement data. See Table C-2 on page 169 for a definitive list of data items and statistic types that can be included in playback views when these options are chosen.
- Data adjustments – for all three options, Historical Server performs appropriate mathematical computations to compensate for differences in:
  - the input recording sessions sample intervals and the requested playback sample intervals
  - the input recording sessions session lengths and the requested playback start and end times

To handle these differences, accumulated counts are prorated. Percentages and rates are weight-averaged, weighted by the number of seconds that each input sample contributes.

See Appendix C, “Specifications for Defining Playback Views” for more information.

*allow\_estimation*

specifies whether or not you want playback to estimate values for data items that cannot be calculated exactly. Valid values are:

- disallow (the default) – causes the `hs_create_playback_view` command to return an error if it encounters data items that require estimation.
- allow – causes playback to estimate values, if necessary, for certain data items. Some data items cannot be included in a playback view unless you allow estimation in the playback session.

This parameter is ignored if *summarization\_interval* is raw.

See Table C-2 on page 169 to determine which data items require estimation.

*missing\_data\_option*

when *target* is client, this parameter specifies how the `hs_playback_sample` command treats periods of time when no data is available in the input sessions. Valid values are:

- skip (default) – when a time period contains no data, the `hs_playback_sample` command goes directly to the next time period containing data, rather than returning a sample having no data.
- show – the `hs_playback_sample` command returns a sample even for a time period where no data is available. During client playback, the column headers are returned with zero rows.

When *target* is file, gaps are not allowed.

*target*

specifies the target results of the playback session. Valid values are:

- client (default) – enables playback to the client.
- file – enables creation of a new session containing all the data specified by this `hs_create_playback_session` command and by subsequent `hs_create_playback_view` commands. Use the `hs_initiate_playback` command to create the new session. Setting *target* to file is not allowed if the *summarization\_interval* parameter is raw or actual.

*directory\_name*

when *target* is file, this parameter specifies the directory where the new files are created. This parameter is ignored when *target* is client. The default is the Historical Server home directory.

The operating system account that started Historical Server must have execute (search) and write permission on the specified directory.

*protection\_level*

when *target* is file, this parameter specifies the permission level that the `hs_initiate_playback` command assigns to the data files for the newly created session. The protection level controls viewing the metadata in the control file (using the `hs_list` command) and creating playback sessions with the data (using the `hs_create_playback_session` command). Valid values are:

- `private` (default) – specifies that the new files will be password-protected. The files will be accessible only to the same account that created them or to the Historical Server superuser.
- `public` – gives unrestricted access to the data in the new session's files.
- `null` – implements the default value, `private`.

When *target* is client, this parameter is ignored.

*script\_type*

when *target* is file, this parameter specifies whether you want the `hs_initiate_playback` command to create a script file for the newly created session. The script file contains SQL commands that create an Adaptive Server table for each playback view defined for the new session. Valid values are:

- `no_script` (default) – does not create a script file for the new session.
- `sybase_script` – creates a script file. The file is located in the Historical Server home directory. Its name is *sSessionId*, where:
  - *s* is a constant.
  - *SessionId* is assigned by Historical Server.
- `null` – implements the default value, `no_script`.

When *target* is client, this parameter is ignored.

*delete\_option*

when *target* is file, this parameter specifies whether you want the `hs_initiate_playback` command to delete the input session files after successfully creating the new session. Valid values are:

- `retain` (default) – does not delete the files containing the data for the input sessions.
- `delete` – deletes all input session files, if creation of the new session is successful. The user must be either the Historical Server superuser or the owner of all the input sessions.
- `null` – implements the default value, `retain`.

When *target* is `client`, this parameter is ignored.

*session\_id[ ,session\_id . . .]*

specifies the unique identifiers for the input sessions to be played back. At least one *session\_id* is *required*. When more than one are used, they must be specified in the correct order according to their start times, with the earliest start time first. Playback skips over the sessions that are out of order. If *summarization\_interval* is `raw`, then only one *session\_id* is valid.

Historical Server assigns a session ID to a recording session when the recording session is defined. Use the `hs_list` command to find the session IDs that you want to play back.

If *target* is `file`, no gaps can exist between an input session's end time and the next input session's start time. Also, each session specified must have completed its recording.

If *target* is `client`, then each session must have started recording, but can be continuing to record when you submit the `hs_create_playback_session` command.

## Examples

- 1 This example creates a playback session based on a single input session (session 7). The session is played back in its entirety, with no summarization or normalization, and without creating a new session.

```
hs_create_playback_session null, null, raw,
null, null, client, null, null, null, null, 7
```

- 2 This example creates a playback session based on three input sessions (sessions 4, 6, and 9). Only data collected between the time period from 9:00 to 5:00 is played back. The played back data is summarized at half-hour intervals. The playback is stored as a new session.

```
hs_create_playback_session "1996/5/3 9:00",
```

```
"1996/5/3 17:00", "0 00:30:00", disallow, skip,  
file, null, public, no_script, retain, 4, 6, 9
```

## Usage

- A connection to Historical Server can either be defining a recording session or defining and executing a playback session, but not both. After the successful execution of the `hs_create_playback_session` command, you must successfully execute a `hs_terminate_playback` command before starting to define a recording session or starting to define another playback session.
- The behavior of the playback session is different depending on the value of the *target* parameter:
  - If *target* is *client*, the client retrieves the data using the `hs_playback_sample` command. Playback can occur from recording sessions that are still in the process of recording.
  - If *target* is *file*, the client does not retrieve any data for this playback session; instead, Historical Server creates a new session and fills the data files for that new session with the data from this playback session. The accessibility of the new session is determined by the *protection\_level* parameter. The user who invokes this command is the owner of the new session. The `hs_initiate_playback` command creates the new session.

Playback is restricted to sessions that are finished recording as of when you submit the `hs_create_playback_session` command.

- If *target* is *file* and multiple playback sessions are used as input, no time gaps are allowed. For example, if you collected data from 9 a.m. to 5 p.m. every day from Monday through Friday, you could not play back those five recording sessions to create a new, summarized, weekly session. However, if you eliminate the time gaps by collecting data from 9 a.m. to 9 a.m. every day from Monday through Friday, you could use the playback feature to create a new, summarized weekly session. Another way to eliminate the time gaps is to keep the 9 a.m. to 5 p.m. recording session, but add another set of recording sessions scheduled from 5 p.m. to 9 a.m. Use a longer sample interval for the off hours to reduce the volume of data collected.
- The value of the *summarization\_interval* parameter used in the `hs_create_playback_session` command affects the rules that the `hs_create_playback_view` command uses to define views.



## hs\_create\_playback\_view

|             |  |
|-------------|--|
| Description | Specifies a view from the input recording sessions that you want to include in the playback session. Also specifies the data items in each view that you want to play back.  |
| Syntax      | <pre>hs_create_playback_view view_name, [data_item_name_1, data_item_stat_1 [,data_item_name_2, data_item_stat_2]...]</pre>  |
| Parameters  | <p><i>view_name</i><br/>name of a view that you want to play back. The playback view name must match the name of a corresponding view in the input sessions. If there are two or more input sessions, then the view must exist in all of the input sessions and must contain the exact same data items and filters in all of the input sessions.</p> <p>Only one playback view can be defined for a given view name. An attempt to create a second playback view with the same name fails.</p> <p>Use the <code>hs_list</code> command to list the views in an input session and the data items in each view.</p> <p><i>data_item_name_n</i><br/>data items existing in the input view that you want to see in the playback view. (In some cases, you can introduce new data items not in the input views.) If the data item contains embedded spaces, surround it with quotation marks.</p> <p>If you do not specify any data items, then the view is defined using all of the data items from the corresponding view in the input sessions. However, if a data item from that corresponding view is not valid in the playback view, an error results.</p> <p>See Table C-2 on page 169 for more information about designing playback views.</p> <p><i>data_item_stat_n</i><br/>statistic types for the respective data items. The statistic types do not necessarily need to be the same as the statistic types used in the input view. See Table C-2 on page 169 to determine valid statistic types for data items in playback views.</p> <p>Surround statistic types with quotation marks.</p> |

Examples

- 1 This example creates a playback view based on the view *device\_view* from the input sessions. The playback view includes all of the data items from the input view, with the same combinations of data items and statistic types:

```
hs_create_playback_view device_view
```

- 2 This example creates a playback view that returns a timestamp and two data items from the input sessions:

```
hs_create_playback_view  
device_view,"Timestamp","Value for  
Sample","Device Name", "Value for Sample",  
"Device Reads","Rate for Sample"
```

Usage

- The `hs_create_playback_view` command is valid only during the definition of a playback session; that is, it must be issued after a successful `hs_create_playback_session` command, but before a successful `hs_initiate_playback` command.
- A playback session must have at least one view.
- Appendix C, “Specifications for Defining Playback Views” explains the requirements for designing valid playback views, including valid combinations of data items and statistic types for playback views.

## hs\_create\_recording\_session

Description

Establishes a new recording session.

Syntax

```
hs_create_recording_session monServerName, sample_interval  
[,dir_name][,start_time][,end_time]  
[,protection_level][,error_option][,script_type], [tab_delimited]
```

Parameters

*monServerName*

name of the Monitor Server used to collect data from the Adaptive Server for which you want to collect historical data. The user name and password you used to connect to Historical Server must match a valid login account on the Adaptive Server being monitored by the Monitor Server you specify here.

*sample\_interval*

determines the time between samples (in seconds). The shortest valid sample interval is one second; the longest valid sample interval is 86400 seconds, which is the number of seconds in one day.

*dir\_name*

path name of the directory where the historical data files resulting from this recording session will reside. The operating system account that started Historical Server must have search (execute) and write permissions on this directory.

The default is the Historical Server home directory, specified in the `-D` parameter to the Historical Server start-up command.

*start\_time*

date and time at which recording is to start, using the format:

```
year/month/day hour:minute[:second] [time zone]
```

The default is to start immediately. The following time zone options are available:

| Parameter value                | Explanation   |
|--------------------------------|---|
| EST                            | U.S. eastern time zone, standard time.  |
| EDT                            | U.S. eastern time zone, daylight saving time.   |
| CST                            | U.S. central time zone, standard time.  |
| CDT                            | U.S. central time zone, daylight saving time.   |
| MST                            | U.S. mountain time zone, standard time.   |
| MDT                            | U.S. mountain time zone, daylight saving time.  |
| PST                            | U.S. Pacific time zone, standard time.  |
| PDT                            | U.S. Pacific time zone, daylight saving time.   |
| -T                             | Middle European time zone, standard time.   |
| MET DST                        | Middle European time zone, daylight saving time.  |
| WET DST                        | Western European (Greenwich) time zone, daylight saving time  |
| GMT                            | Greenwich mean time. This is equivalent to western European (Greenwich) time zone without regard to daylight saving time. All of the preceding time zone specifications, such as EST or EDT, can be supplied only in combination with dates and times when standard time or daylight savings time is in effect. GMT can be paired with any date and time specification. |
| GMT{+-}<br><i>hours_offset</i> | To specify any other time zone, where <i>hours_offset</i> is the number of hours that must be added to Greenwich mean time to derive the local time. The acceptable range of offset values is between +24 and -24 hours, inclusive. Fractional offsets such as +5.5 are valid.  |

If you do not specify a time zone, the local time zone of the Historical Server is used.

The *start\_time* cannot be more than 31 days from the present time.

*end\_time*

time at which recording is to stop. The default is to stop the recording session 24 hours after the *start\_time*. If you specify an *end\_time* and do not specify a *start\_time*, the *start\_time* defaults to the present.

*protection\_level*

specifies whether the data files created in this recording session are password-protected or accessible to all users. The protection level controls viewing the metadata in the control file (using the *hs\_list* command) and creating playback sessions with the data (using the *hs\_create\_playback\_session* command).

- *private* (default) – specifies that the recorded data will be password-protected. The files will be accessible only by the same account that created them, or by the Historical Server superuser.
- *public* – specifies that access to the recorded data will be unrestricted.

*error\_option*

specifies how you want Historical Server to handle non-fatal errors during a recording session. Valid values are:

- *continue* (default) – specifies that recording is to continue when non-fatal errors are detected. For example, when the Monitor Server fills all of its configured buffers while summarizing monitoring information, one or more non-fatal errors are sent to Historical Server, but it is still possible for Historical Server to collect the available information from the current sample and from future samples.
- *halt* – specifies that the recording session is to terminate when a non-fatal error is detected.

*script\_type*

specifies whether you want Historical Server to create a script file that creates tables from your the recording session view definitions.

- *sybase\_script* – creates a script file containing SQL commands that create an Adaptive Server table for each view in the recording session.
- *no\_script* (the default) – does not create a script file.

*tab\_delimited*

When adding this to the `hs_create_recording_session`, the default output file delimitoer HS is using will be ignored. Instead the TAB character will be used.

## Examples

This example creates a recording session to capture data from the Monitor Sever called `SERVER1_MON`. The data is captured every 30 seconds and written to the data files in the `/user/hist_dir` directory, starting now and ending on August 8, 1997 at 10:30 a.m. EDT (eastern time zone, daylight saving time). The resulting files have private restrictions. The recording session continues if non-fatal errors are detected. A script file that creates an Adaptive Server table for each recorded view is created.

```
hs_create_recording_session SERVER1_MON,30,
  /user/hist_dir,NULL,"97/08/08 10:30 EDT",
  private,continue, sybase_script
```

## Usage

- Fatal errors include crashes and other connection failures with Adaptive Server or Monitor Server. A fatal error forces termination of the recording session, regardless of the value of *error\_option*.
- You must issue this command before you define any views, alarms, or filters for the recording session. After you have issued this command and have defined at least one view, you can start recording with the `hs_initiate_recording` command.

## hs\_create\_view

## Description

Defines a collection of data items to be recorded during a session.

## Syntax

```
hs_create_view view_name,
  data_item_name_1, data_item_stat_1
[,data_item_name_2, data_item_stat_2]...
```

## Parameters

*view\_name*

user-defined name of the view. The view name must be constructed from the characters a – z, A – Z, 0 – 9, and the underscore character (\_).

*data\_item\_name\_n*

data items that participate in the view. If a data item contains embedded spaces, surround it with quotation marks.

See Table A-1 on page 107 for a list of available data items. See Table B-2 on page 128 for valid combinations of data items within views.

*data\_item\_stat\_n*

statistic types of the respective data items. The statistic type must be surrounded with quotation marks. Valid statistic types are:

- "Value for Sample"
- "Value for Session"
- "Rate for Sample"
- "Rate for Session"
- "Avg for Sample"
- "Avg for Session"

Not all statistic types are valid for all data items. See Table B-3 on page 152.

Examples

This example creates a view called Page I/O that contains the Page I/O data item with a Value for Session statistic type and the Kernel Process ID data item with a Value for Sample statistic type.

```
hs_create_view PageIO, "Page I/O", "Value for  
Session", "Kernel Process ID", "Value for Sample"
```

Usage

- The order in which you specify the options determines the order in which the data items are stored in the recorded data file for the view.
- You must define at least one view for each recording session.
- If you intend to use the Historical Server playback features to examine data in a recording session, you might want to think about the playback view while designing the recording session view.

For many data items, Historical Server can play back a data item using a different statistic type from the one used during recording. However, for some data items, Historical Server summarizes data by estimating values (as opposed to exact calculation), unless certain additional data items are included in the recorded data. See Table C-2 on page 169 to determine which data items are required for exact calculations.

## hs\_delete\_data

Description

Deletes the historical monitoring files associated with one or more inactive recording sessions.

|            |   |
|------------|---|
| Syntax     | <code>hs_delete_data low_session_id [,high_session_id]</code>   |
| Parameters | <p><i>low_session_id</i><br/>unique identifier of the first recording session whose data is to be deleted.</p> <p><i>high_session_id</i><br/>unique identifier of the last in a range of sessions whose data is to be deleted. If omitted, only the session identified by <i>low_session_id</i> has its data deleted.</p>   |
| Examples   | <p>This example deletes historical monitoring files for any inactive recording sessions that have session IDs of 1 through 15.</p> <pre>hs_delete_data 1,15</pre>   |
| Usage      | <ul style="list-style-type: none"> <li>• The only users who can delete historical data files are: <ul style="list-style-type: none"> <li>• Historical Server superuser</li> <li>• Users who connected to Historical Server using the same user name and password that defined the recording session</li> </ul> </li> <li>• Only inactive recording session files are deleted. Files associated with active recording sessions are not deleted, even if their session IDs fall within the range specified in the <code>hs_delete</code> command.</li> <li>• An inactive recording session is one that was terminated because the <i>end_time</i> was reached or because the <code>hs_terminate_recording</code> command was issued.</li> </ul> |

## hs\_initiate\_playback

|             |   |
|-------------|---|
| Description | Specifies that you are finished defining a playback session and ready to perform the playback. If the playback target is to a file, this command starts the playback. If the playback target is to a client, this command initializes playback so that the <code>hs_playback_sample</code> command with a default <i>step</i> returns the first sample in the playback session. |
| Syntax      | <code>hs_initiate_playback</code>   |
| Usage       | <ul style="list-style-type: none"> <li>• The <code>hs_create_playback_session</code> command and one or more successful <code>hs_create_playback_view</code> commands must precede the <code>hs_initiate_playback</code> command.</li> </ul>  |

- If no views were created before the `hs_initiate_playback` command, then `hs_initiate_playback` returns an error. The user may still attempt an `hs_create_playback_view` command, or may cancel the playback session with the `hs_terminate_playback` command.

## hs\_initiate\_recording

Description

Specifies that the definition of a recording session is complete and requests that recording be started or scheduled to start at the recording session's *start\_time*.

Syntax

`hs_initiate_recording`

Usage

- The `hs_create_recording_session` command and one or more `hs_create_view` commands must precede the `hs_initiate_recording` command.
- One or more `hs_create_alarm` and `hs_create_filter` commands may also precede the `hs_initiate_recording` command.
- After you execute the `hs_initiate_recording` command, you may later cancel the session, but you cannot add any more views, filters, or alarms to the description of this recording session.

## hs\_list

Description

Lists information about past and present recording sessions.

Syntax

`hs_list level [,restriction]`

Parameters

*level*

specifies the level of detail returned for each recording session. Its value can be `sessions`, `views`, `data_items`, `alarms`, `filters`, or `summarization_data_items`.



*restriction*

Selects a subset of the data available about recording sessions for a given *level*.

| If level is  | Then restriction is   |
|--|---|
| sessions   | <ul style="list-style-type: none"> <li>One of the following:               <ul style="list-style-type: none"> <li>active – limits the returned data to currently active recording sessions of this Historical Server instance.</li> <li>inactive – selects only completed recording sessions.</li> <li>latest – selects only the recording session (if any) most recently initiated on the current client connection.</li> </ul> </li> <li>If <i>restriction</i> is omitted, all active and inactive recording sessions that you have permission to access are listed.</li> </ul>                                 |
| views  | <ul style="list-style-type: none"> <li>A session ID whose views you want to list.</li> <li>If <i>restriction</i> is omitted, the views of all recording sessions that you have permission to access are listed.</li> </ul>  |
| data_items,<br>alarms, filters,<br>or<br>summarization<br>– data_items | <ul style="list-style-type: none"> <li>A session ID and, optionally, a view name whose data items you want to list. The syntax is:               <pre>session_id [,view_name]</pre> <p><i>session_id</i> limits the listing to data items that participated in a single session. If specified, <i>view_name</i> limits the listing to data items that appeared in a single view defined for the session.</p> </li> <li>If <i>restriction</i> is omitted, the data items that belong to all views defined for all active and inactive recording sessions that you have permission to access are listed.</li> </ul> |

## Examples

- 1 This example lists all active sessions for this Historical Server instance:

```
hs_list sessions,active
```

- 2 This example lists all alarms that have been defined for data items in the Page I/O view of the session whose ID is 10:

```
hs_list alarms,10,PageIO
```

## Usage

- The `hs_list` command returns the following fields as an integer datatype:
  - Session ID
  - Sample interval
  - Alarm count

- Filter count
- The `hs_list` command returns the following field as a float datatype:
  - Alarm value
- All other fields are returned as character strings.
- If a session was recorded with the private protection level and the current user is not the Historical Server superuser, the current user's name and password are verified against the name and password of the user who recorded the session before that session is made visible.

#### Description of returned data

The data returned by `hs_list` depends on the value of *level*:

- `sessions` causes a single row to be returned for each session, with the following columns:
  - Session ID (a unique identifier for the session)
  - Status of the session:
    - *active*
    - *inactive*
    - *active remotely or inactive* – status of the session cannot be determined unambiguously. Sessions that are currently active in another instance of Historical Server that is using the same home directory as the current instance fall into this category. (For more information about running multiple instances of Historical Server and sharing control files, see “Configuring multiple instances of Historical Server” on page 23.) Sessions that have already ended because of an abnormal termination of the Historical Server instance that was running them, and whose intended end times have not yet been passed, are also in this category.
  - Name of the user who initiated the recording session
  - Name of the Adaptive Server monitored
  - Name of the Monitor Server used
  - Start date and time of the recording session
  - End date and time of the recording session
  - Directory containing the recorded data

- Sampling interval used  
If this value is 0, it means that the session was created by playback with a *summarization\_level* of entire. (The entire session is represented in one sample, and there is no sample interval.)
- Error option used (continue or halt on non-fatal error)
- `views` produces one row for each view, with the following columns:
  - Session ID
  - View name
- `data_items` produces one row for each data item defined in a view, with the following columns:
  - Session ID
  - View name
  - Data item
  - Data item statistic type
  - Number of alarms defined for the data item
  - Number of filters defined for the data item
  - One of the following keywords:
    - `recorded` – indicates that the data is from the original recording session or preserved from that original session.
    - `summarized` – indicates that the data was summarized at a different sample interval from that of the original session.
    - `estimated` – indicates that the data was estimated, rather than calculated accurately, during summarization.
- `alarms` produces one row for each alarm defined for a data item in a view, with the following columns:
  - Session ID
  - View name
  - Data item
  - Data item statistic type
  - Alarm action (log or execute)

- File name for log file or file to execute
- Alarm value
- filters produces one row for each filter for a data item in a view, with the following columns:
  - Session ID
  - View name
  - Data item
  - Statistic type
  - Filter type (eq, neq, range, or top)
  - Value specified (returned as a single string)
- summarization\_data\_items produces one row for each combination of data item and statistic type that can be requested for non-row playback from a view, with the following columns:
  - Session ID
  - View name
  - Data item
  - Statistic type
  - One of the following keywords:
    - recorded – indicates that the data for this data item, if played back, would be the data from the original recording session, or data preserved from that original session.
    - summarized – indicates that the data for this data item, if played back, would be available in summarized form.
    - estimated – indicates that the data for this data item, if played back, would be available only in estimated form.

