ADMINISTRATION GUIDE | PUBLIC
SAP Adaptive Server Enterprise 16.0 SP03
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SAP Adaptive Server Enterprise Cockpit

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1 SAP Adaptive Server Enterprise Cockpit

This guide describes the SAP Adaptive Server Enterprise cockpit, a Web-based tool which provides availability monitoring, historical performance monitoring, and administration capabilities for SAP ASE servers.

2 About SAP ASE Cockpit

SAP Adaptive Server Enterprise cockpit (SAP ASE cockpit) is a Web-based tool for monitoring the status and availability of SAP ASE servers. SAP ASE cockpit supports SAP ASE version 16.0 SP02.

SAP ASE cockpit provides availability monitoring, historical performance monitoring, and administration capabilities in a scalable Web application. It offers management of alerts that provide state- and threshold-based notifications about availability and performance in real time, and intelligent tools for spotting performance and usage trends, all via a thin-client, rich Internet application delivered through your Web browser.

Use the SAP ASE cockpit to track various performance metrics and gather statistics that over time will give you powerful insight into patterns of use and the behavior of databases, devices, caches, and processes on your servers. You can display collected data as tables or graphs. By plotting results over any period of time you choose, from a minute to a year, you can both see the big picture and focus on the particulars. Detailed knowledge of how your servers have performed in the past helps you ensure that SAP ASE meets your needs in the future.

2.1 New Features in SAP ASE Cockpit

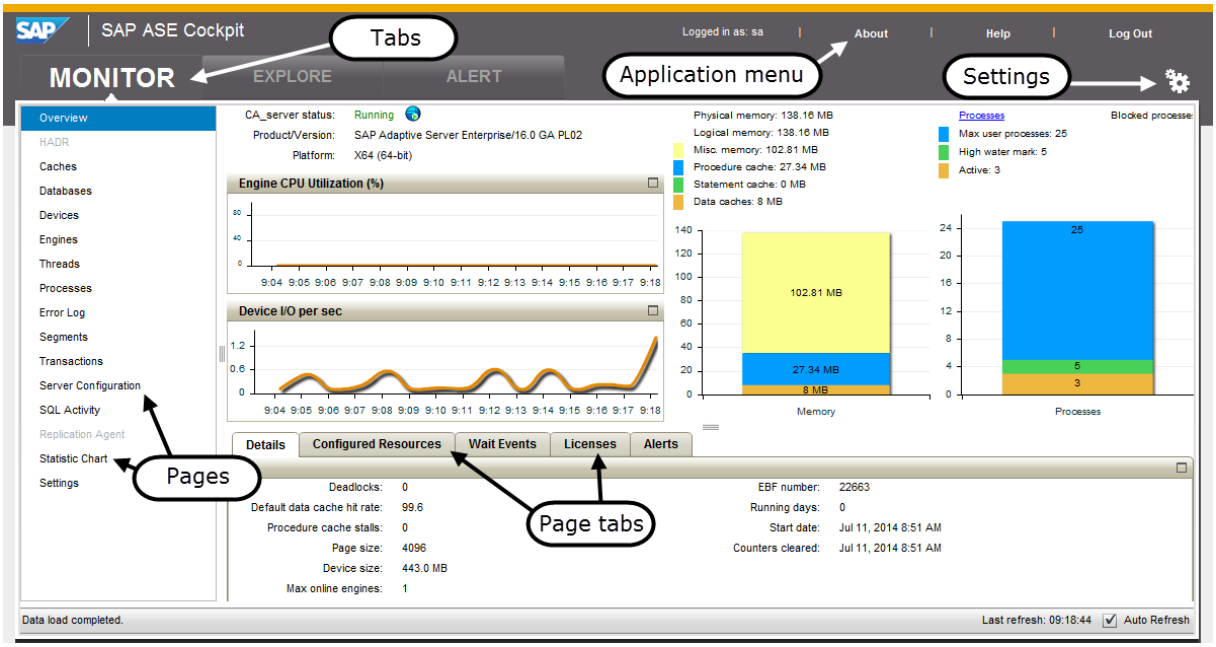
The SAP ASE Cockpit 16.0 SP02 release offers new and enhanced features.