## hs\_playback\_sample

|             |   |
|-------------|---|
| Description | Plays back a sample when the playback <i>target</i> is client. The <i>target</i> is defined in the <code>hs_create_playback_session</code> command. |
| Syntax      | <code>hs_playback_sample [step [, retry_count] ]</code>   |

## Parameters

*step*

specifies the sample to send to the client, relative to the sample sent in the most recent `hs_playback_sample` command for the current playback session. Valid values are 0 or positive numbers.

The default is +1, which sends the next later sample. At the beginning, a *step* of +1 returns the first sample. Zero resends the most recently sent sample. A *step* of +2 sends the next later sample after the one that a *step* of +1 would have sent, and so on. An attempt to display a sample later than the last sample returns an error message.

The `hs_initiate_playback` command initializes playback so that the default (+1) sends the first sample in the playback session.

The definition of what constitutes a sample is affected by the *summarization\_interval* and *missing\_data\_option* parameters to the `hs_create_playback_session` command.

If the playback session was created with a *summarization\_interval* parameter of actual, entire, or a user-specified interval, and if any view in the playback session contains a data item with a statistic type of "Value for Session" or "Rate for Session", then the only permissible value for *step* is +1, the default.

*retry\_count*

specifies the number of times that the Historical Server will retry, at one-second intervals, to read data from a historical data file of a recording session that is still recording at the time of playback.

The default is zero, that is, no retries are attempted and an error is returned when playback reaches an end-of-file condition while reading a historical data file.

## Examples

- 1 This example plays back the next sample:

```
hs_playback_sample
```

- 2 This example skips over one sample and plays the next sample. If recording is ongoing, Historical Server retries up to 30 times to retrieve another sample if the end-of-file is reached.

```
hs_playback_sample 2, 30
```

## Usage

## Format of returned data

The `hs_playback_sample` command returns data in the form of tables. It returns one table for each playback view. The tables are arranged in the same order in which you submitted the `hs_create_playback_view` commands that created the views.

The columns in each table correspond to the data items in the corresponding playback view. The columns are arranged in the order in which the data items were listed when you defined the playback view. See Table B-3 on page 152 to determine the datatype of each column.

Each row represents a different combination of key data items in the view. If the view contains no key data items, then the table returns a single row reflecting server-level data.

When there is no activity to report, some views return a row with zero values and other views omit the row. The rules controlling whether or not a row with zero values appears in a view are:

- Views with server-level data items always return a row, even when there is no activity to report.
- Views that contain the key data items Process ID, Object ID, or Procedure ID omit the row when there is no activity to report. See “Views with Process ID” on page 80 for more explanation about when a Process ID is returned.
- Views that contain keys other than those listed in the previous item return rows even when there is no activity.

If playback is summarizing data, a row is returned for a combination of keys if *any* sample in *any* of the input sessions contains the same combination of keys.

If an integer data item overflows, Historical Server returns the largest valid number in the data item, and returns an information message to the client.

#### Views with Process ID

When a server process terminates, Adaptive Server can reuse its Process ID for a new process. Therefore, the Process ID data item is not guaranteed to uniquely identify a process. The Kernel Process ID data item, however, uniquely identifies a process.

Views that include Process ID return rows as follows:

- Recording session views (and hence, raw playback views) return a row only for Process IDs representing processes that exist at the end of a sample interval. If a server process terminates in the middle of a sample interval, a row is not returned for its Process ID.

- Summary playback views do not require the server process to exist for the duration of the playback sample. Summary views return rows for all server processes included in any of the input views. However, since Process ID is not guaranteed to be unique, the Kernel Process ID must be included in any summary view that includes Process ID to ensure uniqueness of the key. Otherwise, the summary could erroneously combine data from two different processes.

Gaps in data within the playback session

The *start\_time* and *end\_time* parameters to the `hs_create_playback_session` command define the period of time that the playback session covers. When the *target* parameter to the `hs_create_playback_session` command is *client*, there might be intervals of time between the playback session's start and end times for which no data is available in any of the input sessions.

---

**Note** When *target* is *file*, no gaps are allowed in the specified input sessions, so there will not be gaps in the playback session.

---

Gaps in available data might occur when:

- The input sessions specified for the playback session are not contiguous. For example, if a series of input sessions covered the time period between 9 a.m. and 5 a.m., Monday through Friday, data gaps would exist between 5 p.m. each evening and 9 a.m. the next morning. Larger gaps would exist between Friday evening and Monday morning.
- The playback session does summarization and has a start or end time beyond when data is available from the input sessions.

When the target of playback is a client, Historical Server handles gaps according to the value of the *missing\_data\_option* parameter to the `hs_create_playback_session` command:

- *skip* (the default) – when a time period contains no data, the `hs_playback_sample` command goes directly to the next time period containing data, rather than returning a sample having no data.
- *show* – the `hs_playback_sample` command returns a sample even for a time period where no data is available. No data is returned (the length of each data table returned is zero).

For the client to receive a timestamp in this case, there must be a playback view containing *only* the data item Timestamp or Timestamp Datim. A view containing any other data items returns zero rows.

The playback session's summarization level affects the number of empty samples returned during playback:

- if *summarization\_level* is raw or actual, the entire gap is represented with one sample. For example, a gap in data between the hours of 5 p.m. and 9 a.m. would be represented by one sample.
- if *summarization\_level* is a time interval, such as 1/2 hour (specified as "0 00:30:00"), the gap is represented with a sample for each time interval. For example, if the time interval is specified as 1/2 hour, a gap in data between the hours of 5 p.m. and 9 a.m. would be represented by 32 empty samples.
- if *summarization\_level* is entire, gaps are ignored.

## hs\_shutdown

Description

Shuts down Historical Server.

Syntax

hs\_shutdown [*wait\_option*]

Parameters

*wait\_option*

specifies whether termination should occur immediately or wait for active connections to close. Valid values are:

- no\_wait – causes Historical Server to shut down immediately and terminates any connections (including those performing playback) and active recording sessions. The active recording sessions and playback sessions that are creating new sessions are shut down in a controlled manner, which prevents corruption of the control file or any historical data files.
- wait (the default) – defers shutdown until all active recording sessions (including those performing playback) complete and any other active connections are closed. No new connections are accepted during this time.

Examples

This example shuts down Historical Server immediately and terminates any connections and active recording sessions.



## Usage

```
hs_shutdown no_wait
```

- If you use the `hs_shutdown` command without the `no_wait` option and then want to cancel the request, you can send an interrupt to Historical Server to cancel the shutdown request. A DB-Library application calls the `dbcancel()` function and a CT-Library application calls the `ct_cancel()` function to cause such an the interrupt. The `isql` command generates one of these calls when you send it an interrupt signal, which usually is done by typing `Ctrl+C`.
- You can request an immediate shutdown of Historical Server at any time by sending one of the following four signals:
  - `SIGQUIT` (quit)
  - `SIGINT` (interrupt)
  - `SIGABORT` (abort)
  - `SIGTERM` (terminate)

Reception of one of these signals at any time (including while waiting for the `hs_shutdown` command to complete) is equivalent to issuing the `hs_shutdown no_wait` command.

---

**Warning!** Sybase strongly recommends that you do not use the kill signal (`SIGKILL`) to shut down Historical Server. The kill signal does not permit any controlled cleanup to be done and may result in data loss.

---

- If any active sessions were terminated during the shutdown, Historical Server writes information about the sessions to its log file. Active sessions are recording sessions or playback sessions in the process of creating a new recording session.
- If a superuser was specified in the Historical Server start-up command, the only user who can shut down Historical Server is the superuser. If a superuser was not specified, any user can shut down Historical Server.
- See Chapter 3, “Starting and Stopping Historical Server” for more information about stopping Historical Server.

## hs\_status

Description

Obtains status information.

Syntax

hs\_status *option*

Parameters

*option*

one of the following specifications:

- **directory** – displays the name of the Historical Server home directory, specified by the -D parameter to the Historical Server start-up command.
- **superuser** – displays the name of the Historical Server superuser, specified by the -U parameter to the Historical Server start-up command (or NULL if this parameter was omitted).
- **interfaces** – displays the path name of the *interfaces* or *sql.ini* file in use by Historical Server.
- **max\_connections** – displays the maximum number of concurrent client connections permitted.
- **logfile** – displays the name of the Historical Server log file.
- **version** – displays the version string and copyright information of Monitor Historical Server.
- **activity** – displays the following information about the current level of activity on Historical Server:

| <b>Number of connections</b>            | <b>Connections to Historical Server, including the current connection</b>   |
|---|---|
| Number of active recording sessions     | Sessions created with <code>hs_create_recording_session</code> and initiated with <code>hs_initiate_recording</code> . Includes sessions whose start times have not yet been reached. |
| Uninitiated recording sessions          | Sessions created with <code>hs_create_recording_session</code> but no matching <code>hs_initiate_recording</code> was executed.   |
| Number of active playback sessions      | Sessions created with <code>hs_create_playback_session</code> and initiated with <code>hs_initiate_playback</code> .  |
| Number of uninitiated playback sessions | Sessions created with <code>hs_create_playback_session</code> but no matching <code>hs_initiate_playback</code> was executed.   |

The activity information is relevant when stopping Historical Server because Historical Server does not shut down while other connections exist or any sessions are active, unless the `no_wait` option for the `hs_shutdown` command is explicitly requested.

|          |  |
|----------|--|
| Examples | This example displays the name of the Historical Server home directory:<br><br><code>hs_status directory</code>  |
| Usage    | The <code>hs_status</code> command returns the <code>max_connections</code> field and all of the activity fields as integer datatypes. All other fields are returned as character strings. |

## hs\_terminate\_playback

|             |   |
|-------------|---|
| Description | Terminates the definition of a playback session and the actual playback.  |
| Syntax      | <code>hs_terminate_playback</code>  |
| Usage       | <ul style="list-style-type: none"> <li>• This command is valid only after a successful <code>hs_create_playback_session</code> command.</li> <li>• Once you issue a successful <code>hs_create_playback_session</code> command, you must issue <code>hs_terminate_playback</code> before you can start defining any additional playback sessions or recording sessions.</li> <li>• Unlike a recording session definition, playback session definitions are not stored in the Historical Server control file.</li> </ul> |

## hs\_terminate\_recording

|             |  |
|-------------|--|
| Description | Terminates the definition of a recording session, cancels the scheduled start of a recording session, or terminates a recording session in progress.   |
| Syntax      | <code>hs_terminate_recording session_id [,delete_option]</code>  |
| Parameters  | <p><i>session_id</i><br/>identifies the session you want to terminate. Historical Server assigns a session ID when a session is defined with <code>hs_create_recording_session</code>. Use the <code>hs_list</code> command to view session IDs.</p> <p><i>delete_option</i><br/>specifies whether to delete the files associated with the recording session, if recording is in progress.</p> |

- delete – deletes the files.
- retain (the default) – does not delete the files. This parameter is ignored when you are cancelling a recording session that was not initiated.

Examples

This example terminates the active recording session with identifier 5 and then deletes all files associated with session 5.

```
hs_terminate_recording 5,delete
```

Usage

- If you initiate a recording, you are the session owner.
- To terminate a recording session, you must be the session owner or the Historical Server superuser.
- The `hs_terminate_recording_session` command can cancel the definition of a recording session that was created in the current connection but never initiated. This allows you to define another recording session or to define a playback session using the current connection.
- If you attempt to terminate an inactive recording session, this command returns an error.

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## Overview of Historical Server data files

The topics in this section are:

- Description of Historical Server files
- Permissions on files
- General file format

## Description of Historical Server files

The Historical Server files are:

- Control file – all recording sessions for the same Historical Server use the same control file. For information about multiple Historical Server instances and control files, see “Configuring multiple instances of Historical Server” on page 23.
- Error message file – each recording session has its own error message file. The file is empty if no errors are logged for the session.

- Data file – each view in a recording session is represented by a data file. The data file holds all of the samples collected for the view during the session.
- Script file – when you define a recording session using the `hs_create_recording_session` command, the `script_type` parameter can specify creation of a SQL script file. The script file defines a Adaptive Server table for each view in the recording session.

You can use the bulk copy (`bcp`) utility to populate existing Adaptive Server tables. If you are a UNIX user, you can put subsets of the fields into separate Adaptive Server tables if you first invoke the `cut` utility to strip the desired columns from the file.

## Permissions on files

All of the historical monitoring data files for a given recording session are stored in the same directory. This directory is, by default, the directory specified by the `-D` parameter to the Historical Server start-up command. You can override this default for a session when you create the session.

The user who starts Historical Server is the owner of the files that Historical Server creates. The owner has read and write permission on the historical monitoring files. If the data contained in an historical data file or error message file is public rather than private, all users and groups have read permission.

## General file format

All files use newline characters as end-of-record markers. The fields in each file are variable-length and are separated by commas. All data is stored in ASCII format, which is compatible with the Sybase bulk copy (`bcp`) utility.

## Control file

The *hs.ctl* control file resides in the Historical Server home directory. The control file maintains information about all recording sessions, past and present, known to Historical Server. See “The Historical Server control file and home directory” on page 9 for more details about how Historical Server uses the control file.

Use the Historical Server `hs_list` command to gain access to the information in the Historical Server control file. Do not edit the control file. You might inadvertently corrupt the file.

Regardless of the editor you use, do not open and then save this file. This is true especially if Historical Server is running on Windows NT. Unlike the other files created by Historical Server, the control file is not a standard-format Windows NT text file. Lines of text in the control file are terminated only with new-line characters, rather than the usual carriage-return/newline pairs. The editing program may corrupt the file by embedding unwanted carriage-return/newline pairs into the text.

The control file contains the following types of records:

- Header record
- Session control record
- Data item control record
- Alarm control record
- View control record
- Filter control record

## Header record

The first record in the control file is a header record that contains the following six integer fields:

- An “update in progress” flag
- A byte offset in the file of the information being updated
- A unique session ID to be assigned by Historical Server to the next recording session
- A copy of the unique session ID for use in file corruption detection and recovery

- The session ID of the session whose control information was most recently written to the control file
- The number of session entries in the control file that are no longer valid because one or more data files or error message files they refer to were deleted

Following this header record are a number of records of different types that describe all of the recording sessions, past and present, known to Historical Server. These records appear in hierarchical sequential order in the control file, where the hierarchy of record types in top-down order is:

- Session control
- View control
- Data item control
- Alarm control and filter control

For example, a session that consisted of two views, each with two data items that had one alarm and one filter apiece, would be represented by the following hierarchy of control records, stored in the following order:

```
session 1
  view 1
    data item 1
      alarm 1
      filter 1
    data item 2
      alarm 2
      filter 2
  view 2
    data item 3
      alarm 3
      filter 3
    data item 4
      alarm 4
      filter 4
```

The contents of the various control record types are described in the next sections.

## Session control record

The session control record contains:



- Record identifier (the word “session”).
- Status of the session. The status can be active, inactive, or invalid. A status of invalid applies if any data file or error message file belonging to the session has been deleted or if the session was terminated before its start time was reached.
- Byte offset to the next session record in the control file, from the start of this record.
- Session ID, a number that uniquely identifies the session among all sessions that appear in this control file. Session IDs are integers assigned sequentially in increasing order.
- User name of the client who requested that the recording be made.
- Start date and time of the recording session.

The start and end times in the control file reflect as closely as possible when a recording session actually started and ended. These actual times might differ slightly from the *start\_time* and *end\_time* parameter values specified in the command. For example, *start\_time* might be scheduled as 1 p.m., but because of a busy system, the session might actually start at 1:02 p.m.

- End date and time of the recording session.
- Name of the Adaptive Server monitored.
- Name of Monitor Server that participated in the recording session.
- Path name of the directory in which the monitoring files for the session are stored.
- Name of the error message file for the session.
- Sample interval, in seconds, used during recording.  
If this value is 0, it means that the session was created by playback with a *summarization\_level* of entire. (The entire session is represented in one sample, and there is no sample interval.)
- Protection level in effect (public/private).
- Error option (continue/halt if nonfatal error during recording).
- Type of script file created (sybase\_script/no\_script).
- Encrypted password of the client that created the recording session.
- If the session was created as a result of playback, the keyword summary.

There is one session control record in the file for each recording session. The first view control record for the session follows immediately.

## View control record

The view control record contains:

- Record identifier (the word “view”)
- View name
- Name of the data file for the view

One view control record exists for each view defined on a recording session. One or more data item control records that identify the data items in the view follow each control record. Alarm control and filter control records are interspersed between the data item control records as appropriate.

## Data item control record

The data item control record contains:

- Record identifier (the word “dataitem”).
- Data item name.
- Statistic type.
- In sessions created from playback, the keyword *estimated* indicates a data item whose values were obtained by estimation from data items in other sessions.

One data item control record exists for each data item that appeared in the current view’s definition. If alarms or filters or both are applied to the data item, their control records follow that data item’s control record. All of the alarm control records for the data item precede the filter control records for the same data item.

## Alarm control record

The alarm control record contains:

- Record identifier (the word “alarm”)

- Alarm action
- Alarm action data (file name, possibly followed by a list of parameters)
- Alarm datatype
- Alarm value

One alarm control record exists for each alarm that is defined for the current data item. All of the alarm control records for the data item are grouped ahead of the first filter control record for the data item.

## Filter control record

The filter control record contains:

- Record identifier (the word “filter”)
- Filter type
- Filter datatype
- Value specification (one or more fields, separated by commas, in the same format as is used by the `hs_create_filter` command)

One filter control record exists for each filter that was applied to the current data item.

## Data file

A data file contains the data for a single view recorded during a session. The file name is *dsessionid\_viewnumber\_viewname* where:

- *sessionid* is the unique identifier for the session.
- *viewnumber* is a number greater than or equal to one that reflects the order in which views were defined for the session.
- *viewname* is the user-supplied name for the view, truncated if necessary to conform to the file-naming conventions of the current platform. On the Windows NT platform, the file name is limited to eight characters.

One record in the file exists for each unique combination of data item key field values that occurred in each sample taken.

Each such record holds:

- Date and time of the sample  
This timestamp is based on the local time in effect at the Adaptive Server that was monitored
- Values of all of the data items sampled

If no data is returned for this view during a given sample interval, a placeholder record is written to the historical data file. This record contains the timestamp of the sample, followed by a comma-separated list of empty values. That is, the timestamp field is followed by as many commas as are needed to separate the remaining data items of the view, but no values are stored for those data items. This format is acceptable to the Bulk Copy utility, provided that the columns into which the data items are being copied will accept nulls.

## Error message file

Any error messages that are received while recording samples for a session are stored in a separate error message file. This file's name is *eSessionId* where:

- *e* is a constant.
- *SessionId* is the unique identifier for the session.

Each record in this file contains the following fields:

- Date and time of the sample that occasioned the error message. This timestamp is based on the local time in effect at the Adaptive Server that was monitored. The timestamp field may be empty if the error prevented Historical Server from retrieving the sample timestamp.
- Error number
- Error severity
- Error state
- Error source:
  - 1 – unknown
  - 2 – Historical Server
  - 3 – CT-Library
  - 4 – Adaptive Server

- 5 – Monitor Server
- Error message text

For more information about error message fields, refer to the *Reference Manual*.

## Script file

If the value of the *script\_type* parameter of the *hs\_create\_recording\_session* command is *sybase\_script*, a script file is created for the session. The name of the script file is *ssessionId* where *sessionId* is the unique identifier for the session.

## Script file table names

The script file contains the text of create table commands, one command per view defined for the session. The name of each table is *sSessionId\_viewnumber\_viewname* where:

- *s* is a constant.
- *SessionId* is the unique identifier for the session.
- *viewnumber* is a number greater than or equal to one that reflects the order in which views were defined for the session.
- *viewname* is the user-supplied name for the views, truncated if necessary to conform to the limitations on the lengths of Adaptive Server identifiers.

## Script file table column names

The first column defined for each table contains the sample timestamp field. It is always named “Timestamp” and has the *datetime* datatype.

The names of the remaining table columns are derived from the data items that they represent. Each column name is *dataitemname\_stattype* where:

- *dataitemname* is a compressed form of the data item’s name.
- *stattype* is an abbreviated form of the data item’s statistic type.

Each column is assigned a datatype that is appropriate for the type of information that the data item represents. All columns except the sample timestamp column can contain null values.

## Passing script file commands

You can pass the create table commands in the script file to Adaptive Server by using the isql utility's `:r` command. After the table is defined with the `:r` command, you can use the Bulk Copy utility to import the view data files into the tables. For a Bulk Copy example, see “Bulk copy example” on page 97.

## Script use example

Use the following isql command to connect to the Adaptive Server in which you want to store the recorded monitoring data:

```
isql -Uusername -Ppassword -Sserver
```

where *username* is the name of a login account in that Adaptive Server, *password* is the password of that login account, and *server* is the Adaptive Server name.

Execute the following isql commands:

```
use database  
go
```

where *database* is the name of the database that will contain the new tables.

```
:r scriptfile  
go
```

where *scriptfile* is the path name of the script file that was created by the Historical Server.

A table now exists in the Adaptive Server for each view defined for the recording session.

## Bulk copy example

This section describes how to pass historical data files to the Bulk Copy (bcp) utility to populate Adaptive Server tables.

To store recorded data in an Adaptive Server table by using bcp, you must first create a table for each view defined for the session. In the table, create a separate column for each of the data items that comprise the view. The first column for each table, which stores the date and time of the sample, must be of the datetime datatype.

If no data is returned for a view during a sample interval while Historical Server is recording, a placeholder record is written to the view's data file. This record contains the timestamp of the sample followed by a comma-separated list of empty values. For this reason, it is recommended that all but the first column be defined to allow nulls.

You may simplify the process of creating tables by having the Historical Server create a script file for you. Use the `script_type` parameter of the `hs_create_recording_session` command.

After you create the tables on Adaptive Server, you can use the bcp utility to import data from the view data files to their respective tables. Run the following command once for each data file for which you want to import the data into an Adaptive Server table:

```
bcp [[database_name.]owner.]table_name in
view_data_file -c [-e errfile] [-U username]
[-P password] [-S sqlserver] -t,
```

where:

- *database\_name* is the name of the database where the tables to hold the imported data are located.
- *owner* is the name of the table's owner (presumably your own user name in the database that contains the table).
- *table\_name* is the name of the database table into which the data from the view's data file is to be imported.
- *view\_data\_file* is the name of the data file for the view.
- *errfile* is the name of an error file in which any rows that could not be transferred to the database table are to be stored.
- *username* is the login name to Adaptive Server.
- *password* is the password of the *username*.

- *sqlserver* is the name of Adaptive Server.
- *-t*, specifies the column terminators as being commas.

The default row terminator when using the *-c* option is a `\n` (new line) character used by data files. Therefore, you do not need to specify the *-r* option. If you do specify the record terminator option (*-r*), be sure to avoid the special significance the backslash (`\`) character has by including another backslash, i.e., `-r\\n`.

For more information about *bcp*, see the *Utilities Guide*.

## Example

Suppose you want to record, once every second, the reads, writes, and total I/O per device on an Adaptive Server that is monitored by the SMS1100 Monitor Server. You can use the following steps to record the data, create a table to accept the data, and then use the *bcp* utility to import the data into the table. In this example, the view data file that is created by Historical Server for the view is *d1\_1\_device\_io*.

- 1 Use *isql* to log in to Historical Server.
- 2 Record the data by using the following commands:

```
hs_create_recording_session SMS1100, 1
go
hs_create_view device_io,
"device name", "value for sample",
"device reads", "value for sample",
"device writes", "value for sample",
"device i/o", "value for sample"
go
hs_initiate_recording
go
```

- 3 Use *isql* to log in to Adaptive Server. Because the recording session contains only one view (“*device\_io*”), create just one table in the *pubs2* database to store data for that view by using the following Transact-SQL commands:

```
use pubs2
go
create table device_io
(
sample_time          datetime          not null,
```



```

device_name          varchar (255)    null,
device_reads_val     int                null,
device_writes_val    int                null,
device_io_val        int                null,
)
go

```

- 4 After the recording session is complete, you can use `bcp` to import data from the view's data file into the database table. Use the following commands:

```

bcp pubs2..device_io in d1_1_device_io -c
-e d1_1_device_io.err -Username
-Ppassword -Sserver -t

```

## Cut utility example

If you are on a UNIX machine, you can put subsets of the fields from data files into separate Adaptive Server tables if you first invoke the `cut` utility to strip and save the desired columns from the file. Use the following command:

```
cut -flist -d, view_data_file > output_file_name
```

where:

- *list* is a comma-separated list of the field numbers that you want to cut and save from the original view data file. The first field has field number 1.
- *view\_data\_file* is the name of the file where all of the recording data is stored.
- *output\_file\_name* is the name of the file where the stripped data is to be stored.

After using `cut`, you can use the `bcp` utility to import the data in the *output\_file\_name* into an Adaptive Server table. Historical Server might return lines to the *view\_data\_file* that are similar to:

```

1995/3/25 10:32:39,master,0,0,0
1995/3/25 10:32:39,sysprocsdev,0,0,0
1995/3/25 10:32:39,ANewDBDevice,0,0,0
1995/3/25 10:32:39,ATestDevice,0,0,0
1995/3/25 10:32:40,master,0,0,0
1995/3/25 10:32:40,sysprocsdev,0,0,0
1995/3/25 10:32:40,ANewDBDevic,0,0,0
1995/3/25 10:32:40,ATestDevice,0,0,0

```

Suppose that you are interested in only the total I/O for each device during the sample. You could execute the following command to cut out the data you want by executing the following command:

```
cut -f1,2,5 -d, d1_1_device_io > d1_1_device.io.new
```

where field 1 is the date and time of the sample, 2 is the second field, which is the device name, and 5 is the fifth field, which is the device I/O value.

Now you can import the *d1\_1\_device.new* file into an Adaptive Server table as described in the previous section, “Bulk copy example” on page 97.

For more information about the cut utility, refer to the UNIX reference pages on your system.

## Enabling Historical Server to output monitoring data to a database

In addition to saving Historical Server output to a file, you can send the output from the Historical Server directly to a database. When you save your data to a database, it is easier to analyze it.

When data is stored in a database, output from each Historical Server view is stored in a separate table. Changes to the Historical Server view definition will be automatically reflected in the table definition.

## Setting up the receiving Adaptive Server

Before you enable Historical Server to send its monitoring data to an Adaptive Server, you must select that Adaptive Server. Once you select an Adaptive Server to receive Historical Server monitoring data, you must:

- 1 Create a database for the Historical Server to use for storing monitoring data. The default for the name of the database is `hs_monitoring`. If you choose to have a different name for the database, create that named database, then change the database name in the `hs_directload.sql` script.
- 2 Run the install script `hs_directload.sql` on the database. The install script creates two catalog tables, sessions and views, and the stored procedure `sp_hs_dboutput`.

## Starting Historical Server

In order to enable Historical Server to send its monitoring data to an Adaptive Server database, you must specify the following:

- The destination for the monitoring data from Historical Server to a specific Adaptive Server and database, rather than a flat file.
- The user name and password to connect to the output server if they are not the same as those used by the Historical Server to connect to the monitored server. If the user name and the password are not specified, they default to the ones specified in the -U and -P parameters on the command line.

The target Adaptive Server and database for the historical data must be available when Historical Server is started.

The command line syntax is:

```
histserver -U<user name>
-P<password> -D<output dir>
-l<log file> -I<interfaces file>
[-d<delimiter>] [-O<ASE name>] [-o<DATABASE name>] [-f ]
-u<outputASE user name> -p<outputASEpassword>
```

- -O *ASE name* – the name of the target Adaptive Server.
- -o *DATABASE name* – the database name to which the monitoring data is sent, if it is not `hs_monitoring`, identify the database name on this option.
- -u *outputASE user name* – login name for the connection to the Adaptive Server with the output.
- -p *outputASEpassword* – password for the login name for the output Adaptive Server.
- -f – must be used when the -O option is specified if you want Historical Server to send data to files in the output directory as well as the database.

You must have access to Historical Server and update permissions to the target database.

In the following example, the -O and -o parameters are specified and the output database is called `hs_monitoring`:

```
$$SYBASE/ASE-12_5/bin/histserver -D$$SYBASE -Sajax_hs
-l$$SYBASE/ajax_hs.log -Uasa -Pnorthstar -Oajax
-ohs_monitoring
```

## Viewing the data

### Data storage

The data from Historical Server is in the same format as defined when the view was created on the server. To store the data, Historical Server creates two system tables:

- Sessions table provides a record of every recording session that used the output database.
- Views table lists the views that were used by each recording session.
- In addition to one table for each view that is output to the database, there are two system tables created in the Historical Server output database. These tables are:
  - The sessions table provides a record of every recording session that has used the output database.
  - The views table lists the views that were used by each recording session.

The following example shows the possible contents of the sessions table table:

```
1> select * from sessions
2> go
```

```
DbSessionId HsSessionId HsName HsAseName StartDate EndDate
-----
0           0       ajax_hs  ajax    Jul 22 2005 11:26AM   Jul 22 2005 11:45AM
1           14       ajax_hs  ajax    Jul 23 2005 12:25PM   Jul 23 2005  6:10AM
2           15       ajax_hs  ajax    Jul 24 2005 11:41AM   Jul 24 2005 11:59AM
3           16       ajax_hs  ajax    Jul 25 2005 11:56AM   Jul 25 2005 12:09PM
4           19       ajax_hs  ajax    Jul 26 2005 10:59AM   Jul 27 2005 11:25AM
5           23       ajax_hs  ajax    Jul 27 2005 11:26AM   Jul 27 2005 11:36AM
```

The following example shows the possible contents of the views table:

```
1> select * from views
2> go
```

```
DbSessionId ViewName
-----
1           stored_procs
1           connections
2           stored_procs_shutdown_test
```

```

2          connections
3          stored_procs_shutdown_test
3          connections
4          connections
5          stored_procedure_activity
5          connections
5          process_activity

```

The structures of the view data output tables are similar to the structures of the output data files, where:

- First column is the monitoring session ID.
- Second column is the monitored server name.
- Third column is a date/timestamp.
- Subsequent columns per data item specified in the view definition.

This structure, for the date and timestamp, and the data items, is identical to the structure defined in the DDL scripts Historical Server provides when a bulk copy is executed on Historical Server data files into another Adaptive Server.

---

**Note** viewname is the name for the view, truncated if necessary to conform to the file-naming conventions of the current platform. On Windows platforms, the file name is limited to thirty characters.

---

In the following example, the query reports the sessions that were active on July 27, 2005 and the views that were used by those sessions:

```

1> select HsAseName, HsName, StartDate, EndDate, ViewName
2> from sessions, views
3> where sessions.DbSessionId = views.DbSessionId
4> and StartDate >= 'July 27, 2005'
5> and EndDate < 'July 28, 2005'
6> go

```

| HsAseName | HsName     | StartDate           | EndDate             | ViewName       |
|-----------|------------|---------------------|---------------------|----------------|
| tribble   | tribble_hs | Jul 27 2005 10:59AM | Jul 27 2005 11:00AM | connections    |
| tribble   | tribble_hs | Jul 27 2005 11:00AM | Jul 27 2005 11:05AM | sproc_activity |
| tribble   | tribble_hs | Jul 27 2005 11:00AM | Jul 27 2005 11:05AM | connections    |
| tribble   | tribble_hs | Jul 27 2005 11:17AM | Jul 27 2005 11:24AM | sproc_activity |
| tribble   | tribble_hs | Jul 27 2005 11:17AM | Jul 27 2005 11:24AM | connections    |
| tribble   | tribble_hs | Jul 27 2005 11:25AM | Jul 27 2005 11:25AM | sproc_activity |
| tribble   | tribble_hs | Jul 27 2005 11:25AM | Jul 27 2005 11:25AM | connections    |

```
tribble tribble_hs Jul 27 2005 11:26AM Jul 27 2005 11:36AM sproc_activity
tribble tribble_hs Jul 27 2005 11:26AM Jul 27 2005 11:36AM connections
tribble tribble_hs Jul 27 2005 11:26AM Jul 27 2005 11:36AM process_activity
```

The following is an example of a Historical Server view:

```
hs_create_view process_activity,
  "Login Name", "Value for Sample",
  "Process ID", "Value for Sample",
  "Kernel Process ID", "Value for Sample",
  "Connect Time", "Value for Session",
  "Page I/O", "Value for Session",
  "CPU Time", "Value for Session",
  "Current Process State", "Value for Sample"
```

The query below shows the contents of the database table generated by the process\_activity view illustrated above.

```
1> select * from process_activity
3> go
```

```
DbId CPUTime ProcessID KernelProcessID ConnectTime PageIO ProcessState LogName
-----
5 0.128447 17 3211313 61 28531 6 jsmith
5 0.128447 17 3211313 121 28531 6 jsmith
5 0.032169 19 3276850 60 32072 6 byoung
5 0.128447 17 3211313 182 28531 6 jsmith
5 0.099188 18 3342387 61 28759 6 dcharles
5 0.032169 19 3276850 121 33283 6 byoung
5 0.128447 17 3211313 242 28531 6 jsmith
5 0.105076 18 3342387 121 24373 6 dcharles
5 0.032169 19 3276850 181 33283 6 byoung
5 0.128447 17 3211313 303 28531 6 jsmith
```

## Deleting Historical Server sessions

When you delete the recoding session using the command `hs_delete_data`, the default behavior is to only delete the output files corresponding to that session and to leave the entries intact in the output tables.

If you want to remove the session data from the output tables, you should enter:

```
hs_deletedata database_also, sessionId
```

This command removes all the corresponding entries in the Session and ViewPerSession tables.

## Reporting errors

Historical Server reports errors in the monitoring data output saving process in the same manner as it does when outputting to flat files. You are notified of the errors encountered through the session error files and the HS log file. Errors relating to the database output mode can include:

- If the target Adaptive Server does not exist, Historical Server reports a failure.
- If the target database specified on the command-line does not exist, Historical Server reports a failure.
- If Historical Server cannot write to the database specified on the commandline because it has run out of disk space, Historical Server reports a failure.
- If Historical Server has to add columns to an existing table in order to use it for its monitoring output, it will log a warning message.





## Table of data items and definitions

Table A-1 describes the data items available for inclusion in recording session views. The table lists data items in alphabetical order and provides the following information about each one:

- A definition
- An Adaptive Server release dependency designation
- A result or key designation

**Table A-1: Data items and definitions**

| Data item  | Description  |
|--|--|
| Application Execution Class<br><br>Version: 11.5 and later | <p>Configured execution class, if any, for a given application name. Because of override features, the configured execution class does not necessarily reflect the priority and engine group at runtime. The following notations are used in the monitor:</p> <ul style="list-style-type: none"> <li>• Blank – no execution class is configured for this application.</li> <li>• Execution class name – the execution class configured for the application in general, without consideration for specific logins. (That is, an execution class is configured for the application with null scope.)</li> <li>• Execution class name followed by asterisk (*) – in addition to the execution class configured for the application in general, additional execution classes are configured for specific logins. (That is, an execution class is configured for the application with null scope and at least one additional execution class is configured for the application with a specific scope.)</li> <li>• An asterisk (*) without execution class – no execution class is configured for the application in general, but execution classes are configured for specific logins using this application. (That is, at least one execution class is configured for the application with a specific scope.)</li> </ul> <p>Type: Result</p> |
| Application Name<br><br>Version: 11.0 and later            | <p>Name of application for which other statistics are being accumulated. Views that contain Application Name report only on processes that are active as of the end of the sample period.</p> <p>Application name is mutually exclusive with Process ID in a view.</p> <p>Type: Key</p>  |

Table of data items and definitions

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| <b>Data item</b>                               | <b>Description</b>  |
|--|---|
| Blocking Process ID<br>Version: 11.0 and later | ID of the process that holds a lock that another process is waiting for, if any. A returned value of zero means that the other process is not blocked.<br>Type: Result  |
| Cache Efficiency<br>Version: 11.0 and later    | The number of cache hits per second per megabyte of a particular data cache.<br>Type: Result  |
| Cache Hit Pct<br>Version: 11.0 and later       | The fraction of the page reads for objects bound to a particular data cache that are satisfied from the cache computed from the following formula:<br>$\text{cache\_hits} / (\text{cache\_hits} + \text{cache\_misses}) * 100$<br>Type: Result  |
| Cache Hits<br>Version: 11.0 and later          | The number of times a page read was satisfied from a particular data cache.<br>Type: Result   |
| Cache ID<br>Version: 11.0 and later            | The ID of a data cache in Adaptive Server version 11.0 or later. Particular database tables and indexes may be bound to a specific data cache, or all objects in a database may be bound to the same data cache. No object may be bound to more than one data cache.<br>Type: Key   |
| Cache Misses<br>Version: 11.0 and later        | Number of times a page read was satisfied from disk rather than from a particular data cache. This data item includes failed attempts to locate pages in the data caches during page allocation. Therefore, the number of physical page reads reported may be overstated. If this occurs, the percentage of data cache misses reported by Cache Hit Pct is understated.<br>Type: Result |
| Cache Name<br>Version: 11.0 and later          | The name of a data cache. Particular database tables and indexes may be bound to a specific data cache, or all objects in a database may be bound to the same data cache. No object may be bound to more than one cache.<br>Type: Key   |

| Data item  | Description   |
|--|---|
| Cache Prefetch Efficiency<br>Version: 11.0 and later | <p>A percentage comparing the count of pages being reused in large I/O buffers (the denominator) to the number of those pages that were ever referenced by Adaptive Server. When a buffer is reused, all of the pages in it are counted as reused. Buffers are reused when there are no free buffers in the pool to accept a new physical read from a database device. The number of reused pages referenced by Adaptive Server divided by the result of the number of pages per buffer multiplied by the number of reused buffers indicates the effectiveness of large I/O fetches.</p> <p>Regardless of how many buffer pools are configured in a named data cache, Adaptive Server only uses two of them. It uses the 2K buffer pool and the pool configured with the largest-sized buffers. Prefetch effectiveness does not apply to the 2K buffer pool, since 2K grabs are not considered large I/O. Therefore, prefetch effectiveness applies to the largest buffer pool in the cache. For example, if a data cache has pools of buffers sized 2K, 8K, and 16K, the 8K pool is not used, and this metric reflects the effectiveness of large I/O in the 16K buffer pool.</p> <p>If the ratio is large, then prefetching is effective; otherwise, prefetching is not providing much benefit. This may suggest that a buffer pool should be eliminated (or it may imply that a clustered index on some table is fragmented, and that the index should be dropped and re-created).</p> <p>Type: Result</p> |
| Cache Refer and Reuse<br>Version: 11.0 and later     | <p>The number of pages in buffers that were both referenced and reused. This count is employed when determining the efficiency of prefetching buffers (see Cache Prefetch Efficiency). This data item, unlike Cache Prefetch Efficiency, includes activity in the default 2K buffer pool.</p> <p>See Cache Prefetch Efficiency for a definition of buffer reuse.</p> <p>Type: Result</p>  |
| Cache Reuse<br>Version: 11.0 and later               | <p>The number of pages in buffers that were reused. A large value indicates a high rate of turnover (of buffers in this memory pool), and suggests that the pool may be too small. A zero value suggests that this memory pool may be too large. This data item, unlike Cache Prefetch Efficiency, includes activity in the default 2K buffer pool.</p> <p>See Cache Prefetch Efficiency for a definition of buffer reuse.</p> <p>Type: Result</p>  |
| Cache Reuse Dirty<br>Version: 11.0 and later         | <p>The number of times that a buffer that was reused had changes that needed to be written. A non-zero value indicates that the wash size is too small.</p> <p>See Cache Prefetch Efficiency for a definition of buffer reuse.</p> <p>Type: Result</p>  |
| Cache Size<br>Version: 11.0 and later                | <p>The size of a data cache, in megabytes.</p> <p>Type: Result</p>  |

| <b>Data item</b>                                     | <b>Description</b>  |
|--|---|
| Cache Spinlock Contention<br>Version: 11.0 and later | The fraction of the requests for a data cache's spinlock that were forced to wait.<br><i>spinlock_waits / spinlock_requests</i><br>Type: Result   |
| Code Memory Size<br>Version: 11.0 and later          | Amount of memory in bytes allocated to Adaptive Server.<br>Type: Result   |
| Connect Time<br>Version: 11.0 and later              | Number of seconds elapsed since the process was started or since the session was started, whichever is smaller.<br>Type: Result   |
| CPU Busy Percent<br>Version: 11.0 and later          | Percentage of total server CPU ticks that the Adaptive Server CPU was busy.<br>Type: Result   |
| CPU Percent<br>Version: 11.0 and later               | If used in a view with Process ID, this is the percentage of time a single process was in the Running state over the time all processes were in the Running state.<br>If used in a view with Application Name, this is the percentage of time the set of processes running a given application were in the Running state over the time all processes were in the Running state.<br>Type: Result |
| CPU Time<br>Version: 11.0 and later                  | If used in a view with no keys, this data item is the total CPU busy time, in seconds, on the server. If used with keys, this data item is the busy time, in seconds, that was used by each process, application, or engine. Process ID and Application Name are mutually exclusive.<br>Type: Result  |
| CPU Yields<br>Version: 11.0 or later                 | Number of times that the Adaptive Server yielded to the operating system.<br>Type: Result   |
| Current Application Name<br>Version: 11.0 and later  | The name of the application that is currently executing on a particular process.<br>Type: Result  |
| Current Engine<br>Version: 11.0 and later            | Number of the Adaptive Server engine on which the process was running most recently.<br>Type: Result  |
| Current Execution Class<br>Version: 11.5 and later   | The name of the execution class under which a process is currently running.<br>Type: Result   |
| Current Process State<br>Version: 11.0 and later     | Current state of a process. See Process State for definitions of the possible states.<br>Type: Result   |

| <b>Data item</b>   | <b>Description</b>   |
|--|--|
| Current Stmt Batch ID<br>Version: 11.5 and later               | The ID of a particular query batch being executed on a particular process.<br>Type: Result   |
| Current Stmt Batch Text<br>Version: 11.5 and later             | The text of a particular query batch being executed for a particular process. This text may be only an initial substring of the complete text in a query batch. The amount of text stored in this field is determined by the Adaptive Server max SQL text monitored configuration parameter.<br>Type: Result   |
| Current Stmt Batch Text Byte Offset<br>Version: 11.5 and later | The byte offset to the beginning of a statement within the query batch or stored procedure being executed for a particular process. If both:<br>Current Stmt Procedure Database ID is equal to 0 and Current Stmt Procedure ID is equal to 0 then the statement is the currently executing SQL statement in the query batch. Otherwise, the statement is the currently executing SQL statement in the stored procedure uniquely identified by these two IDs.<br>Type: Result |
| Current Stmt Batch Text Enabled<br>Version: 11.5 and later     | Reports whether Adaptive Server (version 11.5 and later) is saving the SQL text of the currently executing query batches and, if so, how much.<br>Value of 0 = saving SQL text disabled<br>Value of 1 or more = maximum number of bytes of batch text per server process that can be saved.<br>Type: Result  |
| Current Stmt Context ID<br>Version: 11.5 and later             | The ID that uniquely identifies a stored procedure invocation within a particular query batch being executed for a particular process.<br>Type: Result   |
| Current Stmt CPU Time<br>Version: 11.5 and later               | The amount of time (in seconds) that the currently executing SQL statement has spent in the running state.<br>Type: Result   |
| Current Stmt Elapsed Time<br>Version: 11.5 and later           | The amount of time (in seconds) that the currently executing SQL statement has been running.<br>Type: Result   |
| Current Stmt Line Number<br>Version: 11.5 and later            | The number of the line (within a query batch or stored procedure) that contains the beginning of the currently executing SQL statement for a particular process. The currently executing SQL statement is in the query batch if both Current Stmt Procedure Database ID is equal to 0 and Current Stmt Procedure ID is equal to 0.<br>Otherwise, the currently executing SQL statement is in the stored procedure uniquely identified by these two IDs.<br>Type: Result      |