Feature	Topics
SAP ASE Cockpit is a new graphical administration tool for on-board management and monitoring of SAP ASE. SAP ASE Cockpit provides availability monitoring, historical monitoring, and real-time monitoring in a scalable Web application. It offers real-time alerts for availability, performance, and capacity issues, and intelligent tools for spotting performance and usage trends. Availability, performance, and capacity alerts are configured and enabled by default. Unlike SAP Control Center, SAP ASE Cockpit is designed as an on-board management solution, where you install the cockpit on each SAP ASE host to manage and monitor that system.	User Interface Overview [page 17]
SAP ASE workload analyzer option – enables the capture and replay of a production workload nondisruptively and uses it to diagnose problems and understand and manage configuration changes proactively. Analytics-based recommendations allow database administrators to improve performance, tune their systems, and improve productivity.	Monitor Captured Workloads [page 438]

Feature	Topics
Disaster Recovery – a system that consists of two servers: a primary on which all transaction processing takes place, and a companion that act as warm or hot standbys for the primary server and contain copies of designated databases from the primary server. Replication Server synchronizes the databases between the primary and standby servers. Unplanned failover is managed by the fault manager, which monitors the health of the HADR components. The HADR dashboard displays the state and the health of the HADR system, including charting the HADR-related alerts.	Disaster Recovery [page 295]
Data Store Access Management – provides a mean for customers to display and manage the physical storage of their data, offering a comprehensive means of managing the data's physical characteristics. We offer tools and automation that permit database administrators to move data between various classes of physical storage, and to change the compression level of the stored data, in order to achieve an optimal balance between storage cost and access speed. DSAM provides below benefits to user: • Data usage monitoring. • Moving data to faster devices or to archive devices based on data access activity. • Enhance performance by keeping active data on high performance storage. • Reduce costs (enabling more effective use of storage assets).	Data Partitions with Data Store Access Management [page 417]
Alerts – are configured by default, and are not required to be set manually as in previous releases. Alerts are categorized into three key performance areas (KPAs): availability, performance, and capacity. Each KPA is composed of several key performance indicators (KPIs) whose data is collected at defined intervals. A KPI triggers an alert when it enters a predefined state or exceeds a threshold.	Alerts in SAP ASE [page 145]

2.2 User Interface Overview

Important elements of the SAP ASE Cockpit user interfaced referenced in other help topics.



2.3 Sorting Columnar Data and Common Display Options

You can sort and organize data displayed in grid format.

> **i** Note
>
> Sorting is case-sensitive. A descending sort lists numbers, then uppercase, then lowercase.

Column Options

On the MONITOR and EXPLORE tabs, for data displayed in grid format, you can rearrange and sort columns.

Sorting Option	Description
Simple sorts	Click a column name to sort based on that column in ascending or descending order. The arrow in the sort tab (right of column name) indicates the sort order.
Reversing sort order	Click a column sort tab to reverse the sort order.

Sorting Option	Description
Nesting sorts	Click a column name to perform the primary sort. For subsidiary sorts, click the column sort tab (not the column name). Choose subsidiary sort columns in the order you want to apply them. After you click a sort tab, it displays its sorting level (1 for the primary sort, 2 for the secondary sort, and so on). Click any column name to clear the nested sort.
Rearranging columns	Move columns by dragging and dropping them.

Columns retain their sort order until you exit SAP ASE Cockpit.

The figure below shows a list of tables that are sorted first by the database. Within the database sort, the tables are sorted by owner; and within owner, sorted by name. All three columns sort in descending order.