*Table of data items and definitions*

| <b>Data item</b>  | <b>Description</b>  |
|---|---|
| Current Stmt Locks Granted After Wait<br><br>Version: 11.5 and later  | Number of lock requests by the currently executing SQL statement that were granted after waiting.<br><br>Type: Result   |
| Current Stmt Locks Granted Immediately<br><br>Version: 11.5 and later | Number of lock requests by the currently executing SQL statement that were granted immediately or were not needed (because sufficient locking was already held by the requestor).<br><br>Type: Result   |
| Current Stmt Locks Not Granted<br><br>Version: 11.5 and later         | Number of lock requests by the currently executing SQL statement that were denied.<br><br>Type: Result  |
| Current Stmt Logical Reads<br><br>Version: 11.5 and later             | Number of data page reads satisfied from cache or from device reads by the currently executing SQL statement.<br><br>Type: Result   |
| Current Stmt Number<br><br>Version: 11.5 and later                    | The number of the statement (appearing in a query batch or stored procedure) that is the currently executing SQL statement for a particular process. The currently executing SQL statement is in the query batch if both Current Stmt Procedure Database ID is equal to 0 and Current Stmt Procedure ID is equal 0.<br><br>Otherwise, the currently executing SQL statement is in the stored procedure uniquely identified by these two IDs.<br><br>A value of 0 indicates partial result data for the currently executing SQL statement. In other words, this SQL statement began executing before monitoring began. Performance metrics are available but numbers reflect only the time period since the start of monitoring.<br><br>Type: Result |
| Current Stmt Page I/O<br><br>Version: 11.5 and later                  | Number of combined logical page reads and page writes by the currently executing SQL statement.<br><br>Type: Result   |
| Current Stmt Physical Reads<br><br>Version: 11.5 and later            | Number of data page reads by the currently executing SQL statement that could not be satisfied from the data cache.<br><br>Type: Result   |
| Current Stmt Procedure Database ID<br><br>Version: 11.5 and later     | The database ID of the stored procedure (including triggers, a special kind of stored procedure) that contains the currently executing SQL statement for a particular process. If the currently executing SQL statement is not contained in a stored procedure, this ID is 0.<br><br>Type: Result   |

| Data item   | Description  |
|---|--|
| Current Stmt Procedure Database Name<br><br>Version: 11.5 and later | The database name of the stored procedure (including triggers, a special kind of stored procedure) that contains the currently executing SQL statement for a particular process. If the currently executing SQL statement is not contained in a stored procedure, this name is <b>***NoDatabase***</b> .<br><br>Type: Result   |
| Current Stmt Procedure ID<br><br>Version: 11.5 and later            | The ID of the stored procedure (including triggers, a special kind of stored procedure) that contains the currently executing SQL statement for a particular process. If the currently executing SQL statement is not contained in a stored procedure, this ID is 0.<br><br>Type: Result   |
| Current Stmt Procedure Name<br><br>Version: 11.5 and later          | The name of the stored procedure (including triggers, a special kind of stored procedure) that contains the currently executing SQL statement for a particular process. If the currently executing SQL statement is not contained in a stored procedure, this name is <b>***NoObject***</b> .<br><br>Type: Result  |
| Current Stmt Procedure Owner Name<br><br>Version: 11.5 and later    | The owner name of the stored procedure (including triggers, a special kind of stored procedure) that contains the currently executing SQL statement for a particular process. If the currently executing SQL statement is not contained in a stored procedure, this name is <b>***NoOwner***</b> .<br><br>Type: Result   |
| Current Stmt Procedure Text<br><br>Version: 11.5 and later          | The text of a particular stored procedure (including triggers, a special kind of stored procedure) being executed for a particular process. If both Current Stmt Procedure Database ID is equal to 0 and Current Stmt Procedure ID is equal to 0 then a stored procedure is not currently executing and this text is a null-terminated empty string (""). If the text is not available (because this stored procedure was compiled and its text was discarded, or because the text is stored in an encrypted format), then this text is a null-terminated empty string ("").<br><br>Type: Result |
| Current Stmt Query Plan Text<br><br>Version: 11.5 and later         | The text of the query plan for a particular query being executed for a particular process. If the text is not available (because the Adaptive Server has removed this plan from its catalog of query plans), then this text is a null-terminated empty string ("").<br><br>Type: Result  |
| Current Stmt Start Time<br><br>Version: 11.5 and later              | The date and time, in the time zone of Adaptive Server, when the currently executing SQL statement began running.<br><br>If this SQL statement began running before monitoring began, then this result is the date and time that activity was first encountered for this statement.<br><br>Type: Result  |

| <b>Data item</b>   | <b>Description</b>   |
|--|--|
| Current Stmt Text Byte Offset<br><br>Version: 11.5 and later | The byte offset to the beginning of a statement within the query batch or stored procedure being executed for a particular process.<br><br>If both Current Stmt Procedure Database ID is equal to 0 and Current Stmt Procedure ID is equal to 0, then the statement is the currently executing SQL statement in the query batch. Otherwise, the statement is the currently executing SQL statement in the stored procedure uniquely identified by those two IDs.<br><br>Type: Result |
| Database ID<br><br>Version: 11.0 and later                   | Unique identification of a database.<br><br>Type: Key  |
| Database Name<br><br>Version: 11.0 and later                 | Name of the database.<br><br>Type: Result  |
| Deadlock Count<br><br>Release: 11.0 and later                | Number of deadlocks.<br><br>Type: Result   |
| Demand Lock<br><br>Version: 11.0 and later                   | A character string (Y or N) that indicates whether or not a lock that has been upgraded to demand lock status.<br><br>Type: Result   |
| Device Hit Percent<br><br>Version: 11.0 and later            | The fraction of device requests is computed by multiplying the quotient of device hits divided by device misses plus device misses by 100.<br><br>Type: Result   |
| Device Hits<br><br>Version: 11.0 and later                   | Number of times access to a device was granted.<br><br>Type: Result  |
| Device I/O<br><br>Version: 11.0 and later                    | Combination of device reads and device writes.<br><br>Type: Result   |
| Device Misses<br><br>Version: 11.0 and later                 | Number of times access to a device had to wait.<br><br>Type: Result  |
| Device Name<br><br>Version: 11.0 and later                   | Name of a database device defined in Adaptive Server.<br><br>Type: Key   |
| Device Reads<br><br>Version: 11.0 and later                  | Number of reads made from a device.<br><br>Type: Result  |
| Device Writes<br><br>Version: 11.0 and later                 | Number of writes made to a device.<br><br>Type: Result   |



| <b>Data item</b>  | <b>Description</b>  |
|---|---|
| Elapsed Time<br>Version: 11.0 and later                     | The time increment, in seconds, either from one data refresh to the next (sample) or from the creation of the view to the present (session).<br>Type: Result  |
| Engine Number<br>Version: 11.0 and later                    | Number of the Adaptive Server engine.<br>Type: Key  |
| Host Name<br>Version: 11.0 and later                        | The name of the host computer that established a particular connection.<br>Type: Result   |
| Index Logical Reads<br>Release: 11.0 and later              | Number of index page reads satisfied from cache and from database devices.<br>Type: Result  |
| Index Physical Reads<br>Version: 11.0 and later             | Number of index page reads that could not be satisfied from the data cache.<br>Type: Result   |
| Kernel Process ID<br>Version: 11.0 and later                | An Adaptive Server process identifier that remains unique over long periods of time.<br>Type: Key   |
| Kernel Structures<br>Memory Size<br>Version: 11.0 and later | Amount of memory in bytes allocated to the kernel structures.<br>Type: Result   |
| Large I/O Denied<br>Version: 11.0 and later                 | The number of times the buffer manager did not satisfy requests (of the optimizer) to load data into a buffer in this data cache by fetching more than one contiguous page from disk at a time.<br>Type: Result |
| Large I/O Performed<br>Version: 11.0 and later              | The number of times the buffer manager satisfied requests (of the optimizer) to load data into a buffer in this data cache by fetching more than one contiguous page from disk at a time.<br>Type: Result       |
| Large I/O Requested<br>Version: 11.0 and later              | The number of times the optimizer made requests (of the buffer manager) to load data into a buffer in this data cache by fetching more than one contiguous page from disk at a time.<br>Type: Result            |
| Lock Count<br>Version: 11.0 and later                       | Number of locks.<br>Type: Result  |
| Lock Hit Percent<br>Version: 11.0 and later                 | Percentage of successful requests for locks.<br>Type: Result  |

## Table of data items and definitions

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| <b>Data item</b>                                   | <b>Description</b>   |
|--|--|
| Lock Result<br>Version: 11.0 and later             | Result of a logical lock request. Lock result values are: <ul style="list-style-type: none"><li>• 1 – granted immediately.</li><li>• 2 – not needed; requestor already held a sufficient lock.</li><li>• 3 – waited; requestor waited.</li><li>• 4 – did not wait; lock was not available immediately and the requestor did not want the lock request to be queued.</li><li>• 5 – deadlock; requestor selected as deadlock victim.</li><li>• 6 – interrupted; the lock request was interrupted by attention condition.</li></ul> Type: Key |
| Lock Results Summarized<br>Version: 11.0 and later | Lock results summarized at a granted or not granted level. <ul style="list-style-type: none"><li>• 1 – the lock result summary granted is composed of the lock results: granted, not needed, and waited.</li><li>• 2 – the lock result summary not granted is composed of the lock results: did not wait, deadlock, and interrupted.</li></ul> Type: Key   |
| Lock Status<br>Version: 11.0 and later             | Current status of a lock which includes lock status values: <ul style="list-style-type: none"><li>• 1 – held and blocking.</li><li>• 2 – held and not blocking.</li><li>• 3 – requested and blocked.</li><li>• 4 – requested and not blocked.</li></ul> Type: Key  |
| Lock Status Count<br>Version: 11.0 and later       | Number of locks in each lock status. This is a snapshot value.<br>Type: Result   |

| <b>Data item</b>          | <b>Description</b>  |
|---------------------------|---|
| Lock Type                 | Adaptive Server protects tables or data pages currently used by active transactions by locking them. Adaptive Server employs the following lock types:  |
| Version: 11.0 and later   | <ul style="list-style-type: none"> <li>• 1 – exclusive table lock.</li> <li>• 2 – shared tablelock.</li> <li>• 3 – exclusive intent lock.</li> <li>• 4 – shared intent lock.</li> <li>• 5 – exclusive page lock.</li> <li>• 6 – shared page lock.</li> <li>• 7 – update page lock.</li> <li>• 8 – exclusive row lock.</li> <li>• 9 – shared row lock.</li> <li>• 10 – update row lock.</li> </ul> |
|                           | Type: Key   |
| Locks Being Blocked Count | Number of locks being blocked by this process that holds this “held_and_blocking” lock.   |
| Version: 11.0 and later   | Type: Result  |
| Locks Granted Immediately | Number of locks that were granted immediately, without having to wait for another lock to be released.  |
| Version: 11.5 and later   | Type: Result  |
| Locks Granted After Wait  | Number of locks that were granted after waiting for another lock to be released.  |
| Version: 11.5 and later   | Type: Result  |
| Locks Not Granted         | Number of locks that were requested but not granted.  |
| Version: 11.5 and later   | Type: Result  |
| Log Contention Percent    | The percentage of times, of the total times when a user log cache was flushed into the transaction log, that it had to wait for the log semaphore.  |
| Version: 11.0 and later   | A high percentage may indicate that the user log cache size should be increased.  |
|                           | Type: Result  |
| Logical Page Reads        | Number of data page reads per unit of time, whether satisfied from cache or from a database device.   |
| Version: 11.0 and later   | Type: Result  |
| Login Name                | Login name associated with Adaptive Server processes.   |
| Version: 11.0 and later   | Type: Result  |

*Table of data items and definitions*

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| <b>Data item</b>         | <b>Description</b>  |
|--------------------------|---|
| Most Active Device I/O   | Number of combined reads and writes against the device with the most activity during a given time interval.   |
| Version: 11.0 and later  | Type: Result  |
| Most Active Device Name  | Name of the device with the largest number of combined reads and writes during a given time interval.   |
| Version: 11.0 and later  | Type: Result  |
| Net Bytes Received       | Number of network bytes received.   |
| Version: 11.0 and later  | Type: Result  |
| Net Bytes Sent           | Number of network bytes sent.   |
| Version: 11.0 and later  | Type: Result  |
| Net Default Packet Size  | Default network packet size.  |
| Version: 11.0 and later  | Type: Result  |
| Net I/O Bytes            | Total number of network bytes sent and received.  |
| Version: 11.0 and later  | Type: Result  |
| Net Max Packet Size      | Configured maximum size for a network packet.   |
| Version: 11.0 and later  | Type: Result  |
| Net Packet Size Received | Average size of network packets received.   |
| Version: 11.0 and later  | Type: Result  |
| Net Packet Size Sent     | Average size of network packets sent.   |
| Version: 11.0 and later  | Type: Result  |
| Net Packets Received     | Number of network packets received.   |
| Version: 11.0 and later  | Type: Result  |
| Net Packets Sent         | Number of network packets sent.   |
| Version: 11.0 and later  | Type: Result  |
| Number of Engines        | Number of engines configured for Adaptive Server.   |
| Version: 11.0 and later  | Type: Result  |
| Number of Processes      | Number of processes currently running on Adaptive Server, or, if used with the key Application Name, the number of processes currently running a given application. |
| Version: 11.0 and later  | Type: Result  |

| <b>Data item</b>        | <b>Description</b>   |
|-------------------------|--|
| Object ID               | ID of a database object. The object returned is a database table, a stored procedure, or a temporary table.  |
| Version: 11.0 and later | Object IDs might be negative numbers. The object IDs that Adaptive Server assigns to temporary tables can be positive or negative.<br>Type: Key        |
| Object Name             | Database object name. The string <b>**TempObject**</b> is reported for temporary tables.   |
| Version: 11.0 and later | Type: Result   |
| Object Type             | Type of database object:   |
| Version: 11.0 and later | <ul style="list-style-type: none"> <li>• 0 – none.</li> <li>• 1 – stored procedure (including triggers).</li> <li>• 2 – table.</li> </ul> Type: Result |
| Owner Name              | Name of an objects' owner.   |
| Version: 11.0 and later | Type: Result   |
| Page Cache Size         | Amount of memory in bytes allocated for the page cache.  |
| Version: 11.0 and later | Type: Result   |
| Page Hit Percent        | Percentage of times that a data page read could be satisfied from cache without requiring a physical page read.  |
| Version: 11.0 and later | Type: Result   |
| Page I/O                | Combined total of logical page reads and page writes.  |
| Version: 11.0 and later | Type: Result   |
| Page Number             | Data page number for a particular lock or lock request.  |
| Version: 11.0 and later | Type: Key  |
| Page Writes             | Number of pages written to a database device.  |
| Version: 11.0 and later | Type: Result   |
| Physical Page Reads     | Number of data page reads that could not be satisfied from the data cache.   |
| Version: 11.0 and later | Type: Result   |
| Procedure Buffer Size   | Amount of memory in bytes allocated for the procedure buffer.  |
| Version: 11.0 and later | Type: Result   |
| Procedure CPU Time      | Number of seconds of CPU time spent executing a stored procedure.  |
| Version: 11.0 and later | Type: Result   |

*Table of data items and definitions*

| <b>Data item</b>                                     | <b>Description</b>  |
|--|---|
| Procedure Database ID<br>Version: 11.0 and later     | Database ID of the active stored procedure.<br>Type: Key  |
| Procedure Database Name<br>Version: 11.0 and later   | Database name of the active stored procedure.<br>Type: Key  |
| Procedure Elapsed Time<br>Version: 11.0 and later    | Number of seconds elapsed during a stored procedure execution. All statistic types valid with this data item report time in units of seconds. For example, "Procedure Elapsed Time", "Average for Session" reports the average number of elapsed seconds per procedure execution.<br>Type: Result |
| Procedure Execution Class<br>Version: 11.5 and later | Configured execution class, if any, for a given stored procedure.<br>Type: Result   |
| Procedure Execution Count<br>Version: 11.0 and later | Number of times a stored procedure, or a line in a stored procedure, was executed.<br>Type: Result  |
| Procedure Header Size<br>Version: 11.0 and later     | Amount of memory in bytes allocated for the procedure header.<br>Type: Result   |
| Procedure Hit Percent<br>Version: 11.0 and later     | Percentage of times that a procedure execution found the procedure's query plan in procedure cache and available for use.<br>Type: Result   |
| Procedure ID<br>Version: 11.0 and later              | Active stored procedure. Active indicates the top-level stored procedure was called.<br>Type: Key   |
| Procedure Line Number<br>Version: 11.0 and later     | Stored procedure line number.<br>Type: Key  |
| Procedure Line Text<br>Version: 11.0 and later       | Entire text of the stored procedure.<br>Type: Result  |
| Procedure Logical Reads<br>Version: 11.0 and later   | Number of requests to execute a stored procedure, whether satisfied from procedure cache or with a read from <i>sysprocedures</i> .<br>Type: Result   |
| Procedure Name<br>Version: 11.0 and later            | Name of the active stored procedure.<br>Type: Result.   |

| <b>Data item</b>                                      | <b>Description</b>   |
|---|--|
| Procedure Owner Name<br>Version: 11.0 and later       | Name of the owner of the active stored procedure.<br>Type: Result  |
| Procedure Physical Reads<br>Version: 11.0 and later   | Number of requests to execute a stored procedure, for which a read from <i>sysprocedures</i> was necessary.<br>Type: Result  |
| Procedure Statement Number<br>Version: 11.0 and later | Statement number within a stored procedure. A single stored procedure line can contain one or more statements.<br>Type: Key  |
| Process ID<br>Version: 11.0 and later                 | Adaptive Server process identification number. Views that contain Process ID only report on processes that are active as of the end of the sample period. Process ID is mutually exclusive with Application Name in a view.<br>Type: Key   |
| Process State<br>Version: 11.0 and later              | Process state: <ul style="list-style-type: none"> <li>• 0 – None.</li> <li>• 1 – alarm sleep. Waiting on an alarm.</li> <li>• 2 – background. Adaptive Server process executing.</li> <li>• 3 – bad status. Undetermined error condition.</li> <li>• 4 – infected. Tagged by Adaptive Server as unprocessable.</li> <li>• 5 – lock sleep. Waiting on a lock acquisition.</li> <li>• 6 – received sleep. Waiting on a network read.</li> <li>• 7 – runnable. Waiting to run according to priority and availability of CPU.</li> <li>• 8 – running. Executing.</li> <li>• 9 – send sleep. Waiting on a network send.</li> <li>• 10 – sleeping. Paused for any other reason not listed here, such as: waiting on device I/O (physical reads) or waiting for client activity.</li> <li>• 11 – stopped. Process terminated.</li> <li>• 12 – terminating. Process terminating.</li> <li>• 13 – unknown. Process state undeterminable.</li> <li>• 14 – remote I/O. Waiting on a remote (OMNI) server to complete an operation.</li> <li>• 15 – synch sleep. Waiting to synchronize with some other server process(es) that are working in parallel to execute a given query.</li> </ul> Type: Key |
| Process State Count<br>Version: 11.0 and later        | Number of processes in a particular state.<br>Type: Result   |

*Table of data items and definitions*

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| <b>Data item</b>                                     | <b>Description</b>  |
|--|---|
| Rows Deleted<br>Version: 11.0 and later              | Number of rows deleted from a database table.<br>Type: Result   |
| Rows Deleted Deferred<br>Version: 11.0 and later     | Number of rows deleted from a database table in deferred mode.<br>Type: Result  |
| Rows Deleted Direct<br>Version: 11.0 and later       | Number of rows deleted from a database table in direct mode.<br>Type: Result  |
| Rows Inserted<br>Version: 11.0 and later             | Insertions into a database table.<br>Type: Result   |
| Rows Inserted Clustered<br>Version: 11.0 and later   | Insertions into database tables with clustered indexes.<br>Type: Result   |
| Rows Inserted Heap<br>Version: 11.0 and later        | Insertions into database tables without clustered indexes.<br>Type: Result  |
| Rows Updated<br>Version: 11.0 and later              | Updates to a database table.<br>Type: Result  |
| Rows Updated Deferred<br>Version: 11.0 and later     | Updates that require two steps to complete. First, records for deleting the existing entry and inserting the new entry are written to the log, but only the deletes are actually performed on the data pages. In the second step, the log is rescanned and the insert operations performed on the data pages.<br>Type: Result |
| Rows Updated Direct<br>Version: 11.0 and later       | The sum of expensive, in-place, and not-in-place updates (everything except updates deferred).<br>Type: Result  |
| Rows Updated Expensive<br>Version: 11.0 and later    | A type of direct update that deletes a row from its original location and inserts it in a new location.   |
| Rows Updated In Place<br>Version: 11.0 and later     | A type of direct update that does not require rows to move on a data page.<br>Type: Result  |
| Rows Updated Not In Place<br>Version: 11.0 and later | A type of direct update that does not require the updated row to move, but because the length of the updated row changes, other rows on the data page are moved. Also known as cheap updates.<br>Type: Result   |



| Data item  | Description  |
|--|--|
| Select Statements<br>Version: 11.0 and later           | Number of SELECT or OPEN CURSOR statements.<br>Type: Result  |
| Server Structures Size<br>Version: 11.0 and later      | Amount of memory in bytes allocated for the Adaptive Server structures.<br>Type: Result  |
| SQL Server Name<br>Version: 11.0 and later             | Name of the Adaptive Server that is being monitored as specified by the -S parameter in the start-up command for the Monitor Server being used.<br>Type: Result  |
| SQL Server Version<br>Version: 11.0 and later          | Version of the Adaptive Server that is being monitored. For more information, see the global @@version variable in the <i>Transact-SQL User's Guide</i> .<br>Type: Result  |
| Thread Exceeded Max<br>Version: 11.5 and later         | The number of times a query plan was adjusted at runtime because of attempting to exceed the configured limit of threads in the server-wide worker thread pool in Adaptive Server version 11.5 and later.<br>Type: Result  |
| Thread Exceeded Max Percent<br>Version: 11.5 and later | The percentage of time a query plan was adjusted at runtime because of attempting to exceed the configured limit of threads in the server-wide worker thread pool in Adaptive Server version 11.5 and later.<br>Type: Result   |
| Thread Max Used<br>Version: 11.5 and later             | The maximum number of threads from the server-wide worker thread pool that were concurrently in use on the server.<br>Type: Result   |
| Time Waited on Lock<br>Version: 11.0 and later         | Amount of time (in seconds) that a lock request has been waiting.<br>Type: Result  |
| Timestamp<br>Version: 11.0 and later                   | In recording session views and in playback views when <i>summarization_level</i> is raw, the date and time on the Adaptive Server when the recording session data was gathered.<br><br>In playback views, when <i>summarization_level</i> is actual, entire, or a user-defined interval, the time is converted to the time zone of Historical Server.<br><br>For more information, see the <i>getdate()</i> function in the <i>Transact-SQL User's Guide</i> .<br>Type: Result                               |
| Timestamp Datim<br>Version: 11.0 and later             | In recording session views and in playback views when <i>summarization_level</i> is raw, the date and time on the Adaptive Server when the recording session data was gathered, returned in a CS_DATETIME structure. For more information, see the <i>getdate()</i> function in the <i>Transact-SQL User's Guide</i> .<br><br>In playback views, when <i>summarization_level</i> is actual, entire, or a user-defined interval, the time is converted to the time zone on Historical Server.<br>Type: Result |

*Table of data items and definitions*

---

| <b>Data item</b>        | <b>Description</b>   |
|-------------------------|--|
| Transactions            | Total number of committed Transact-SQL statement blocks delimited by a begin transaction and commit transaction statement. |
| Version: 11.0 and later | Type: Result   |

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# Specifications for Defining Recording Session Views

This appendix describes rules and considerations for designing recording session views.

| Topic  | Page |
|--|------|
| Definition of key and result                         | 125  |
| Designing recording session views                    | 126  |
| Table of valid key and result data item combinations | 128  |
| Table of valid statistic types for data items        | 151  |

## Definition of key and result

Data items are either keys or results.