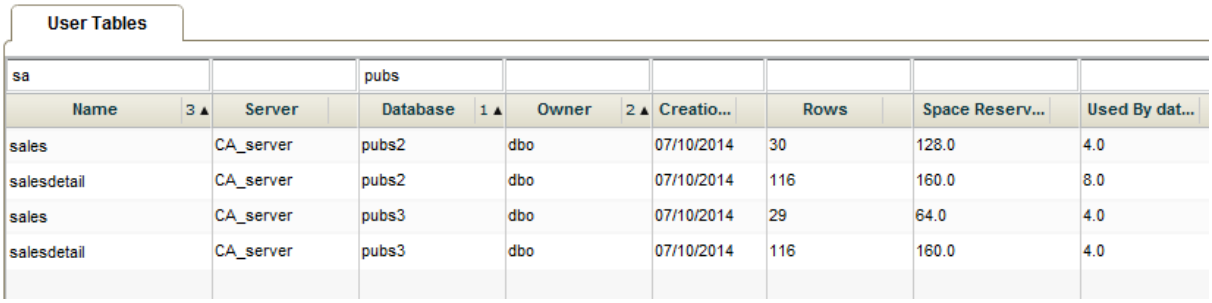
User Tables

Name 3 ▲	Server	Database 1 ▲	Owner 2 ▲	Creatio...	Rows	Space Reserv...	Used By dat...
ijdbc_function_escapes	CA_server	master	dbo	07/10/2014	88	32.0	4.0
jdbc_function_escapes	CA_server	master	dbo	07/10/2014	95	32.0	4.0
spt_ijdbc_conversion	CA_server	master	dbo	07/10/2014	20	32.0	4.0
spt_ijdbc_mda	CA_server	master	dbo	07/10/2014	175	64.0	16.0
spt_ijdbc_table_types	CA_server	master	dbo	07/10/2014	3	32.0	4.0
spt_jdbc_conversion	CA_server	master	dbo	07/10/2014	20	32.0	4.0
spt_jdbc_table_types	CA_server	master	dbo	07/10/2014	3	32.0	4.0
spt_jtext	CA_server	master	dbo	07/10/2014	1	96.0	4.0
spt_limit_types	CA_server	master	dbo	07/10/2014	5	32.0	4.0
spt_mda	CA_server	master	dbo	07/10/2014	236	64.0	16.0
spt_monitor	CA_server	master	dbo	07/10/2014	1	32.0	4.0
spt_values	CA_server	master	dbo	07/10/2014	2135	160.0	100.0
syblicenseslog	CA_server	master	dbo	07/10/2014	0	32.0	4.0
au_pix	CA_server	pubs2	dbo	07/10/2014	6	320.0	4.0
authors	CA_server	pubs2	dbo	07/10/2014	23	192.0	4.0
blurbs	CA_server	pubs2	dbo	07/10/2014	6	64.0	4.0
discounts	CA_server	pubs2	dbo	07/10/2014	4	32.0	4.0

Filter by Column

There is a filtering field at the top of each column to narrow the range of objects displayed. Delete the filtering terms to return to the original display. Filtering terms are not case-sensitive. For example:

- Enter the name of a database at the top of the Database column to display only the tables included in that database. The display reacts as you enter each character, so you might not need to enter the entire name.
- Enter text at the top of the Name column to filter tables names that start with the specified text and that reside in the specified database.



Maximize an Area on a Page

Some areas on a page include a minimize or maximize icon in the upper-right corner ( ). Click the icon to expand that area to its maximum size. Click the icon again to restore the area to its former size.

Once you maximize an area, the maximized state is retained, even when changing tabs, until you exit SAP ASE Cockpit.

Change the Font Size

To change the size of fonts in SAP ASE Cockpit screens:

- Enter *Ctrl-Alt +* to enlarge display fonts.
- Enter *Ctrl-Alt -* to shrink display fonts.

The font change applies to the SAP ASE Cockpit interface, and persists even after your exit SAP ASE Cockpit.

2.4 Keyboard Shortcuts

Shortcut key sequences available for the SAP ASE Cockpit Web interface.

Key Sequence	Action
Space bar	• Opens and closes the list after you press the Tab to navigate to a menu item or a button with a drop down list. • Expands and collapses a node in the left pane. • In a wizard or property window, selects or deselects the item after you navigate to a check box. • In a wizard or dialog box, applies the highlighted button (for example, Yes, No, Back, Next, Apply, Finish, or Cancel).

Key Sequence	Action
Escape	• Releases a drop down list. • On the MONITOR tab, closes the errors window after you click the errors link at the bottom right of the window. • Closes most wizards before completion.

Arrow keys	• Highlight the next item in a list or menu in the indicated direction.
	• Highlight the next radio button in a list in the indicated direction.
	• In the left pane, left and right arrows expand and collapse a node.
	• In a table with column searching, with the cursor positioned in the first row:
	  ○ Press up arrow twice to access the column search row.
	  ○ Press left or right arrow to move between columns.
	  ○ Press down arrow twice to exit the column search row and return to the list.