- A key data item uniquely identifies the rows returned in a view. For example, in a view that defines per-process data, the Process ID data item identifies each process.
- A result data item identifies the information to be returned concerning each key value.

By using a mix of keys and results to define recording session views, you control the data that Historical Server returns.

You can combine key data items within a view to narrow the scope of the returned data. With the inclusion of each successive key, envision adding the word “per” to a view definition. For example, page I/Os “per” database table “per” process. (Only certain key combinations are valid for each data item. See Table B-2 on page 128.)

To return server-wide data, define a view with no keys. In a view with no keys, the result always contains exactly one row. (Only certain data items are valid at the server level. See Table B-2 on page 128.)

Table B-1 provides examples of views using different key combinations.

**Table B-1: View examples using various key combinations**

| View definition  | Results  |
|--|--|
| Page I/O   | <p>Since there are no keys in the view, the result is page I/O for the whole server. For example:</p> <pre> Page I/O ----- 145                     </pre>  |
| Process ID (key), Login Name, Page I/O   | <p>The result is page I/O per process. For example:</p> <pre> Process ID      Login Name      Page I/O ----- 1                sa                45 5                joe               100                     </pre>   |
| Process ID (key), Database ID (key), Object ID (key), Database Name, Object Name, Page I/O | <p>The result is page I/O per database table per process. For example:</p> <pre> Process ID      Database ID      Object ID      Database Name      Object Name      Page I/O ----- 1                5                208003772     pubs2              authors          10 1                5                336004228     pubs2              titles           35 5                5                208003772     pubs2              authors          100                     </pre> |

## Designing recording session views

To define a view:

- Choose valid combinations of key and result data items using Table B-2 on page 128.
- Choose valid statistic types for each of the data items using Table B-3 on page 152.

## Using the Process ID

When a server process terminates, Adaptive Server can reuse its Process ID for a new process. Therefore, the Process ID data item is not guaranteed to uniquely identify a process. The Kernel Process ID data item, however, uniquely identifies a process.

To create a non-raw playback view that shows per-process data, the recording session view and the playback view must include both the Process ID and Kernel Process ID data items. If playback is raw, using only Process ID is allowed.

Views that include Process ID return rows as follows:

- Recording session views and raw playback views.

These views return a row only for Process IDs that exist at the end of a sample interval. If a server process terminates in the middle of a sample interval, a row is not returned for its Process ID.

- Playback views when the session's *summarization\_level* parameter is actual, entire, or user-defined intervals.

These views return rows for all server processes included in any of the input samples. However, since process IDs are not guaranteed to be unique, the Kernel Process ID data item must also be included to ensure uniqueness of the key. Otherwise, the view could erroneously summarize two different processes.

## Using the application name

Historical Server accumulates performance data per application by summing the data for all processes having the same application name. It collects performance data only for processes that exist as of the end of the sample interval. See “Using the Process ID” on page 126 for more information.

## Empty rows versus no rows in views

When there is no activity to report, some data items cause an empty row (that is, a row with zero values for result data items) to appear in a view, and other data items cause the row to be omitted. The rules controlling whether empty rows appear in a view are:

- Server-level data items always return a row, even when there is no activity to report.
- Views that contain the key data item Process ID or Application Name only report on processes that are active as of the end of the sample period.
- Views that contain the key data items Object ID or Stored Procedure ID omit the row when there is no activity to report during the sample period.

- Views that contain keys other than those listed in the previous bullets return rows when there is no activity.

## Table of valid key and result data item combinations

There are restrictions on the data items that can be combined within a view. The restrictions are based upon the relationships between data items. For example, it makes no sense to ask for “CPU Busy Percent” per “Page Number”; therefore, it is not allowed.

Table B-2 shows valid combinations of result and key data items for views. The table lists result data items in alphabetical order. The basic rules for determining whether a result data item can be included in a recording session view are:

- The view must include *all* of the required keys listed for the result data item.
- The view *can* include the optional keys listed for the result data item. However, not all of the optional keys listed for a data item are guaranteed to work together.
- The view *cannot* include any other keys besides those listed as required or optional. (A few exceptions are described in the Notes column.)
- Data Available at Server Level? – indicates whether this data item can be used in a view without any keys to obtain summary or static information about Adaptive Server.
- A result data item that has no required keys can be used in server-level views. Server-level views have no keys and report summary or static information about Adaptive Server.
- Footnotes contain additional information about using the result data items in views.

**Table B-2: Valid key and result combinations**

| Data item                                | Required and optional keys   |
|--|--|
| Application Execution Class <sup>2</sup> | Valid at server level?<br>No<br>Required keys:<br>Application Name |
| Application Name (KEY) <sup>3</sup>      |  |

| <b>Data item</b>            | <b>Required and optional keys</b>  |
|-----------------------------|--|
| Blocking Process ID         | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <ul style="list-style-type: none"> <li>• Process ID</li> <li>• Database ID</li> <li>• Object ID</li> <li>• Lock Status</li> <li>• Page Number</li> </ul> <p><i>Optional keys:</i></p> <p>Lock Type</p> |
| Cache Efficiency            | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <p>Cache ID</p>  |
| Cache Hit Pct               | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <p>Cache ID</p>  |
| Cache Hits                  | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <p>Cache ID</p>  |
| Cache ID (KEY) <sup>4</sup> |  |
| Cache Misses                | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <p>Cache ID</p>  |
| Cache Name <sup>4</sup>     | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <p>Cache ID</p>  |
| Cache Prefetch Efficiency   | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <p>Cache ID</p>  |

*Table of valid key and result data item combinations*

| <b>Data item</b>          | <b>Required and optional keys</b>  |
|---------------------------|--|
| Cache Refer and Reuse     | <i>Valid at server level?</i><br>No<br><i>Required keys:</i><br>Cache ID                                   |
| Cache Reuse               | <i>Valid at server level?</i><br>No<br><i>Required keys:</i><br>Cache ID                                   |
| Cache Reuse Dirty         | <i>Valid at server level?</i><br>Yes<br><i>Required keys:</i><br>None<br><i>Optional keys:</i><br>Cache ID |
| Cache Size                | <i>Valid at server level?</i><br>No<br><i>Required keys:</i><br>Cache ID                                   |
| Cache Spinlock Contention | <i>Valid at server level?</i><br>No<br><i>Required keys:</i><br>Cache ID                                   |
| Code Memory Size          | <i>Valid at server level?</i><br>Yes<br><i>Required keys:</i><br>None                                      |
| Connect Time              | <i>Valid at server level?</i><br>No<br><i>Required keys:</i><br>Process ID                                 |



| <b>Data item</b>         | <b>Required and optional keys</b>   |
|--------------------------|---|
| CPU Busy Percent         | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p> <p><i>Optional keys:</i></p> <p>Engine Number</p>  |
| CPU Percent <sup>3</sup> | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <p>Process ID <i>or</i></p> <p>Application Name</p> <p><i>Optional keys:</i></p> <p>Engine Number</p>   |
| CPU Time <sup>3</sup>    | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p> <p><i>Optional keys:</i></p> <ul style="list-style-type: none"> <li>• Process ID <i>or</i></li> <li>• Application Name</li> <li>• Engine Number</li> </ul> |
| CPU Yields               | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p> <p><i>Optional keys:</i></p> <p>Engine Number</p>  |
| Current Application Name | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <p>Process ID</p>   |
| Current Engine           | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <p>Process ID</p>   |

Table of valid key and result data item combinations

| <b>Data item</b>                                 | <b>Required and optional keys</b>                            |
|--|--|
| Current Execution Class <sup>2</sup>             | Valid at server level?<br>No<br>Required keys:<br>Process ID |
| Current Process State                            | Valid at server level?<br>No<br>Required keys:<br>Process ID |
| Current Stmt Batch ID <sup>2</sup>               | Valid at server level?<br>No<br>Required keys:<br>Process ID |
| Current Stmt Batch Text <sup>2</sup>             | Valid at server level?<br>No<br>Required keys:<br>Process ID |
| Current Stmt Batch Text Byte Offset <sup>2</sup> | Valid at server level?<br>No<br>Required keys:<br>Process ID |
| Current Stmt Batch Text Enabled <sup>2</sup>     | Valid at server level?<br>Yes<br>Required keys:<br>None      |
| Current Stmt Context ID <sup>2</sup>             | Valid at server level?<br>No<br>Required keys:<br>Process ID |
| Current Stmt CPU Time <sup>2</sup>               | Valid at server level?<br>No<br>Required keys:<br>Process ID |
| Current Stmt Elapsed Time <sup>2</sup>           | Valid at server level?<br>No<br>Required keys:<br>Process ID |

| <b>Data item</b>                                    | <b>Required and optional keys</b>                            |
|---|--|
| Current Stmt Line Number <sup>2</sup>               | Valid at server level?<br>No<br>Required keys:<br>Process ID |
| Current Stmt Locks Granted After Wait <sup>2</sup>  | Valid at server level?<br>No<br>Required keys:<br>Process ID |
| Current Stmt Locks Granted Immediately <sup>2</sup> | Valid at server level?<br>No<br>Required keys:<br>Process ID |
| Current Stmt Locks Not Granted <sup>2</sup>         | Valid at server level?<br>No<br>Required keys:<br>Process ID |
| Current Stmt Logical Reads                          | Valid at server level?<br>No<br>Required keys:<br>Process ID |
| Current Stmt Number <sup>2</sup>                    | Valid at server level?<br>No<br>Required keys:<br>Process ID |
| Current Stmt Page I/O <sup>2</sup>                  | Valid at server level?<br>No<br>Required keys:<br>Process ID |
| Current Stmt Page Writes <sup>2</sup>               | Valid at server level?<br>No<br>Required keys:<br>Process ID |
| Current Stmt Physical Reads <sup>2</sup>            | Valid at server level?<br>No<br>Required keys:<br>Process ID |

Table of valid key and result data item combinations

| <b>Data item</b>                                     | <b>Required and optional keys</b>  |
|--|--|
| Current Stmt Procedure<br>Database ID <sup>2</sup>   | <i>Valid at server level?</i><br>No<br><i>Required keys:</i><br>Process ID |
| Current Stmt Procedure<br>Database Name <sup>2</sup> | <i>Valid at server level?</i><br>No<br><i>Required keys:</i><br>Process ID |
| Current Stmt Procedure ID <sup>2</sup>               | <i>Valid at server level?</i><br>No<br><i>Required keys:</i><br>Process ID |
| Current Stmt Procedure Name <sup>2</sup>             | <i>Valid at server level?</i><br>No<br><i>Required keys:</i><br>Process ID |
| Current Stmt Procedure Owner<br>Name <sup>2</sup>    | <i>Valid at server level?</i><br>No<br><i>Required keys:</i><br>Process ID |
| Current Stmt Procedure Text <sup>2</sup>             | <i>Valid at server level?</i><br>No<br><i>Required keys:</i><br>Process ID |
| Current Stmt Query Plan Text <sup>2</sup>            | <i>Valid at server level?</i><br>No<br><i>Required keys:</i><br>Process ID |
| Current Stmt Start Time <sup>2</sup>                 | <i>Valid at server level?</i><br>No<br><i>Required keys:</i><br>Process ID |
| Current Stmt Text Byte Offset <sup>2</sup>           | <i>Valid at server level?</i><br>No<br><i>Required keys:</i><br>Process ID |

| <b>Data item</b>           | <b>Required and optional keys</b>  |
|----------------------------|--|
| Database ID ( <i>KEY</i> ) |  |
| Database Name <sup>1</sup> | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <p>Database ID</p>   |
| Deadlock Count             | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>   |
| Demand Lock                | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <ul style="list-style-type: none"> <li>• Process ID</li> <li>• Database ID</li> <li>• Object ID</li> <li>• Lock Status</li> <li>• Page Number</li> </ul> <p><i>Optional keys:</i></p> <p>Lock Type</p> |
| Device Hit Percent         | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p> <p><i>Optional keys:</i></p> <p>Device Name</p>   |
| Device Hits                | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p> <p><i>Optional keys:</i></p> <p>Device Name</p>   |

Table of valid key and result data item combinations

| <b>Data item</b>           | <b>Required and optional keys</b>  |
|----------------------------|--|
| Device I/O                 | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p> <p><i>Optional keys:</i></p> <p>Device Name</p> |
| Device Misses              | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p> <p><i>Optional keys:</i></p> <p>Device Name</p> |
| <b>Device Name (KEY)</b>   |  |
| Device Reads               | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p> <p><i>Optional keys:</i></p> <p>Device Name</p> |
| Device Writes              | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p> <p><i>Optional keys:</i></p> <p>Device Name</p> |
| Elapsed Time               | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>   |
| <b>Engine Number (KEY)</b> |  |
| Host Name                  | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <p>Process ID</p>  |

| Data item                      | Required and optional keys   |
|--------------------------------|--|
| Index Logical Reads            | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p> <p><i>Optional keys:</i></p> <ul style="list-style-type: none"> <li>• Process ID</li> <li>• Database ID</li> <li>• Object ID</li> <li>• Engine Number</li> <li>• Key combination:                             <ul style="list-style-type: none"> <li>• Procedure Database ID</li> <li>• Procedure ID</li> </ul> </li> </ul> |
| Index Physical Reads           | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p> <p><i>Optional keys:</i></p> <ul style="list-style-type: none"> <li>• Process ID</li> <li>• Database ID</li> <li>• Object ID</li> <li>• Engine Number</li> <li>• Key combination:                             <ul style="list-style-type: none"> <li>• Procedure Database ID</li> <li>• Procedure ID</li> </ul> </li> </ul> |
| Kernel Process ID <sup>1</sup> | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <p>Process ID</p>  |
| Kernel Structures Memory Size  | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>   |

Table of valid key and result data item combinations

| <b>Data item</b>                       | <b>Required and optional keys</b>   |
|--|---|
| Large I/O Denied                       | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <p>Cache ID</p>   |
| Large I/O Performed                    | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <p>Cache ID</p>   |
| Large I/O Requested                    | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <p>Cache ID</p>   |
| Lock Count                             | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p> <p><i>Optional keys:</i></p> <ul style="list-style-type: none"> <li>• Process ID</li> <li>• Lock Type</li> <li>• Lock Result</li> <li>• Lock Results Summarized</li> </ul> |
| Lock Hit Percent                       | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>  |
| Lock Result ( <i>KEY</i> )             |   |
| Lock Results Summarized ( <i>KEY</i> ) |   |
| Lock Status ( <i>KEY</i> )             |   |
| Lock Status Count                      | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <p>Lock Status</p>  |
| Lock Type ( <i>KEY</i> )               |   |



| <b>Data item</b>                       | <b>Required and optional keys</b>   |
|--|---|
| Locks Being Blocked Count              | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <ul style="list-style-type: none"> <li>• Process ID</li> <li>• Database ID</li> <li>• Object ID</li> <li>• Lock Status</li> <li>• Lock Type</li> <li>• Page Number</li> </ul>   |
| Locks Granted After Wait <sup>3</sup>  | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p> <p><i>Optional keys:</i></p> <ul style="list-style-type: none"> <li>• Process ID <i>or</i></li> <li>• Application Name</li> <li>• Key Combination: <ul style="list-style-type: none"> <li>• Database ID</li> <li>• Object ID</li> </ul> </li> <li>• Key Combination: <ul style="list-style-type: none"> <li>• Procedure Database ID</li> <li>• Procedure ID</li> </ul> </li> </ul> |
| Locks Granted Immediately <sup>3</sup> | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p> <p><i>Optional keys:</i></p> <ul style="list-style-type: none"> <li>• Process ID <i>or</i></li> <li>• Application Name</li> <li>• Key Combination: <ul style="list-style-type: none"> <li>• Database ID</li> <li>• Object ID</li> </ul> </li> <li>• Key Combination: <ul style="list-style-type: none"> <li>• Procedure Database ID</li> <li>• Procedure ID</li> </ul> </li> </ul> |

Table of valid key and result data item combinations

| Data item                      | Required and optional keys  |
|--------------------------------|---|
| Locks Not Granted <sup>3</sup> | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p> <p><i>Optional keys:</i></p> <ul style="list-style-type: none"> <li>• Process ID <i>or</i></li> <li>• Application Name</li> <li>• Key Combination: <ul style="list-style-type: none"> <li>• Database ID</li> <li>• Object ID</li> </ul> </li> <li>• Key Combination: <ul style="list-style-type: none"> <li>• Procedure Database ID</li> <li>• Procedure ID</li> </ul> </li> </ul> |
| Log Contention Percent         | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>  |
| Logical Page Reads             | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p> <p><i>Optional keys:</i></p> <ul style="list-style-type: none"> <li>• Process ID</li> <li>• Engine Number</li> <li>• Key combination: <ul style="list-style-type: none"> <li>• Database ID</li> <li>• Object ID</li> </ul> </li> <li>• Key combination: <ul style="list-style-type: none"> <li>• Procedure Database ID</li> <li>• Procedure ID</li> </ul> </li> </ul>              |
| Login Name <sup>1</sup>        | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <p>Process ID</p>   |

| <b>Data item</b>         | <b>Required and optional keys</b>                                     |
|--------------------------|---|
| Most Active Device I/O   | <i>Valid at server level?</i><br>Yes<br><i>Required keys:</i><br>None |
| Most Active Device Name  | <i>Valid at server level?</i><br>Yes<br><i>Required keys:</i><br>None |
| Net Bytes Received       | <i>Valid at server level?</i><br>Yes<br><i>Required keys:</i><br>None |
| Net Bytes Sent           | <i>Valid at server level?</i><br>Yes<br><i>Required keys:</i><br>None |
| Net Default Packet Size  | <i>Valid at server level?</i><br>Yes<br><i>Required keys:</i><br>None |
| Net I/O Bytes            | <i>Valid at server level?</i><br>Yes<br><i>Required keys:</i><br>None |
| Net Max Packet Size      | <i>Valid at server level?</i><br>Yes<br><i>Required keys:</i><br>None |
| Net Packet Size Received | <i>Valid at server level?</i><br>Yes<br><i>Required keys:</i><br>None |
| Net Packet Size Sent     | <i>Valid at server level?</i><br>Yes<br><i>Required keys:</i><br>None |

Table of valid key and result data item combinations

| <b>Data item</b>                 | <b>Required and optional keys</b>  |
|----------------------------------|--|
| Net Packets Received             | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>   |
| Net Packets Sent                 | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>   |
| Number of Engines                | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>   |
| Number of Processes <sup>2</sup> | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p> <p><i>Optional keys:</i></p> <p>Application Name</p>                    |
| Object ID ( <i>KEY</i> )         |  |
| Object Name <sup>1</sup>         | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <ul style="list-style-type: none"> <li>• Database ID</li> <li>• Object ID</li> </ul> |
| Object Type <sup>1</sup>         | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <ul style="list-style-type: none"> <li>• Database ID</li> <li>• Object ID</li> </ul> |
| Owner Name <sup>1</sup>          | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <ul style="list-style-type: none"> <li>• Database ID</li> <li>• Object ID</li> </ul> |

| Data item                 | Required and optional keys   |
|---------------------------|--|
| Page Cache Size           | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>   |
| Page Hit Percent          | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p> <p><i>Optional keys:</i></p> <ul style="list-style-type: none"> <li>• Process ID</li> <li>• Engine Number</li> <li>• Key combination: <ul style="list-style-type: none"> <li>• Database ID</li> <li>• Object ID</li> </ul> </li> <li>• Key combination: <ul style="list-style-type: none"> <li>• Procedure Database ID</li> <li>• Procedure ID</li> </ul> </li> </ul> |
| Page I/O                  | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p> <p><i>Optional keys:</i></p> <ul style="list-style-type: none"> <li>• Process ID</li> <li>• Engine Number</li> <li>• Key combination: <ul style="list-style-type: none"> <li>• Database ID</li> <li>• Object ID</li> </ul> </li> <li>• Key combination: <ul style="list-style-type: none"> <li>• Procedure Database ID</li> <li>• Procedure ID</li> </ul> </li> </ul> |
| Page Number( <i>KEY</i> ) |  |

*Table of valid key and result data item combinations*

---

| <b>Data item</b>      | <b>Required and optional keys</b>  |
|-----------------------|--|
| Page Writes           | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p> <p><i>Optional keys:</i></p> <ul style="list-style-type: none"> <li>• Process ID</li> <li>• Engine Number</li> <li>• Key combination: <ul style="list-style-type: none"> <li>• Database ID</li> <li>• Object ID</li> </ul> </li> <li>• Key combination: <ul style="list-style-type: none"> <li>• Procedure Database ID</li> <li>• Procedure ID</li> </ul> </li> </ul> |
| Physical Page Reads   | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p> <p><i>Optional keys:</i></p> <ul style="list-style-type: none"> <li>• Process ID</li> <li>• Engine Number</li> <li>• Key combination: <ul style="list-style-type: none"> <li>• Database ID</li> <li>• Object ID</li> </ul> </li> <li>• Key combination: <ul style="list-style-type: none"> <li>• Procedure Database ID</li> <li>• Procedure ID</li> </ul> </li> </ul> |
| Procedure Buffer Size | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>   |

| <b>Data item</b>                       | <b>Required and optional keys</b>   |
|--|---|
| Procedure CPU Time                     | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <ul style="list-style-type: none"> <li>• Procedure Database ID</li> <li>• Procedure ID</li> </ul> <p><i>Optional keys:</i></p> <ul style="list-style-type: none"> <li>• Process ID</li> <li>• Procedure Stmt Number</li> <li>• Procedure Line Number</li> </ul> |
| Procedure Database ID ( <i>KEY</i> )   |   |
| Procedure Database Name <sup>1</sup>   | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <ul style="list-style-type: none"> <li>• Procedure Database ID</li> </ul>   |
| Procedure Elapsed Time                 | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <ul style="list-style-type: none"> <li>• Procedure Database ID</li> <li>• Procedure ID</li> </ul> <p><i>Optional keys:</i></p> <ul style="list-style-type: none"> <li>• Process ID</li> <li>• Procedure Stmt Number</li> <li>• Procedure Line Number</li> </ul> |
| Procedure Execution Class <sup>2</sup> | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <ul style="list-style-type: none"> <li>• Procedure Database ID</li> <li>• Procedure ID</li> </ul>   |