Tab	• Highlights the next item in the tab order. (Tab order progresses through the accessible fields in a left-to-right, top-to-bottom fashion, starting at the upper left.) • In a two-pane window, moves to the next pane. • In a window that includes a table or grid display, Tab twice highlights the table. Press down arrow to enter it.
Shift-Tab	• Highlights the previous item in the tab order. (Tab order progresses through the accessible fields in a bottom-to-top, right-to-left, fashion, starting at the bottom right.) • In a two-pane window, moves to the previous pane.
Home	• Highlights the first item in the active window (or the active section of a window). For example, the first row in a list. • In the left pane, highlights the first node.
End	• Highlights the last item in the active window (or the active section of a window). For example, the last row in a list. • In the left pane, highlights the last node.
Ctrl-Alt +	Increases the size of displayed text. Change persists to future sessions.
Ctrl-Alt -	Decreases the size of displayed text. Change persists to future sessions.
F11	(Internet Explorer only) Enables or disables the browser's full-screen mode.

2.5 Displaying the Versions of the SAP ASE Cockpit Components

View a list of components installed in SAP ASE Cockpit and their versions.

Context

Check the versions of the components in your SAP ASE Cockpit installation to determine whether your installation is up to date. Refer to online release information for the specific supported product component versions.

Procedure

1. Log in to SAP ASE Cockpit and select *About*.
2. Compare the installed component versions against the versions published in the online release information.

2.6 SAP ASE Cockpit Accessibility Information

SAP ASE Cockpit uses the Adobe Flex application.

For the most current information about Adobe Flex keyboard shortcuts, see http://livedocs.adobe.com/flex/3/html/help.html?content=accessible_5.html .

3 Get Started with SAP ASE Cockpit

Start and configure the SAP ASE Cockpit server and launch the SAP ASE Cockpit console.

3.1 SAP ASE Cockpit Installation

SAP ASE Cockpit is installed as part of an SAP ASE server installation.

SAP ASE cockpit is licensed free of charge to customers who have a paid license for SAP ASE.

For detailed installation information, see the*Installation Guide for SAP Adaptive Server Enterprise* documentation.

3.2 Start and Stop the SAP ASE Cockpit Server

You can start SAP ASE Cockpit server manually, or set the service to start automatically and to restart in case of failure.

If you elect to run the SAP ASE Cockpit server manually, you must issue a command every time you want to start or shut down the server. If you elect to run as a service (recommended), you can configure the service to start and restart automatically.

Installation of SAP ASE Cockpit prompts you for your preferred method.

Regardless of the start method used, wait at least five minutes after startup to log in to the SAP ASE Cockpit console. Startup triggers automatic discovery, technical user verification, and collection jobs. Competing with these processes may cause unexpected behavior.

3.2.1 Starting and Stopping the SAP ASE Cockpit Server in Windows

When you run SAP ASE Cockpit server manually, issue a command every time you start or shut down.

Prerequisites

Ensure that your home directory—that is, the home directory of the user who starts SAP ASE Cockpit—is writable from the SAP ASE Cockpit host. If the starting user cannot write to the home directory, SAP ASE

Cockpit logs an error and fails to launch. Resetting the user's HOME environment variable to a writable directory does not solve the problem.

Context

> **i Note**
>
> If you are starting SAP ASE Cockpit server for the first time in Windows 2008, Windows 7, or Windows 8, use the *Run as Administrator* option so that SAP ASE Cockpit can register its ODBC driver. (This is necessary even if you are logged in as an administrator.)

Procedure

1. To start the SAP ASE Cockpit server, execute:

   ```
   %SYBASE%\COCKPIT-4\bin\cockpit.bat
   ```

2. To stop SAP ASE Cockpit, at the `cockpit>` prompt, execute:

   ```
   shutdown
   ```

   At the prompt, enter a text reason for the shutdown.

   > **⚠ Caution**
   >
   > Do not enter `shutdown` at a Windows prompt; it shuts down the operating system.

Related Information

cockpit Command [page 28]

3.2.2 Starting and Stopping the SAP ASE Cockpit Server in UNIX

When you run SAP ASE Cockpit server manually, issue a command every time you start or shut down.

Prerequisites

Ensure that your home directory—that is, the home directory of the user who starts SAP ASE Cockpit—is writable from the SAP ASE Cockpit host. If the starting user cannot write to the home directory, SAP ASE Cockpit logs an error and fails to launch. Resetting the user's HOME environment variable to a writable directory does not solve the problem.

Context

You can start the SAP ASE Cockpit server in the foreground or background. When you run SAP ASE Cockpit server in the background, you can use `nohup`, `&`, and > to redirect output and system error to a file, and suppress the SAP ASE Cockpit server console.

Procedure

1. Set the environment variables. Do this only once.
   a. Change to the parent of the SAP ASE Cockpit installation directory.
   b. Execute one of the following to set environment variables.

      Bourne shell:

      ```
      . SYBASE.sh
      ```

      C shell:

      ```
      source SYBASE.csh
      ```

2. To start the SAP ASE Cockpit server, do one of:

Option	Description
In the foreground	Execute: `$SYBASE/COCKPIT-4/bin/cockpit.sh`
In the background	Execute a command similar to the sample below that matches your shell. The sample command directs output to the file `cockpit-console.out`. If the output file already exists, you might need

Option	Description

	to use additional shell operators to append to or truncate the file.Check the which shell is used: `echo $SHELL`
	Bourne shell (sh) or Bash
	`nohup ./cockpit.sh 2>&1 > cockpit-console.out &`
	C shell
	`nohup ./cockpit.sh >& cockpit-console.out &`

3. To stop the SAP ASE Cockpit server:

Option	Description
Running in the foreground	At the `cockpit>` prompt, execute: `shutdown` At the prompt, enter a text reason for the shutdown. ⚠ Caution Do not enter `shutdown` at a UNIX prompt; it shuts down the operating system.
Running in the background	At the UNIX command line, execute: `$SYBASE/COCKPIT-4/bin/cockpit.sh --stop`

Related Information

cockpit Command [page 28]
cockpit Command [page 28]

3.2.3 Configuring SAP ASE Cockpit Server as a Windows Service

You can set the service to start automatically and to restart in case of failure. SAP recommends running SAP ASE Cockpit as a service.

Prerequisites

Ensure that your home directory—that is, the home directory of the user who starts SAP ASE Cockpit—is writable from the SAP ASE Cockpit host. If the starting user cannot write to the home directory, SAP ASE

Cockpit logs an error and fails to launch. Resetting the user's HOME environment variable to a writable directory does not solve the problem.

Context

If you run SAP ASE Cockpit server as a service, you can still manually start and stop the service, as needed. By default, if you install SAP ASE Cockpit to run as a service, the service is configured to automatically start, but not automatically restart. You must configure this manually.

Procedure

1. To configure automatic restart:
   a. In Windows Control Panel, open Services with Administrative Tools.
   b. Click the *Recovery* tab and change the First, Second, and Subsequent failures to *Restart the Service*.
   c. Click *OK*.
2. To manually start the service:

Option	Description
In the Services window	Click *Start*

At a command line	Execute:
	`net start "Cockpit 4.0"`
	`The Cockpit 4.0 service is starting..... The Cockpit 4.0 service was started successfully.`

3. To manually stop the service:

Option	Description
In the Services window	Click *Stop*

At a command line	Execute:
	`net stop "Cockpit 4.0"`
	`The Cockpit 4.0 service is stopping..... The Cockpit 4.0 service was stopped successfully.`

3.2.4 Configuring SAP ASE Cockpit Server as a UNIX Service

You can set the service to start automatically and to restart in case of failure. SAP recommends running SAP ASE Cockpit as a service.

Prerequisites

Ensure that your home directory—that is, the home directory of the user who starts SAP ASE Cockpit—is writable from the SAP ASE Cockpit host. If the starting user cannot write to the home directory, SAP ASE Cockpit logs an error and fails to launch. Resetting the user's HOME environment variable to a writable directory does not solve the problem.

Context

A UNIX service is a daemon process that starts automatically after the machine is started and runs in the background. UNIX installations of SAP ASE Cockpit server include a shell script, `cockpitd`, which you can use to configure the SAP ASE Cockpit service. (Some UNIX platforms supply tools that make service configuration easier; Linux `chkconfig` is an example.)

> **i Note**
>
> SAP recommends that if you are not familiar with setting up services in UNIX, you delegate this task to a system administrator or consult the system administration documentation for your UNIX platform.