Table of valid key and result data item combinations

| <b>Data item</b>                     | <b>Required and optional keys</b>   |
|--------------------------------------|---|
| Procedure Execution Count            | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <ul style="list-style-type: none"> <li>• Procedure Database ID</li> <li>• Procedure ID</li> </ul> <p><i>Optional keys:</i></p> <ul style="list-style-type: none"> <li>• Process ID</li> <li>• Procedure Stmt Number</li> <li>• Procedure Line Number</li> </ul> |
| Procedure Header Size                | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>  |
| Procedure Hit Percent                | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>  |
| Procedure ID ( <i>KEY</i> )          |   |
| Procedure Line Number ( <i>KEY</i> ) |   |
| Procedure Line Text                  | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <ul style="list-style-type: none"> <li>• Procedure Database ID</li> <li>• Procedure ID</li> </ul>   |
| Procedure Logical Reads              | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>  |
| Procedure Name <sup>1</sup>          | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <ul style="list-style-type: none"> <li>• Procedure Database ID</li> <li>• Procedure ID</li> </ul>   |



| <b>Data item</b>                             | <b>Required and optional keys</b>   |
|--|---|
| Procedure Owner Name <sup>1</sup>            | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <ul style="list-style-type: none"> <li>• Procedure Database ID</li> <li>• Procedure ID</li> </ul> |
| Procedure Physical Reads                     | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>  |
| Procedure Statement Number<br>( <i>KEY</i> ) |   |
| Process ID ( <i>KEY</i> ) <sup>3</sup>       |   |
| Process State ( <i>KEY</i> )                 |   |
| Process State Count                          | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <p>Process State</p>  |
| Rows Deleted                                 | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>  |
| Rows Deleted Deferred                        | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>  |
| Rows Deleted Direct                          | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>  |
| Rows Inserted                                | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>  |

*Table of valid key and result data item combinations*

| <b>Data item</b>          | <b>Required and optional keys</b>                                     |
|---------------------------|---|
| Rows Inserted Clustered   | <i>Valid at server level?</i><br>Yes<br><i>Required keys:</i><br>None |
| Rows Inserted Heap        | <i>Valid at server level?</i><br>Yes<br><i>Required keys:</i><br>None |
| Rows Updated              | <i>Valid at server level?</i><br>Yes<br><i>Required keys:</i><br>None |
| Rows Updated Deferred     | <i>Valid at server level?</i><br>Yes<br><i>Required keys:</i><br>None |
| Rows Updated Direct       | <i>Valid at server level?</i><br>Yes<br><i>Required keys:</i><br>None |
| Rows Updated Expensive    | <i>Valid at server level?</i><br>Yes<br><i>Required keys:</i><br>None |
| Rows Updated In Place     | <i>Valid at server level?</i><br>Yes<br><i>Required keys:</i><br>None |
| Rows Updated Not In Place | <i>Valid at server level?</i><br>Yes<br><i>Required keys:</i><br>None |
| Select Statements         | <i>Valid at server level?</i><br>Yes<br><i>Required keys:</i><br>None |

| <b>Data item</b>                         | <b>Required and optional keys</b>  |
|--|--|
| Server Structures Size                   | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>   |
| SQL Server Name                          | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>   |
| SQL Server Version                       | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>   |
| Thread Exceeded Max <sup>2</sup>         | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>   |
| Thread Exceeded Max Percent <sup>2</sup> | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>   |
| Thread Max Used <sup>2</sup>             | <p><i>Valid at server level?</i></p> <p>Yes</p> <p><i>Required keys:</i></p> <p>None</p>   |
| Time Waited on Lock                      | <p><i>Valid at server level?</i></p> <p>No</p> <p><i>Required keys:</i></p> <ul style="list-style-type: none"> <li>• Process ID</li> <li>• Database ID</li> <li>• Object ID</li> <li>• Lock Status</li> <li>• Page Number</li> </ul> <p><i>Optional keys:</i></p> <p>Lock Type</p> |

*Table of valid key and result data item combinations*

| <b>Data item</b> | <b>Required and optional keys</b>                                     |
|------------------|---|
| Timestamp        | <i>Valid at server level?</i><br>Yes<br><i>Required keys:</i><br>None |
| Timestamp Datim  | <i>Valid at server level?</i><br>Yes<br><i>Required keys:</i><br>None |
| Transactions     | <i>Valid at server level?</i><br>Yes<br><i>Required keys:</i><br>None |

1. These data items infer names from IDs or status types. They are valid in any view containing the required keys, regardless of the other keys that might also be in the view. (For example, Database Name is valid in any view containing the key Database ID; therefore, it would be valid in a view whose keys are Database ID and Process ID.)

2. These data items are available only if you are monitoring Adaptive Server version 11.5 and later.

3. Process ID and Application Name cannot be used in the same view.

4. In versions earlier than 11.5, Cache Name was a key. Currently, Cache Name is a result. A new key, Cache ID, replaces the key Cache Name. For compatibility, Cache Name remains valid as a key. However, for efficiency and for forward compatibility, use Cache ID as the key in new views.

## Examples of valid combinations

- Login Name, Process ID, Page I/O
- Process ID, CPU Percent
- Login Name, Process ID
- Deadlock Count, CPU Busy Percent
- Transactions, Rows Deleted, Rows Inserted, Rows Updated
- Current Engine, Login Name, Process ID
- Current Engine, Login Name, Process ID, CPU Percent
- Login Name, Process ID, Page I/O, Connect Time

## Examples of invalid combinations

- Current Engine, Process ID, Lock Status Count  
Lock Status Count is not available per process.
- Login Name, Blocking Process ID  
Need to add the other required key data items.
- Net I/O Bytes, Demand Lock  
Demand Lock requires keys and Net I/O Bytes is not valid with any key data items.
- Current Engine, Login Name, Deadlock Count  
Deadlock Count is not compatible with any key data items, but keys are required for Current Engine and Login Name.

## Table of valid statistic types for data items

There are six valid statistic types:

- “Value for Sample”
- “Value for Session”
- “Rate for Sample”
- “Rate for Session”
- “Avg for Sample”
- “Avg for Session”

However, all six are not valid for all data items. Table B-3 shows the statistic types that are valid with each data item. In the table:

- A blank cell indicates that the statistic type is not valid with that data item.
- The valid statistic types are indicated by showing the datatype of the resulting data when that statistic type is specified:
  - long and ENUMS indicate integers
  - double indicates floating point numbers
  - charp indicates character strings

**Table B-3: Data items and their valid statistic types**

| <b>Statistic type data item</b> | <b>Value for sample</b> | <b>Value for session</b> | <b>Rate for sample</b> | <b>Rate for session</b> | <b>Avg for sample</b> | <b>Avg for session</b> |
|---------------------------------|-------------------------|--------------------------|------------------------|-------------------------|-----------------------|------------------------|
| Application Execution Class     | charp                   |                          |                        |                         |                       |                        |
| Application Name                | charp                   |                          |                        |                         |                       |                        |
| Blocking Process ID             | long                    |                          |                        |                         |                       |                        |
| Cache Efficiency                | double                  | double                   |                        |                         |                       |                        |
| Cache Hit Pct                   | double                  | double                   |                        |                         |                       |                        |
| Cache Hits                      | long                    | long                     | double                 | double                  |                       |                        |
| Cache ID                        | long                    |                          |                        |                         |                       |                        |
| Cache Misses                    | long                    | long                     | double                 | double                  |                       |                        |
| Cache Name                      | charp                   |                          |                        |                         |                       |                        |
| Cache Prefetch Efficiency       | double                  | double                   |                        |                         |                       |                        |
| Cache Refer and Reuse           | long                    | long                     | double                 | double                  |                       |                        |
| Cache Reuse                     | long                    | long                     | double                 | double                  |                       |                        |
| Cache Reuse Dirty               | long                    | long                     | double                 | double                  |                       |                        |
| Cache Size                      | double                  |                          |                        |                         |                       |                        |
| Cache Spinlock Contention       | double                  | double                   |                        |                         |                       |                        |
| Code Memory Size                | long                    |                          |                        |                         |                       |                        |
| Connect Time                    | long                    | long                     |                        |                         |                       |                        |
| CPU Busy Percent                | double                  | double                   |                        |                         |                       |                        |
| CPU Percent                     | double                  | double                   |                        |                         |                       |                        |
| CPU Time                        | double                  | double                   |                        |                         |                       |                        |
| CPU Yields                      | long                    | long                     | double                 | double                  |                       |                        |

| <b>Statistic type data item</b>        | <b>Value for sample</b> | <b>Value for session</b> | <b>Rate for sample</b> | <b>Rate for session</b> | <b>Avg for sample</b> | <b>Avg for session</b> |
|--|-------------------------|--------------------------|------------------------|-------------------------|-----------------------|------------------------|
| Current Application Name               | charp                   |                          |                        |                         |                       |                        |
| Current Engine                         | long                    |                          |                        |                         |                       |                        |
| Current Execution Class                | charp                   |                          |                        |                         |                       |                        |
| Current Process State                  | ENUMS                   |                          |                        |                         |                       |                        |
| Current Stmt Batch ID                  | long                    |                          |                        |                         |                       |                        |
| Current Stmt Batch Text                | charp                   |                          |                        |                         |                       |                        |
| Current Stmt Batch Text Byte Offset    | long                    |                          |                        |                         |                       |                        |
| Current Stmt Batch Text Enabled        | long                    |                          |                        |                         |                       |                        |
| Current Stmt Context ID                | long                    |                          |                        |                         |                       |                        |
| Current Stmt CPU Time                  | double                  | double                   |                        |                         |                       |                        |
| Current Stmt Elapsed Time              | double                  | double                   |                        |                         |                       |                        |
| Current Stmt Line Number               | long                    |                          |                        |                         |                       |                        |
| Current Stmt Locks Granted Immediately | long                    | long                     | double                 | double                  |                       |                        |
| Current Stmt Locks Granted After Wait  | long                    | long                     | double                 | double                  |                       |                        |
| Current Stmt Locks Not Granted         | long                    | long                     | double                 | double                  |                       |                        |

Table of valid statistic types for data items

| <b>Statistic type data item</b>      | <b>Value for sample</b> | <b>Value for session</b> | <b>Rate for sample</b> | <b>Rate for session</b> | <b>Avg for sample</b> | <b>Avg for session</b> |
|--------------------------------------|-------------------------|--------------------------|------------------------|-------------------------|-----------------------|------------------------|
| Current Stmt Logical Reads           | long                    | long                     | double                 | double                  |                       |                        |
| Current Stmt Number                  | long                    |                          |                        |                         |                       |                        |
| Current Stmt Page I/O                | long                    | long                     | double                 | double                  |                       |                        |
| Current Stmt Page Writes             | long                    | long                     | double                 | double                  |                       |                        |
| Current Stmt Physical Reads          | long                    | long                     | double                 | double                  |                       |                        |
| Current Stmt Procedure Database ID   | long                    |                          |                        |                         |                       |                        |
| Current Stmt Procedure Database Name | charp                   |                          |                        |                         |                       |                        |
| Current Stmt Procedure ID            | long                    |                          |                        |                         |                       |                        |
| Current Stmt Procedure Name          | charp                   |                          |                        |                         |                       |                        |
| Current Stmt Procedure Owner Name    | charp                   |                          |                        |                         |                       |                        |
| Current Stmt Procedure Text          | charp                   |                          |                        |                         |                       |                        |
| Current Stmt Query Plan Text         | charp                   |                          |                        |                         |                       |                        |
| Current Stmt Start Time              | charp                   |                          |                        |                         |                       |                        |
| Current Stmt Text Byte Offset        | long                    |                          |                        |                         |                       |                        |
| Database ID                          | long                    |                          |                        |                         |                       |                        |



| <b>Statistic type data item</b> | <b>Value for sample</b> | <b>Value for session</b> | <b>Rate for sample</b> | <b>Rate for session</b> | <b>Avg for sample</b> | <b>Avg for session</b> |
|---------------------------------|-------------------------|--------------------------|------------------------|-------------------------|-----------------------|------------------------|
| Database Name                   | charp                   |                          |                        |                         |                       |                        |
| Deadlock Count                  | long                    | long                     |                        |                         |                       |                        |
| Demand Lock                     | charp                   |                          |                        |                         |                       |                        |
| Device Hit Percent              | double                  | double                   |                        |                         |                       |                        |
| Device Hits                     | long                    | long                     | double                 | double                  |                       |                        |
| Device I/O                      | long                    | long                     | double                 | double                  |                       |                        |
| Device Misses                   | long                    | long                     | double                 | double                  |                       |                        |
| Device Name                     | charp                   |                          |                        |                         |                       |                        |
| Device Reads                    | long                    | long                     | double                 | double                  |                       |                        |
| Device Writes                   | long                    | long                     | double                 | double                  |                       |                        |
| Elapsed Time                    | long                    | long                     |                        |                         |                       |                        |
| Engine Number                   | long                    |                          |                        |                         |                       |                        |
| Host Name                       | charp                   |                          |                        |                         |                       |                        |
| Index Logical Reads             | long                    | long                     | double                 | double                  |                       |                        |
| Index Physical Reads            | long                    | long                     | double                 | double                  |                       |                        |
| Kernel Process ID               | long                    |                          |                        |                         |                       |                        |
| Kernel Structures Memory Size   | long                    |                          |                        |                         |                       |                        |
| Large I/O Denied                | long                    | long                     | double                 | double                  |                       |                        |
| Large I/O Performed             | long                    | long                     | double                 | double                  |                       |                        |
| Large I/O Requested             | long                    | long                     | double                 | double                  |                       |                        |
| Lock Count                      | long                    | long                     | double                 | double                  |                       |                        |

Table of valid statistic types for data items

| <b>Statistic type data item</b> | <b>Value for sample</b> | <b>Value for session</b> | <b>Rate for sample</b> | <b>Rate for session</b> | <b>Avg for sample</b> | <b>Avg for session</b> |
|---------------------------------|-------------------------|--------------------------|------------------------|-------------------------|-----------------------|------------------------|
| Lock Hit Percent                | double                  | double                   |                        |                         |                       |                        |
| Lock Result                     | ENUMS                   |                          |                        |                         |                       |                        |
| Lock Results Summarized         | ENUMS                   |                          |                        |                         |                       |                        |
| Lock Status                     | ENUMS                   |                          |                        |                         |                       |                        |
| Lock Status Count               | long                    | long                     | double                 | double                  |                       |                        |
| Lock Type                       | ENUMS                   |                          |                        |                         |                       |                        |
| Locks Being Blocked Count       | long                    |                          |                        |                         |                       |                        |
| Locks Granted After Wait        | long                    | long                     | double                 | double                  |                       |                        |
| Locks Granted Immediately       | long                    | long                     | double                 | double                  |                       |                        |
| Locks Not Granted               | long                    | long                     | double                 | double                  |                       |                        |
| Log Contention Percent          | double                  | double                   |                        |                         |                       |                        |
| Logical Page Reads              | long                    | long                     | double                 | double                  |                       |                        |
| Login Name                      | charp                   |                          |                        |                         |                       |                        |
| Most Active Device I/O          | long                    | long                     | double                 | double                  |                       |                        |
| Most Active Device Name         | charp                   |                          |                        |                         |                       |                        |
| Net Bytes Received              | long                    | long                     | double                 | double                  |                       |                        |
| Net Bytes Sent                  | long                    | long                     | double                 | double                  |                       |                        |
| Net Default Packet Size         | long                    |                          |                        |                         |                       |                        |
| Net I/O Bytes                   | long                    | long                     | double                 | double                  |                       |                        |

| <b>Statistic type data item</b> | <b>Value for sample</b> | <b>Value for session</b> | <b>Rate for sample</b> | <b>Rate for session</b> | <b>Avg for sample</b> | <b>Avg for session</b> |
|---------------------------------|-------------------------|--------------------------|------------------------|-------------------------|-----------------------|------------------------|
| Net Max Packet Size             | long                    |                          |                        |                         |                       |                        |
| Net Packet Size Received        | double                  | double                   | double                 | double                  |                       |                        |
| Net Packet Size Sent            | double                  | double                   | double                 | double                  |                       |                        |
| Net Packets Received            | long                    | long                     | double                 | double                  |                       |                        |
| Net Packets Sent                | long                    | long                     | double                 | double                  |                       |                        |
| Number of Engines               | long                    |                          |                        |                         |                       |                        |
| Number of Processes             | long                    |                          |                        |                         |                       |                        |
| Object ID                       | long                    |                          |                        |                         |                       |                        |
| Object Name                     | charp                   |                          |                        |                         |                       |                        |
| Object Type                     | ENUMS                   |                          |                        |                         |                       |                        |
| Owner Name                      | charp                   |                          |                        |                         |                       |                        |
| Page Cache Size                 | long                    |                          |                        |                         |                       |                        |
| Page Hit Percent                | double                  | double                   |                        |                         |                       |                        |
| Page I/O                        | long                    | long                     | double                 | double                  |                       |                        |
| Page Number                     | long                    |                          |                        |                         |                       |                        |
| Page Writes                     | long                    | long                     | double                 | double                  |                       |                        |
| Physical Page Reads             | long                    | long                     | double                 | double                  |                       |                        |
| Procedure Buffer Size           | long                    |                          |                        |                         |                       |                        |
| Procedure CPU Time              | double                  | double                   |                        |                         | double                | double                 |
| Procedure Database ID           | long                    |                          |                        |                         |                       |                        |
| Procedure Database Name         | charp                   |                          |                        |                         |                       |                        |

Table of valid statistic types for data items

| <b>Statistic type data item</b> | <b>Value for sample</b> | <b>Value for session</b> | <b>Rate for sample</b> | <b>Rate for session</b> | <b>Avg for sample</b> | <b>Avg for session</b> |
|---------------------------------|-------------------------|--------------------------|------------------------|-------------------------|-----------------------|------------------------|
| Procedure Elapsed Time          | double                  | double                   |                        |                         | double                | double                 |
| Procedure Execution Class       | charp                   |                          |                        |                         |                       |                        |
| Procedure Execution Count       | long                    | long                     | double                 | double                  |                       |                        |
| Procedure Header Size           | long                    |                          |                        |                         |                       |                        |
| Procedure Hit Percent           | double                  | double                   |                        |                         |                       |                        |
| Procedure ID                    | long                    |                          |                        |                         |                       |                        |
| Procedure Line Number           | long                    |                          |                        |                         |                       |                        |
| Procedure Line Text             | charp                   |                          |                        |                         |                       |                        |
| Procedure Logical Reads         | long                    | long                     | double                 | double                  |                       |                        |
| Procedure Name                  | charp                   |                          |                        |                         |                       |                        |
| Procedure Owner Name            | charp                   |                          |                        |                         |                       |                        |
| Procedure Physical Reads        | long                    | long                     | double                 | double                  |                       |                        |
| Procedure Statement Number      | long                    |                          |                        |                         |                       |                        |
| Process ID                      | long                    |                          |                        |                         |                       |                        |
| Process State                   | ENUMS                   |                          |                        |                         |                       |                        |
| Process State Count             | long                    |                          |                        |                         |                       |                        |
| Rows Deleted                    | long                    | long                     | double                 | double                  |                       |                        |
| Rows Deleted Deferred           | long                    | long                     | double                 | double                  |                       |                        |

| <b>Statistic type data item</b> | <b>Value for sample</b> | <b>Value for session</b> | <b>Rate for sample</b> | <b>Rate for session</b> | <b>Avg for sample</b> | <b>Avg for session</b> |
|---------------------------------|-------------------------|--------------------------|------------------------|-------------------------|-----------------------|------------------------|
| Rows Deleted Direct             | long                    | long                     | double                 | double                  |                       |                        |
| Rows Inserted                   | long                    | long                     | double                 | double                  |                       |                        |
| Rows Inserted Clustered         | long                    | long                     | double                 | double                  |                       |                        |
| Rows Inserted Heap              | long                    | long                     | double                 | double                  |                       |                        |
| Rows Updated                    | long                    | long                     | double                 | double                  |                       |                        |
| Rows Updated Deferred           | long                    | long                     | double                 | double                  |                       |                        |
| Rows Updated Direct             | long                    | long                     | double                 | double                  |                       |                        |
| Rows Updated Expensive          | long                    | long                     | double                 | double                  |                       |                        |
| Rows Updated In Place           | long                    | long                     | double                 | double                  |                       |                        |
| Rows Updated Not In Place       | long                    | long                     | double                 | double                  |                       |                        |
| Select Statements               | long                    | long                     | double                 | double                  |                       |                        |
| Server Structures Size          | long                    |                          |                        |                         |                       |                        |
| SQL Server Name                 | charp                   |                          |                        |                         |                       |                        |
| SQL Server Version              | charp                   |                          |                        |                         |                       |                        |
| Thread Exceeded Max             | long                    | long                     | double                 | double                  |                       |                        |

*Table of valid statistic types for data items*

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| <b>Statistic type data item</b> | <b>Value for sample</b> | <b>Value for session</b> | <b>Rate for sample</b> | <b>Rate for session</b> | <b>Avg for sample</b> | <b>Avg for session</b> |
|---------------------------------|-------------------------|--------------------------|------------------------|-------------------------|-----------------------|------------------------|
| Thread Exceeded Max Percent     | double                  | double                   |                        |                         |                       |                        |
| Thread Max Used                 | long                    |                          |                        |                         |                       |                        |
| Time Waited on Lock             | long                    |                          |                        |                         |                       |                        |
| Timestamp                       | charp                   |                          |                        |                         |                       |                        |
| Timestamp Datim                 | datim                   |                          |                        |                         |                       |                        |
| Transactions                    | long                    | long                     | double                 | double                  |                       |                        |

# Specifications for Defining Playback Views

This appendix describes rules and considerations for designing playback views.

| Topic  | Page |
|--|------|
| Summarization level details                        | 161  |
| Designing playback views                           | 166  |
| Table of data item requirements for playback views | 169  |
| Additional information about some data items       | 174  |

## Summarization level details

All playback views in a session play back with the same summarization level. You define the summarization level of playback using the *summarization\_level* parameter to the `hs_create_playback_session` command. The summarization levels are:

- raw
- actual
- entire
- user-defined intervals

## Raw playback

This option plays back data as it was collected, using the same sample intervals. Choose this option to view raw data as it was recorded. This is the only option available for playing back snapshot data, such as current SQL statement data and per-process status data. See Table C-2 on page 169 for a definitive list of the snapshot data items. (They are the ones with “No” in the “Allowed for Non-raw” column.)

This option is valid only when *target* is client.

Historical Server performs no processing on the data. The time of each playback sample matches exactly the time on the sample from the input session. The data is exactly the same as in the input session.

Raw playback includes only those recording session samples that fall entirely between the playback *start\_time* and *end\_time*. For example, if the playback session *start\_time* is 3 p.m., and an input recording session has 10-minute samples with one starting at 2:55 p.m., the first sample in the playback is the one that starts at 3:05 p.m.

If playback *start\_time* is later than the input recording session start time, cumulative session values are played back as they were collected, with no adjustments made. For example, if an input recording session started at 1 p.m., but the playback *start\_time* is 3 p.m., the data item “Device I/O” “Total for Session” would reflect the total I/O since 1 p.m.

## Actual playback

This option plays back data using the same sample intervals as the input recording sessions. The playback view can use statistic types different from those in the recorded data, and it can include some estimated and calculated data items not in the original view. It cannot include snapshot data, such as process or lock status data and current SQL statement data. See Table C-2 on page 169 for a definitive list of data items that can be converted or added to a playback view.