Procedure

1. Open `cockpitd` and make these changes:
   - Change the line that sets the SYBASE variable to the location of your SAP installation (that is, the parent of `COCKPIT-4`, the SAP ASE Cockpit installation directory). By default, this directory is called `/opt/sybase` if you installed SAP ASE Cockpit on a machine with an existing SAP product or environment variable; otherwise the default parent directory is `/opt/sap`.
   - If you are using shared-disk mode to run a single instance whose name is not the host name, or to run multiple instances on the same host, add the instance name to the script name. Change:

     ```
     SCRIPT_NAME=cockpit.sh
     ```

     to:

     ```
     SCRIPT_NAME="cockpit.sh -instance <instance-name>"
     ```
2. In Linux, configure the service to run in run levels 2, 3, 4, and 5. Execute:

   ```
   /usr/sbin/chkconfig --add cockpitd
   ```

```
/usr/sbin/chkconfig --level 2345 cockpitd
```

You can test the `cockpitd` script with **`/usr/sbin/service cockpitd status`**. (The `service` command accepts these options: `start` | `stop` | `status` | `restart`.)

3. Use the `S90cockpitd` and `K10cockpitd` links to test starting and stopping the service. The links are called automatically when the machine is started or shut down.

3.2.5 cockpit Command

Use `cockpit.bat` (Windows) or `cockpit.sh` (UNIX) to manually start and stop SAP ASE Cockpit servers and to perform administrative tasks like configuring ports and enabling and disabling services.

A single cockpit server can manage other SAP database products if they reside on the same host. The cockpit server shares ports and other resources, and the `cockpit` command enables all installed plugins.

Use the `instance` command to manage multiple server instances from the same Cockpit installation directory. See *Shared Disk Mode*.

Syntax

```
cockpit[.bat | .sh] [-a | --address <RMI-service-address>]
[-b | --bitwidth]
[--dbpassword]
[-disable | --disable <service-name,service-name...>]
[-enable | --enable <service-name,service-name...>]
[-h | --help]
[-I | --info [<information-category>]]
[-instance [<instance-name>]]
[-m | --message <message-level>]
[-password | --password <password>]
[-p | --port {<port-name>=<port-number> |
    <service-name>:<property-name>=<port-number>}]
[{-start | --start} | {-stop | --stop}]
[-status | --status]
[-user | --user <login-name>]
[-v | -version | --version]
```

Parameters

-a | --address **`<RMI-service-address>`**

the address for the RMI service to use; must be an IP address on this machine or the name of this machine (which is the default).

-b | --bitwidth

returns an informational only string identifying the bit width (32 or 64) of the underlying platform. If you use this option, the `cockpit` command does not start the SAP ASE Cockpit.

--dbpassword

changes the password of the default dba account provided for the repository database. It prompts you for the new password, validates it, and starts the SAP ASE Cockpit server. This option does not work if you start the SAP ASE Cockpit in the background—it fails to start if there is no console.

-disable | --disable **<service-name,service-name...>**

disable the specified services. This option does not work while SAP ASE Cockpit is running or as part of a command that starts the SAP ASE Cockpit. To use it, shut down the SAP ASE Cockpit, execute `cockpit --disable`, then restart. See under --ports for service names; separate each service from the next with a comma.

-enable | --enable **<service-name,service-name...>**

enable the specified services. Separate each service from the next with a comma. When you use this option, `cockpit` does not start SAP ASE Cockpit—use a separate command to start the SAP ASE Cockpit.

-h | --help

display help and usage information for the `cockpit` command. If you use this option, `cockpit` does not start SAP ASE Cockpit.

-I | --info [**<information-category>**]

display the specified categories of information about SAP ASE Cockpit. Separate each category from the next with a comma. The information categories are:

all	returns all the information provided by the sys, ports, and services categories. Default option.
sys	returns general information about this instance of SAP ASE Cockpit, including the version, the home (installation) directory, the host machine's name and IP address, the RMI port number, the messaging level, and details about the platform and Java installation.
ports	lists all the ports on which the SAP ASE Cockpit and its services listen, indicates whether each port is in use, and shows the service running on each port.
services	lists all the services known to the SAP ASE Cockpit, indicates whether each service is enabled, and lists other services on which each service depends.
sysprop	lists all the Java system properties known to the Java VM and their values.
env	lists the complete Java VM process environment.

-instance [**<instance-name>**]

use with other options (`-start` and `-stop`, for example) to specify an instance in a shared disk deployment. If you do not enter a name for the instance, it defaults to the host name.

-m | --message **<message-level>**

set the amount of detail recorded in system logs; also known as the logging level. Valid values are OFF, FATAL, ERROR, WARN, INFO, DEBUG, and ALL. WARN is the default.