Choose this option to add or change certain data items when summarization is not required.

This option is valid only when *target* is client.



Historical Server returns samples whose time intervals correspond to those of samples in the input sessions. However, samples might be truncated to comply with the *start\_time* or *end\_time* specified, or if overlaps occur across input sessions.

If the requested playback start or end times fall in the middle of a sample interval, Historical Server prorates counted values and performs weighted averages on percentages and rates. The weights are the number of seconds that each input sample contributes.

For example, if the playback session *start\_time* is 3 p.m., and an input recording session has 10-minute samples with one starting at 2:55 p.m., the first sample in the playback is the one that started at 2:55 p.m., with all values prorated 50 percent to reflect half a sample.

If playback *start\_time* is later than the input recording session start time, cumulative session values are played back prorated to reflect the partial session. For example, if an input recording session started at 1 p.m., but the playback *start\_time* is 3 p.m., the data item “Device I/O” “Total for Session” would be a prorated value for I/O since 3 p.m.

## Entire playback

This option plays back data for all input recording sessions summarized as a single sample. For example, seven input recording sessions would result in a single playback sample. The sample interval is the timespan between the requested playback *start\_time* and *end\_time*.

The playback view can use statistic types different from those in the recorded data, and it can include some estimated and calculated data items not in the original view. It cannot include snapshot data, such as process or lock status data and current SQL statement data. See Table C-2 on page 169 for a definitive list of data items that can be converted or added to a playback view.

Choose this option to consolidate recorded data, rolling up details into overviews of activity over longer time periods.

If the requested playback start or end times fall in the middle of the input recording session, Historical Server prorates counted values and performs weighted averages on percentages and rates. The weights are the number of seconds that each input sample contributes.

For example, if the playback session *start\_time* is 3 p.m. and the *end\_time* is 6 p.m., and an input recording session started at 1 p.m. and ended at 9 p.m., Historical Server calculates data item values for the hours between 3 p.m. and 6 p.m. It prorates cumulative (session) counts and uses weighted averages for cumulative percentages and rates if the start and end times specified for playback do not match the start and end times of the input sessions.

## Playback with user-defined intervals

This option plays back data summarized into sample intervals of the specified length. The parameter value is the sample interval, specified as:

"S"  
"M:S"  
"H:M:S"  
"D H:M:S"

where:

- *S* is seconds.
- *M* is minutes.
- *H* is hours.
- *D* is days.

All components are numeric and can be one or two digits. Some examples are:

"30" (specifies sample intervals of 30 seconds)  
"10:0" (specifies sample intervals of 10 minutes)  
"8:30:0" (specifies sample intervals of 8 1/2 hours)  
"5 0:0:0" (specifies sample intervals of 5 days)

The first sample interval starts at *start\_time*, and every sample, except possibly the last one, has the specified length. If the requested playback start or end times fall in the middle of a sample interval in the original recording session, Historical Server prorates the recorded data values for the playback sample. The last sample might be shorter, if necessary, to end at the *end\_time* specified.

Choose this option to summarize data into any desired granularity. This type of summary can mediate deviations in activity and is useful for observing trends over time.

The playback view can use statistic types different from those in the recorded data, and it can include some estimated and calculated data items not in the original view. See Table C-2 on page 169 for a definitive list of data items that can be converted or added to a playback view.

For each sample interval, Historical Server prorates counted values and performs weighted averages on percentages and rates to align the data with the requested playback sample interval. The weights are the number of seconds that each input sample contributes.

## Summary of summarization intervals

Table C-1 summarizes the playback features offered by each of the *summarization\_interval* values.

**Table C-1: Summarization interval features**

| Feature  | Raw                        | Actual | Entire | Defined interval |
|--|----------------------------|--------|--------|------------------|
| All recorded data items are available for playback.  | Yes                        | No     | No     | No               |
| Timestamp allowed in playback view.  | Yes                        | Yes    | Yes    | Yes              |
| Changed statistic types allowed in playback view.  | No                         | Yes    | Yes    | Yes              |
| Playback to a file (to create a summarized recording session) allowed.                     | No                         | No     | Yes    | Yes              |
| Calculated or estimated data items not in input view allowed in playback view.             | No                         | Yes    | Yes    | Yes              |
| Session (cumulative) data prorated when playback starts in the middle of an input session. | No                         | Yes    | Yes    | Yes              |
| Sample data prorated when playback starts in the middle of an input sample.                | No – the sample is omitted | Yes    | Yes    | Yes              |
| Summarization.   | No                         | No     | Yes    | Yes              |
| Standardized sample intervals, with appropriate data adjustments.                          | No                         | No     | No     | Yes              |

## Designing playback views

This section describes the following topics:

- Rules for specifying input sessions
- Relationship of input views to playback views
- Rules for defining raw playback views
- Rules for defining non-raw playback views

### Rules for specifying input sessions

When you are using multiple input sessions to create a playback session to a file, no time gaps are allowed in input sessions. That is, when *target* is file, no gaps can exist between an input session's end time and the next input session's start time.

For example, if you collected data from 9 a.m. to 5 p.m. every day from Monday through Friday, you could not play back those five recording sessions to create a new, summarized, weekly session. However, if you eliminate the time gaps by collecting data from 9 a.m. to 9 a.m. every day from Monday through Friday, you could use the playback feature to create a new, summarized weekly session. Another way to eliminate the time gaps is to keep the 9 a.m. to 5 p.m. recording session, but add another set of recording sessions scheduled from 5 p.m. to 9 a.m. Use a longer sample interval for the off hours to reduce the volume of data collected.

### Relationship of input views to playback views

Use the `hs_create_playback_session` command to create a playback session. Then use one or more `hs_create_playback_view` commands to add views to the playback session. A playback session must contain at least one view. It can contain more than one view.

In the `hs_create_playback_session` command, you specify the input session IDs that you want to include in the playback. The input views are the views that were defined for the input recording sessions. A playback view defines which data items in the corresponding input view you want to play back.

Playback views are derived from the input views. The name of a playback view must match the name of a view in the input sessions. In the case of multiple input sessions, the view must exist in *all* of the input sessions, and the view definitions in all of the input sessions must contain exactly the same list of data items and the same list of filters.

## Rules for defining views

The rules for defining playback views are different depending on whether the *summarization\_interval* defined for the playback session is raw or non-raw.

### Rules for defining raw playback views

When the *summarization\_interval* for the playback session is raw:

- All key data items in the input view *must* be included in the playback view. The column labeled “Key” in Table C-2 indicates which data items are keys. The only valid statistic type for a key is “Value for Sample.”
- The result data items in the input view are optional in the playback view.
- The statistic types for all data items in the playback view must be the same as those used for the input view.
- Any playback view can include these data items:
  - “Timestamp” “Value for Sample”
  - “Timestamp Datim” “Value for Sample”
  - “Elapsed Time” “Value for Sample”
  - “Elapsed Time” “Value for Session”

If you want to play back all data items in the input view and do not need to add Timestamp, use the `hs_create_playback_view` command without the *data\_item\_name\_n* and *data\_item\_stat\_n* parameters. The default when you omit these parameters is to define the playback view using all of the data items from the input view of the same name.

### Rules for defining non-raw playback views

When *summarization\_interval* is entire, actual, or a summary interval:

- All key data items in the input view *must* be included in the playback view. The column labeled “Key” in Table C-2 on page 169 indicates which data items are keys. The only valid statistic type for keys is “Value for Sample”.

- Any playback view can include these data items:
  - “Timestamp” “Value for Sample”
  - “Timestamp Datim” “Value for Sample”
  - “Elapsed Time” “Value for Sample”
  - “Elapsed Time” “Value for Session”
- The column labeled “Valid for Non-row?” in Table C-2 indicates which result data items are allowed in a non-row playback view. The column labeled “Conditions for Inclusion” represents conditions under which the data item is allowed.
- If the “Conditions for Inclusion” column indicates “Full”, the full range of statistic types valid for that data item is available to the playback view, regardless of the statistic type used in the input view. Use Table B-3 on page 152 to determine valid statistic types for each data item.
- If the “Conditions for Inclusion” column indicates “Estimated”, then both of the following conditions must be true if you want to include the data item in the playback view:
  - The statistic type for the data item must be “Value for Sample” in the input view, *and*
  - The playback session must be defined to allow estimations. (In the `hs_create_playback_session` command, the `allow_estimation` parameter must be allow.)

The full range of statistic types valid for the data item is available for the playback view, regardless of the statistic type used in the input view.

- If the “Conditions for Inclusion” column indicates “Calculated”, then one of the following conditions must be true if you want to include the data item in the playback view:
  - The data items listed in the column labeled “Other Data Items Needed for Calculation” exist in the input view. If this is true, Historical Server calculates values during playback, *or*
  - If the data items required for calculation do not exist in the input view, Historical Server can estimate values during playback. For this to happen, the conditions for estimating, described previously, must be true.

The full range of statistic types valid for the data item is available for the playback view, regardless of the statistic type used in the input view.

## Table of data item requirements for playback views

Table C-2 describes the requirements for including data items in a playback view. Read the previous section for explanations of the columns.

**Table C-2: Data item requirements for playback views**

| <b>Data item (keys in an input view are required in a playback view)</b> | <b>Valid for non-raw?</b> | <b>Conditions for inclusion</b>   |
|--|---------------------------|---|
| Application Execution Class  | Valid                     | Value for Sample  |
| Application Name ( <i>KEY</i> )  |                           |   |
| Blocking Process ID  | No                        |   |
| Cache Efficiency   | Valid                     | Estimated   |
| Cache Hit Pct  | Valid                     | Calculated from: <ul style="list-style-type: none"> <li>• Cache Hits</li> <li>• Cache Misses</li> </ul> |
| Cache Hits   | Valid                     | Full  |
| Cache ID ( <i>KEY</i> ) <sup>1</sup>                                     |                           |   |
| Cache Misses   | Valid                     | Full  |
| Cache Name <sup>1</sup>  | Valid                     | Value for Sample  |
| Cache Prefetch Efficiency  | Valid                     | Estimated   |
| Cache Refer And Reuse  | Valid                     | Full  |
| Cache Reuse  | Valid                     | Full  |
| Cache Reuse Dirty  | Valid                     | Full  |
| Cache Size   | Valid                     | Value for Sample  |
| Cache Spinlock Contention  | Valid                     | Estimated   |
| Code Memory Size   | Valid                     | Value for Sample  |
| Connect Time   | Valid                     | Full  |
| CPU Busy Percent   | Valid                     | Estimated   |
| CPU Percent  | Valid                     | Estimated   |
| CPU Time   | Valid                     | Full  |
| CPU Yields   |                           |   |
| Current Application Name   |                           |   |
| Current Engine   | No                        |   |
| Current Execution Class  | No                        |   |
| Current Process State  | No                        |   |
| Current Stmt Batch ID  | No                        |   |
| Current Stmt Batch Text  | No                        |   |
| Current Stmt Batch Text Byte Offset                                      | No                        |   |
| Current Stmt Batch Text Enabled  | No                        |   |

Table of data item requirements for playback views

| <b>Data item (keys in an input view are required in a playback view)</b> | <b>Valid for non-raw?</b> | <b>Conditions for inclusion</b>   |
|--|---------------------------|---|
| Current Stmt Cache Reads   | No                        |   |
| Current Stmt Context ID  | No                        |   |
| Current Stmt CPU Time  | No                        |   |
| Current Stmt Elapsed Time  | No                        |   |
| Current Stmt Line Number   | No                        |   |
| Current Stmt Locks Granted Immediately                                   | No                        |   |
| Current Stmt Locks Granted After Wait                                    | No                        |   |
| Current Stmt Locks Not Granted   | No                        |   |
| Current Stmt Max Text Config Size  | No                        |   |
| Current Stmt Max Text Default Size                                       | No                        |   |
| Current Stmt Max Text Run Size   | No                        |   |
| Current Stmt Number  | No                        |   |
| Current Stmt Page I/O  | No                        |   |
| Current Stmt Page Writes   | No                        |   |
| Current Stmt Physical Reads  | No                        |   |
| Current Stmt Procedure Database ID                                       | No                        |   |
| Current Stmt Procedure Database Name                                     | No                        |   |
| Current Stmt Procedure ID  | No                        |   |
| Current Stmt Procedure Name  | No                        |   |
| Current Stmt Procedure Owner Name  | No                        |   |
| Current Stmt Procedure Text  | No                        |   |
| Current Stmt Query Plan Text   | No                        |   |
| Current Stmt Start Time  | No                        |   |
| Current Stmt Text Byte Offset  | No                        |   |
| Database ID ( <i>KEY</i> )   | Valid                     |   |
| Database Name  | Valid                     | Value for Sample  |
| Deadlock Count   | Valid                     | Full  |
| Demand Lock  | No                        |   |
| Device Hit Percent   | Valid                     | Calculated from: <ul style="list-style-type: none"> <li>• Device Hits</li> <li>• Device Misses</li> </ul> |
| Device Hits  | Valid                     | Full  |
| Device I/O   | Valid                     | Full  |
| Device Misses  | Valid                     | Full  |
| Device Name ( <i>KEY</i> )   | Valid                     | Value for Sample  |
| Device Reads   | Valid                     | Full  |



| <b>Data item (keys in an input view are required in a playback view)</b> | <b>Valid for non-raw?</b> | <b>Conditions for inclusion</b> |
|--|---------------------------|---------------------------------|
| Device Writes  | Valid                     | Full                            |
| Elapsed Time <sup>2</sup>  | Valid                     | Full                            |
| Engine Number ( <i>KEY</i> )   | Valid                     | Value for Sample                |
| Host Name  | No                        |                                 |
| Index Logical Reads  | Valid                     | Full                            |
| Index Physical Reads   | Valid                     | Full                            |
| Kernel Process ID ( <i>KEY</i> )   | Valid                     | Value for Sample                |
| Kernel Structures Memory Size  | Valid                     | Value for Sample                |
| Large I/O Denied   | Valid                     | Full                            |
| Large I/O Performed  | Valid                     | Full                            |
| Large I/O Requested  | Valid                     | Full                            |
| Lock Count   | Valid                     | Full                            |
| Lock Hit Percent   | Valid                     | Estimated                       |
| Lock Result ( <i>KEY</i> )   | Valid                     | Value for Sample                |
| Lock Results Summarized ( <i>KEY</i> )                                   | Valid                     | Value for Sample                |
| Lock Status ( <i>KEY</i> )   | Valid                     | Value for Sample                |
| Lock Status Count  | No                        |                                 |
| Lock Type ( <i>KEY</i> )   | Valid                     | Value for Sample                |
| Locks Being Blocked Count  | No                        |                                 |
| Locks Granted Immediately  | Valid                     | Full                            |
| Locks Granted After Wait   | Valid                     | Full                            |
| Locks Not Granted  | Valid                     | Full                            |
| Log Contention Percent   | Valid                     | Estimated                       |
| Logical Page Reads   | Valid                     | Full                            |
| Login Name   | Valid                     | Value for Sample                |
| Most Active Device I/O   | No                        |                                 |
| Most Active Device Name  | No                        |                                 |
| Net Bytes Received   | Valid                     | Full                            |
| Net Bytes Sent   | Valid                     | Full                            |
| Net Default Packet Size  | Valid                     | Value for Sample                |
| Net I/O Bytes  | Valid                     | Full                            |
| Net Max Packet Size  | Valid                     | Value for Sample                |

Table of data item requirements for playback views

| <b>Data item (keys in an input view are required in a playback view)</b> | <b>Valid for non-raw?</b> | <b>Conditions for inclusion</b>   |
|--|---------------------------|---|
| Net Packet Size Received   | Valid                     | Calculated from: <ul style="list-style-type: none"> <li>• Net Packets Received</li> <li>• Net Bytes Received</li> </ul>                 |
| Net Packet Size Sent   | Valid                     | Calculated from: <ul style="list-style-type: none"> <li>• Net Packets Sent</li> <li>• Net Bytes Sent</li> </ul>                         |
| Net Packets Received   | Valid                     | Full  |
| Net Packets Sent   | Valid                     | Full  |
| Number of Engines  | Valid                     | Value for Sample  |
| Number of Processes  | Valid                     | Estimated   |
| Object ID ( <i>KEY</i> )   | Valid                     | Value for Sample  |
| Object Name  | Valid                     | Value for Sample  |
| Object Type  | Valid                     | Value for Sample  |
| Owner Name   | Valid                     | Value for Sample  |
| Page Cache Size  | Valid                     | Value for Sample  |
| Page Hit Percent   | Valid                     | Calculated from: <ul style="list-style-type: none"> <li>• Logical Reads</li> <li>• Physical Reads</li> </ul>                            |
| Page I/O   | Valid                     | Full  |
| Page Number ( <i>KEY</i> )   | Valid                     | Value for Sample  |
| Page Writes  | Valid                     | Full  |
| Physical Page Reads  | Valid                     | Full  |
| Procedure Buffer Size  | Valid                     | Value for Sample  |
| Procedure CPU Time   |                           |   |
| Procedure Database ID ( <i>KEY</i> )                                     | Valid                     | Value for Sample  |
| Procedure Database Name  | Valid                     | Full  |
| Procedure Elapsed Time   | Valid                     | Requires: Procedure Execution Count<br>See “Using Procedure Elapsed Time and Procedure CPU Time” in this document for more information. |
| Procedure Execution Class  | No                        |   |
| Procedure Execution Count  | Valid                     | Full  |

| <b>Data item (keys in an input view are required in a playback view)</b> | <b>Valid for non-raw?</b> | <b>Conditions for inclusion</b>  |
|--|---------------------------|--|
| Procedure Header Size  | Valid                     | Value for Sample   |
| Procedure Hit Percent  | Valid                     | Calculated from: <ul style="list-style-type: none"> <li>• Procedure Logical Reads</li> <li>• Procedure Physical Reads</li> </ul> |
| Procedure ID ( <i>KEY</i> )  | Valid                     | Value for Sample   |
| Procedure Line Number ( <i>KEY</i> )                                     | Valid                     | Value for Sample   |
| Procedure Line Text  | Valid                     | Value for Sample   |
| Procedure Logical Reads  | Valid                     | Full   |
| Procedure Name   | Valid                     | Value for Sample   |
| Procedure Owner Name   | Valid                     | Value for Sample   |
| Procedure Physical Reads   | Valid                     | Full   |
| Procedure Statement Number ( <i>KEY</i> )                                | Valid                     | Value for Sample   |
| Process ID ( <i>KEY</i> )  | Valid                     | Value for Sample   |
| Process State ( <i>KEY</i> )   | Valid                     | Value for Sample   |
| Process State Count  | No                        |  |
| Rows Deleted   | Valid                     | Full   |
| Rows Deleted Deferred  | Valid                     | Full   |
| Rows Deleted Direct  | Valid                     | Full   |
| Rows Inserted  | Valid                     | Full   |
| Rows Inserted Clustered  | Valid                     | Full   |
| Rows Inserted Heap   | Valid                     | Full   |
| Rows Updated   | Valid                     | Full   |
| Rows Updated Deferred  | Valid                     | Full   |
| Rows Updated Direct  | Valid                     | Full   |
| Rows Updated Expensively   | Valid                     | Full   |
| Rows Updated In Place  | Valid                     | Full   |
| Rows Updated Not In Place  | Valid                     | Full   |
| Select Statements  | Valid                     | Full   |
| Server Structures Size   | Valid                     | Value for Sample   |
| SQL Server Name  | Valid                     | Value for Sample   |
| SQL Server Version   | Valid                     | Value for Sample   |
| Thread Exceeded Max  | Valid                     | Full   |
| Thread Exceeded Max Percent  | Valid                     | Full   |
| Thread Max Used  | No                        |  |

| Data item (keys in an input view are required in a playback view) | Valid for non-raw? | Conditions for inclusion |
|---|--------------------|--------------------------|
| Time Waited on Lock   | No                 |                          |
| Timestamp <sup>2</sup>  | Valid              | Value for Sample         |
| Timestamp Datim <sup>2</sup>                                      | Valid              | Value for Sample         |
| Transactions  | Valid              | Full                     |

1. In versions earlier than 11.5, Cache Name was a key. Currently, Cache Name is a result. A new key, Cache ID, replaces the key Cache Name. For compatibility, Cache Name remains valid as a key. However, for efficiency and for forward compatibility, use Cache ID as the key in new views.

2. These data items can be included in any playback view even if not present in the input view.

## Additional information about some data items

This section provides additional information about using some data items in views.

### Using “Timestamp”, “Timestamp Datim”, and “Elapsed Time”

The following data items can always be included in a playback view, even if they were not in the input view:

“Timestamp” “Value for Sample”  
 “Timestamp Datim” “Value for Sample”  
 “Elapsed Time” “Value for Sample”  
 “Elapsed Time” “Value for Session”

You can create a playback view consisting of *only* one or more of these time-related data items. To do this, you need a valid view name from the input session, which means that there must be some view in the input sessions that you do not intend to play back.

When *summarization\_level* is raw, “Timestamp” and “Timestamp Datim” values are the same as those in the original data file, which is the time as reported by Adaptive Server when the recording was originally made. When *summarization\_level* is actual, entire, or a user-defined interval, “Timestamp” and “Timestamp Datim” values reflect the time zone on the Historical Server system where the summarization was made.

## Using Process ID

When a server process terminates, Adaptive Server can reuse its Process ID for a new process. Therefore, the Process ID data item is not guaranteed to uniquely identify a process. The Kernel Process ID data item, however, uniquely identifies a process.

To create a non-raw playback view that shows per-process data, the input view and the playback view must include both the Process ID and Kernel Process ID data items. If playback is raw, using only Process ID is allowed.

Views that include Process ID return rows as follows:

- Recording session views and raw playback views.

These views return a row only for process IDs that exist at the end of a sample interval. If a server process terminates in the middle of a sample interval, a row is not returned for its process ID.

- Playback views when the session's *summarization\_level* parameter is actual, entire, or user-defined intervals.

These views return rows for all server processes included in any of the input views. However, since the Process IDs are not guaranteed to be unique, the Kernel Process ID data item must also be included to ensure uniqueness of the key. Otherwise, the view could erroneously summarize two different processes.

## Using Procedure Elapsed Time and Procedure CPU Time

This section discusses how to use the data items that can have the “Avg for Sample” and “Avg for Session” statistic types. The data items are:

- Procedure Elapsed Time
- Procedure CPU Time

If the playback view uses these data item names with the “Value for Sample” or “Value for Session” statistic types, the input view must have the same statistic type.

If the playback view uses these data item names with the “Avg for Sample” or “Avg for Session” statistic types:

- The returned value is *calculated* if the input view includes the additional data item Procedure Execution Count.
- The returned value is *estimated* if all of the following are true:

- Procedure Execution Count does not exist in the input view, and
- Procedure Elapsed Time exists in the input view with the statistic type “Avg for Sample”, and
- The playback session allows estimations. That is, in the `hs_create_playback_session` command, the *allow\_estimation* parameter was set to allow.

## Examples of Recording Session Views

The appendix contains examples of valid views for Historical Server. These views also appear in the *views* file that was installed in the *sample/histserver* subdirectory under the installation directory.

You may find that some of these views collect exactly the information you need, while others can serve as templates for building the views that you need.

Some of the sample views differ from one another only in the time interval over which the data is accumulated (either duration of the recording session, or just the most recent sample interval). Other views contain similar data items but in different orders. The order in which data items appear in a view is significant because the data is sorted according to the key fields. The first key field that appears in a view's definition acts as the primary sort key, the second key field is the secondary sort key, and so on.

Do *not* use the *views* file directly as input to *isql*, for the following reasons:

- It is unlikely that you would want to define all of the views contained in this file for a single recording session.
- The file contains comment lines intermingled with lines that contain the actual text of the view definitions. Historical Server does not understand comment lines. As you cut and paste the view definitions, discard the comment lines.

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## Cache performance summary

This view represents the overall effectiveness of Adaptive Server caches during the most recent sample interval. It shows the percentage of data page reads that are satisfied from the Adaptive Server data caches, as well as the percentage of requests for procedure executions that are satisfied from the Adaptive Server procedure cache.

```
hs_create_view cache_perf_sum,  
"Page Hit Percent", "Value for Sample",  
"Procedure Hit Percent", "Value for Sample"
```



## Database object lock status

This view shows the status of locks on database objects that are held or being requested by Adaptive Server processes, as of the end of the most recent sample interval. Each lock is identified by the name and ID of the object being locked, the name and ID of the database that contains that object, and the page number to which the lock applies (if it is a page lock).

Each Adaptive Server process associated with the lock is also identified by its login name, Process ID, and Kernel Process ID. The type of lock is presented, together with the current status of the lock and an indication of whether or not this is a demand lock. If the lock is being requested by the process, the amount of time that this process waited to acquire the lock and the Process ID of the process that already holds the lock are shown. If, instead, the process already holds the lock, the count of other processes waiting to acquire that lock is shown.

```
hs_create_view object_lock_status,
"Database ID", "Value for Sample",
"Database Name", "Value for Sample",
"Object ID", "Value for Sample",
"Object Name", "Value for Sample",
"Page Number", "Value for Sample",
>Login Name", "Value for Sample",
"Process ID", "Value for Sample",
"Kernel Process ID", "Value for Sample",
"Lock Type", "Value for Sample",
"Lock Status", "Value for Sample",
"Demand Lock", "Value for Sample",
"Time Waited on Lock", "Value for Sample",
"Blocking Process ID", "Value for Sample",
"Locks Being Blocked Count", "Value for Sample"
```

## Database object page I/O

This view shows objects in the Adaptive Server databases and the page I/Os associated with them. It shows the Adaptive Server database name and ID and the object names and IDs within each database. This view shows for each object the associated logical page reads, physical page reads, and page writes for both the most recent sample interval and for the recording session.

```
hs_create_view object_page_io,
"Database ID", "Value for Sample",
```

```
"Database Name", "Value for Sample",  
"Object ID", "Value for Sample",  
"Object Name", "Value for Sample",  
"Logical Page Reads", "Value for Sample",  
"Physical Page Reads", "Value for Sample",  
"Page Writes", "Value for Sample",  
"Logical Page Reads", "Value for Session",  
"Physical Page Reads", "Value for Session",  
"Page Writes", "Value for Session"
```

## Data cache activity for individual caches

This view is available only for SQL Server version 11.0.x and Adaptive Server version 11.5 and later. It contains information about the performance of individual data caches.

For each named cache configured in the Adaptive Server, and also for the default data cache, this view collects the cache's name and the percentage of page reads for objects bound to the cache that were satisfied from the cache since the start of the recording session.

This view also presents a measure of the efficiency of the cache's space utilization, and the percentage of times when an attempt to acquire the cache's spinlock was forced to wait, since the start of the session. The actual number of cache hits and misses for the session are also collected.

```
hs_create_view data_cache_sum,  
"Cache Name", "Value for Sample",  
"Cache Hit Pct", "Value for Session",  
"Cache Efficiency", "Value for Session",  
"Cache Spinlock Contention", "Value for Session",  
"Cache Hits", "Value for Session",  
"Cache Misses", "Value for Session"
```

## Data cache statistics for recording session

This view represents the overall effectiveness of the combined data caches of the Adaptive Server since the start of the recording session. It shows the percentage of requests for page reads that were satisfied from cache for the recording session.

The view also shows the number and rate of logical page reads, physical page reads, and page writes for the recording session.

```
hs_create_view session_page_cache_stats,  
"Page Hit Percent", "Value for Session",  
"Logical Page Reads", "Value for Session",  
"Logical Page Reads", "Rate for Session",  
"Physical Page Reads", "Value for Session",  
"Physical Page Reads", "Rate for Session",  
"Page Writes", "Value for Session",  
"Page Writes", "Rate for Session"
```

## Data cache statistics for sample interval

This view represents the overall effectiveness of the combined data caches of the Adaptive Server for the most recent sample interval. It shows the percentage of requests for page reads that were satisfied from cache for the most recent sample interval.

The view also shows the number and rate of logical page reads, physical page reads, and page writes for the most recent sample interval.

```
hs_create_view sample_page_cache_stats,  
"Page Hit Percent", "Value for Sample",  
"Logical Page Reads", "Value for Sample",  
"Logical Page Reads", "Rate for Sample",  
"Physical Page Reads", "Value for Sample",  
"Physical Page Reads", "Rate for Sample",  
"Page Writes", "Value for Sample",  
"Page Writes", "Rate for Sample"
```

## Device I/O for recording session

This view represents the I/O activity that occurred on Adaptive Server database devices since the start of the recording session. It identifies each device by name. Device I/O levels are presented in two ways: as counts of total device I/Os, reads and writes since the start of the session, and also as overall rates of total I/Os, reads and writes per second since the session began.

```
hs_create_view session_device_io,  
"Device Name", "Value for Sample",  
"Device Reads", "Value for Session",  
"Device Writes", "Value for Session",  
"Device I/O", "Value for Session",  
"Device Reads", "Rate for Session",  
"Device Writes", "Rate for Session",  
"Device I/O", "Rate for Session"
```

## Device I/O for sample interval

This view represents the I/O activity that occurred on the Adaptive Server database devices during the most recent sample interval. It identifies each device by name. Device I/O levels are presented in two ways: as counts of total device I/Os, reads and writes during the most recent sample interval, and also as rates of total I/Os, reads and writes per second during the sample interval.

```
hs_create_view sample_device_io,  
"Device Name", "Value for Sample",  
"Device I/O", "Value for Sample",  
"Device Reads", "Value for Sample",  
"Device Writes", "Value for Sample",  
"Device I/O", "Rate for Sample",  
"Device Reads", "Rate for Sample",  
"Device Writes", "Rate for Sample"
```

## Device I/O performance summary

This view represents reads and writes to database devices by Adaptive Server, accumulated from the start of the recording session. It shows the overall rate of reads and writes to database devices since the start of the session, as well as the most active database device for that time period and the rate of reads and writes to the most active device.

```
hs_create_view device_perf_sum,
"Device I/O", "Rate for Session",
"Most Active Device Name", "Value for Session",
"Most Active Device I/O", "Rate for Session"
```

## Engine activity

This view shows the level of activity for each active Adaptive Server engine during the most recent sample interval. For each engine, the percentage of the sample interval, when that engine used the CPU, is presented.

Also shown are the number of logical page reads, physical page reads, and page writes that were generated by that engine during the sample interval.

```
hs_create_view engine_activity,
"Engine Number", "Value for Sample",
"CPU Busy Percent", "Value for Sample",
"Logical Page Reads", "Value for Sample",
"Physical Page Reads", "Value for Sample",
"Page Writes", "Value for Sample"
```

## Lock performance summary

This view represents the total number of locks of each type requested and granted during the most recent sample interval.

```
hs_create_view lock_perf_sum,
"Lock Type", "Value for Sample",
"Lock Results Summarized", "Value for Sample",
"Lock Count", "Value for Sample"
```

## Network activity for recording session

This view represents the network activity over all of the Adaptive Server network connections since the start of the recording session. It shows the default packet size, the maximum packet size, and both average packet sizes sent and received since the start of the session. The view shows the number of packets sent, the number of packets received, and the rate at which packets were sent and received. It also shows the number of bytes sent and the number of bytes received and the rate at which bytes were sent and received.

```
hs_create_view session_network_activity,  
  "Net Default Packet Size", "Value for Sample",  
  "Net Max Packet Size", "Value for Sample",  
  "Net Packet Size Sent", "Value for Session",  
  "Net Packet Size Received", "Value for Session",  
  "Net Packets Sent", "Value for Session",  
  "Net Packets Received", "Value for Session",  
  "Net Packets Sent", "Rate for Session",  
  "Net Packets Received", "Rate for Session",  
  "Net Bytes Sent", "Value for Session",  
  "Net Bytes Received", "Value for Session",  
  "Net Bytes Sent", "Rate for Session",  
  "Net Bytes Received", "Rate for Session"
```

## Network activity for sample interval

This view represents the network activity over all of the Adaptive Server network connections during the most recent sample interval. It shows the default packet size, the maximum packet size, and both average packet sizes sent and received for the sample interval. The view shows the number of packets sent, the number of packets received, and the rate at which packets were sent and received. It also shows the number of bytes sent and the number of bytes received and the rate at which bytes were sent and received.

```
hs_create_view sample_network_activity,  
  "Net Default Packet Size", "Value for Sample",  
  "Net Max Packet Size", "Value for Sample",  
  "Net Packet Size Sent", "Value for Sample",  
  "Net Packet Size Received", "Value for Sample",  
  "Net Packets Sent", "Value for Sample",  
  "Net Packets Received", "Value for Sample",  
  "Net Packets Sent", "Rate for Sample",
```

```
"Net Packets Received", "Rate for Sample",  
"Net Bytes Sent", "Value for Sample",  
"Net Bytes Received", "Value for Sample",  
"Net Bytes Sent", "Rate for Sample",  
"Net Bytes Received", "Rate for Sample"
```

## Network performance summary

This view represents the rate of Adaptive Server activity over all its network connections during the most recent sample interval. It shows the number of bytes per second that were received by and sent by the Adaptive Server during the interval.

```
hs_create_view network_perf_sum,  
"Net Bytes Received", "Rate for Sample",  
"Net Bytes Sent", "Rate for Sample"
```

## Page I/O

This view enables you to determine which tables experienced the highest number of page reads over the duration of the recording session. It also allows you to track activity against tables at different times of day because page reads are also accumulated on a per-sample basis. You can set the sample interval for the recording session to whatever granularity is most useful for establishing activity trends at different times of day.

You may want to accumulate only total page reads for the entire recording session. In that case, you can set the sample interval to nearly the length of the recording session, and drop “Logical Page Reads”, “Value for Sample” from the view.

```
hs_create_view page_ios,  
"Database ID", "Value for Sample",  
"Database Name", "Value for Sample",  
"Object ID", "Rate for Sample",  
"Logical Page Reads", "Value for Sample",
```

"Logical Page Reads", "Rate for Session"

---

**Note** The count of the page I/Os collected by this view for a given database table includes I/Os against indexes on the table, in addition to those performed against the data pages of the table itself.

---

## Procedure cache statistics for recording session

This view represents the effectiveness of the procedure cache of the Adaptive Server since the start of the recording session. It shows the percentage of requests for stored procedure executions that were satisfied by the procedure cache.

The view also shows the number of logical reads and physical reads of stored procedures since the start of the session, and the overall rate of logical and physical reads of stored procedures since the start of the session.

```
hs_create_view session_procedure_cache_stats,  
"Procedure Hit Percent", "Value for Session",  
"Procedure Logical Reads", "Value for Session",  
"Procedure Logical Reads", "Rate for Session",  
"Procedure Physical Reads", "Value forSession",  
"Procedure Physical Reads", "Rate for Session"
```

## Procedure cache statistics for sample interval

This view represents the effectiveness of the procedure cache of the Adaptive Server for the most recent sample interval. It shows the percentage of requests for stored procedure executions that were satisfied by the procedure cache for the most recent sample interval.

The view also shows the number of logical reads and physical reads of stored procedures during the most recent sample interval, and the rate of logical and physical reads of stored procedures for the most recent sample interval.

```
hs_create_view sample_procedure_cache_stats,  
"Procedure Hit Percent", "Value for Sample",  
"Procedure Logical Reads", "Value for Sample",
```



```
"Procedure Logical Reads", "Rate for Sample",  
"Procedure Physical Reads", "Value for Sample",  
"Procedure Physical Reads", "Rate for Sample"
```

## Procedure page I/O

This view represents page I/Os that occurred while running stored procedures during the most recent sample interval. For each stored procedure that generated page I/Os during the sample interval, it shows the stored procedure name and ID, together with the name and ID of the database that contains the procedure. If page I/Os were produced when no stored procedure was active, those I/Os are associated with procedure ID and database ID values of zero.

This view also shows, on a per stored procedure level, the total page I/Os, the percentage of page I/O requests that could be satisfied by the Adaptive Server data caches, and the number of logical page reads, physical page reads, and page writes generated while executing the stored procedures during the most recent sample interval.

```
hs_create_view procedure_page_cache_io,  
"Procedure Database Name", "Value for  
Sample", "Procedure Database ID", "Value for  
Sample", "Procedure Name", "Value for Sample", "Procedure  
ID", "Value for Sample", "Page I/O", "Value for  
Sample", "Page Hit Percent", "Value for Sample", "Logical  
Page Reads", "Value for Sample", "Physical Page Reads",  
"Value for Sample", "Page Writes", "Value for Sample"
```

## Process activity

This view shows the CPU utilization, page I/Os, and current process state for all processes in the Adaptive Server.

For the most recent sample interval, the login name, Process ID and Kernel Process ID are given for each process, together with its current process state.

The view also presents each process's connect time, total page I/Os and CPU utilization time, accumulated since the start of the recording session.

```
hs_create_view process_activity,
```

```
"Login Name", "Value for Sample",  
"Process ID", "Value for Sample",  
"Kernel Process ID", "Value for Sample",  
"Connect Time", "Value for Session",  
"Page I/O", "Value for Session",  
"CPU Time", "Value for Session",  
"Current Process State", "Value for Sample"
```

## Process database object page I/O

This view represents the page I/Os by database object for each Adaptive Server process. It shows the login name, Process ID, and Kernel Process ID for each process that had page I/Os during the most recent sample interval.

For each such process and for each database object it accessed, the view also shows the object name, object ID, and the object's database name and ID, plus the page I/Os associated the object.

The view also shows the total page I/Os, the percentage of page I/O requests that could be satisfied by the Adaptive Server cache, and the number of logical page reads, physical page reads, and page writes for the most recent sample interval.

```
hs_create_view process_object_page_io,  
"Login Name", "Value for Sample",  
"Process ID", "Value for Sample",  
"Kernel Process ID", "Value for Sample",  
"Database Name", "Value for Sample",  
"Database ID", "Value for Sample",  
"Object Name", "Value for Sample",  
"Object ID", "Value for Sample",  
"Object Type", "Value for Sample",  
"Page I/O", "Value for Sample",  
"Page Hit Percent", "Value for Sample",  
"Logical Page Reads", "Value for Sample",  
"Physical Page Reads", "Value for Sample",  
"Page Writes", "Value for Sample"
```

## Process detail for locks

This view shows the status of locks held by or being requested by Adaptive Server processes as of the end of the most recent sample interval. Each lock is identified by the login name, Process ID, and Kernel Process ID of the Adaptive Server process associated with the lock, as well as the name and ID of the object being locked, the name and ID of the database that contains that object, and the page number to which the lock applies (if it is a page lock). The current status of each lock is presented, as is an indication of whether or not this is a demand lock. If the lock is being requested by the process, the amount of time that this process waited to acquire the lock and the Process ID of the process that already holds the lock are shown. If instead the process already holds the lock, the count of other processes waiting to acquire that lock is shown.

```

hs_create_view process_detail_locks,
  "Login Name", "Value for Sample",
  "Process ID", "Value for Sample",
  "Kernel Process ID", "Value for Sample",
  "Database Name", "Value for Sample",
  "Database ID", "Value for Sample",
  "Object Name", "Value for Sample",
  "Object ID", "Value for Sample",
  "Page Number", "Value for Sample",
  "Lock Status", "Value for Sample",
  "Demand Lock", "Value for Sample",
  "Time Waited on Lock", "Value for Sample",
  "Blocking Process ID", "Value for Sample",
  "Locks Being Blocked Count", "Value for Sample"

```

## Process detail page I/O

This view represents the page I/Os for each Adaptive Server process in detail. The login name, Process ID, Kernel Process ID, current process state and current engine are shown for each Adaptive Server process as of the end of the most recent sample interval. The view shows the percentage of page I/O requests that could be satisfied by the Adaptive Server data caches, both for the sample interval and since the start of the session.

This view also presents the number of logical page reads, physical page reads, and page writes accumulated since the start of the recording session.

```
hs_create_view process_detail_io,  
"Login Name", "Value for Sample",  
"Process ID", "Value for Sample",  
"Kernel Process ID", "Value for Sample",  
"Current Process State", "Value for Sample",  
"Current Engine", "Value for Sample",  
"Connect Time", "Value for Session",  
"CPU Time", "Value for Session",  
"Page Hit Percent", "Value for Sample",  
"Page Hit Percent", "Value for Session",  
"Logical Page Reads", "Value for Session",  
"Physical Page Reads", "Value for Session",  
"Page Writes", "Value for Session"
```

## Process locks

This view shows the count of lock requests for every process in the Adaptive Server that generated lock requests during the most recent sample interval.

```
hs_create_view process_lock,  
"Login Name", "Value for Sample",  
"Process ID", "Value for Sample",  
"Kernel Process ID", "Value for Sample",  
"Lock Count", "Value for Sample"
```

## Process page I/O

This view represents the page I/Os summarized on a per Adaptive Server process level for the most recent sample. It shows the login name, Process ID, and Kernel Process ID for each process in the Adaptive Server that generated page I/Os during the interval.

This view also shows, on a per process level, the total page I/Os, the percentage of page I/O requests that could be satisfied by the Adaptive Server data caches, and the number of logical page reads, physical page reads, and writes for the most recent sample interval.

```
hs_create_view process_page_io,  
"Login Name", "Value for Sample",  
"Process ID", "Value for Sample",
```

```
"Kernel Process ID", "Value for Sample",  
"Page I/O", "Value for Sample",  
"Page Hit Percent", "Value for Sample",  
"Logical Page Reads", "Value for Sample",  
"Physical Page Reads", "Value for Sample",  
"Page Writes", "Value for Sample"
```

## Process state summary

This view shows the number of processes that were in each process state at the end of the most recent sample interval.

```
hs_create_view process_perf_sum,  
"Process State", "Value for Sample",  
"Process State Count", "Value for Sample"
```

## Process stored procedure page I/O

This view represents the page I/Os associated with stored procedure executions by Adaptive Server processes. It shows the login name, Process ID, and Kernel Process ID for each process that generated page I/Os during the sample interval. For each process and stored procedure that generated page I/Os, it shows the name and ID of the database that contains the stored procedure, as well as the name and ID of the procedure itself.

The view also shows the total page I/Os, the percentage of page I/O requests that could be satisfied from data caches, and the number of logical page reads, physical page reads, and page writes for the most recent sample interval.

```
hs_create_view process_procedure_page_io,  
"Login Name", "Value for Sample",  
"Process ID", "Value for Sample",  
"Kernel Process ID", "Value for Sample",  
"Procedure Database Name", "Value for Sample",  
"Procedure Database ID", "Value for Sample",  
"Procedure Name", "Value for Sample",  
"Procedure ID", "Value for Sample",  
"Page I/O", "Value for Sample",  
"Page Hit Percent", "Value for Sample",  
"Logical Page Reads", "Value for Sample",
```

```
"Physical Page Reads", "Value for Sample",  
"Page Writes", "Value for Sample"
```

## Server performance summary

This view represents overall Adaptive Server performance. It shows the number of lock requests per second, the percentage of the sample interval when the Adaptive Server was busy, the number of transactions processed per second, and the number of times the Adaptive Server detected a deadlock during the most recent sample interval.

```
hs_create_view server_perf_sum,  
"Lock Count", "Rate for Sample",  
"CPU Busy Percent", "Value for Sample",  
"Transactions", "Rate for Sample",  
"Deadlock Count", "Value for Sample"
```

## Stored procedure activity

This view shows stored procedure activity at the level of procedure statement. Each statement of any stored procedure that was executed during the most recent sample interval is identified by the name and ID of the database that contains the procedure, the name and ID of the procedure, the relative number of the statement within the procedure, and the line of the procedure's text on which the statement begins.

The view includes the number of times each statement was executed, both during the most recent sample interval and since the start of the recording session. It also contains the average elapsed time needed to execute the statement, both for the sample interval and for the recording session so far.

```
hs_create_view procedure_activity,  
"Procedure Database ID", "Value for Sample",  
"Procedure Database Name", "Value for Sample",  
"Procedure ID", "Value for Sample",  
"Procedure Name", "Value for Sample",  
"Procedure Line Number", "Value for Sample",  
"Procedure Statement Number", "Value for Sample",  
"Procedure Execution Count", "Value for Sample",
```

```
"Procedure Execution Count", "Value for Session",  
"Procedure Elapsed Time", "Avg for Sample",  
"Procedure Elapsed Time", "Avg for Session"
```

## Transaction activity

This view details the transaction activity that occurred in Adaptive Server, both for the sample interval and the recording session.

```
hs_create_view transaction_activity,  
"Transactions", "Value for Sample",  
"Rows Deleted", "Value for Sample",  
"Rows Inserted", "Value for Sample",  
"Rows Updated", "Value for Sample",  
"Rows Updated Directly", "Value for Sample",  
"Transactions", "Value for Session",  
"Rows Deleted", "Value for Session",  
"Rows Inserted", "Value for Session",  
"Rows Updated", "Value for Session",  
"Rows Updated Directly", "Value for Session",  
"Transactions", "Rate for Sample",  
"Rows Deleted", "Rate for Sample",  
"Rows Inserted", "Rate for Sample",  
"Rows Updated", "Rate for Sample",  
"Rows Updated Directly", "Rate for Sample",  
"Transactions", "Rate for Session",  
"Rows Deleted", "Rate for Session",  
"Rows Inserted", "Rate for Session",  
"Rows Updated", "Rate for Session",  
"Rows Updated Directly", "Rate for Session"
```





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