-password | --password

specify the password of the user account SAP ASE Cockpit uses to stop servers or query them for status. Use this option with `--user`. When you enter a command with `--user` but without `--password`, the console prompts you to enter a password.

-p | --port {**<port-name>**=**<port-number>** | **<service-name>**:**<property-name>**=**<port-number>**}

configure the specified service to run on the specified port. Changing ports is useful if you discover a port conflict between SAP ASE Cockpit and other software on the same system. When you use this option, `cockpit` does not start SAP ASE Cockpit—use a separate command to start the SAP ASE Cockpit.

Valid port names, service names and property names are:

Port Name	Description	Service Names	Property Names	Default Port
db	Database port	SccSADataserver	com.sybase.asa.server.port	4638
		Messaging	messaging.db.port	
		Alert	alert.database.port	
http	Web HTTP port	EmbeddedWebContainer	http.port	4282
https	Web HTTPS (secure HTTP) port	EmbeddedWebContainer	https.port	4283
msg	Messaging port	Messaging	messaging.port	4993
rmi	RMI port	RMI	port	4992
tds	Tabular Data Stream™ port (used to communicate with other SAP database products)	Tds	tdsPort	4998

You can also execute `cockpit --info ports` to display service names and associated property names; they appear in the first two columns of the output.

-start | --start

start the SAP ASE Cockpit. This is the default option—if you execute `cockpit` with no options, it starts the SAP ASE Cockpit. This option cannot be combined in the same command with options that set ports or enable or disable services; use a separate `cockpit` command to start the SAP ASE Cockpit.

-status | --status

display a status message indicating whether the SAP ASE Cockpit is running.

-stop | --stop

shut down the SAP ASE Cockpit if it is running.

-user | --user [**<login-name>**]

specify the user account SAP ASE Cockpit uses to stop managed servers or query them for status. Use this option with `--password`. If you do not enter a login name, the console prompts you to enter one.

-v | -version | --version

display the version of SAP ASE Cockpit software running on this system. If you use this option, `cockpit` does not start SAP ASE Cockpit.

Examples

Set the RMI port

each of these commands sets the RMI port to `5992`. The first command demonstrates the port name syntax; the second demonstrates the service name:property name syntax:

```
cockpit --port rmi=5992
cockpit --port RMI:port=5992
```

Set the RMI port and start SAP ASE Cockpit

these commands set the RMI port to `9996`, then start the SAP ASE Cockpit. Two commands (separated by a semicolon here) are needed because `cockpit` does not start the SAP ASE Cockpit when the command includes any of the port-setting options:

```
cockpit -p rmi=9996; cockpit
```

Set all database ports

this command sets all three of the repository database ports (data server, messaging, and database alert) to `3638`:

```
cockpit --port db=3638
```

Set the TDS port

this command sets the TDS port to `9998`:

```
cockpit --port Tds:tdsPort=9998
```

Enable a service and start the SAP ASE Cockpit

the first `cockpit` command enables the TDS service; the second starts the SAP ASE Cockpit. (The two commands are separated by a semicolon.) The second command is needed because `cockpit` does not start SAP ASE Cockpit when the command includes the `-enable` option:

```
cockpit -enable Tds; cockpit
```

Start a SAP ASE Cockpit instance

this command starts the SAP ASE Cockpit instance called `kalamazoo`. `-start` is optional because it is the default:

```
cockpit -start -instance kalamazoo
```

Permissions

None required.

Related Information

Starting and Stopping the SAP ASE Cockpit Server in Windows [page 22]
Starting and Stopping the SAP ASE Cockpit Server in UNIX [page 24]

3.3 Logging In to the SAP ASE Cockpit

Connect to the SAP ASE Cockpit using a Web browser.

Prerequisites

- Adobe Flash Player is installed in the browser you are using for SAP ASE Cockpit.
- The SAP ASE Cockpit server is running. See cockpit Command [page 28]

Procedure

1. Open a Web browser and enter:

   ```
   https://<hostname>:4283/cockpit
   ```

   > **i** Note
   >
   > Port 4283 is the default port. If you specified a different port during installation, substitute the custom port number. To verify the defined port, type *info -p* in the console window on the SAP ASE Cockpit server.

2. At the login prompt, select the system to manage and enter a valid SAP ASE user name (such as `sa`) and password, as SAP ASE authentication is used for SAP ASE Cockpit login.

3.4 Logging Out of SAP ASE Cockpit

Click *Log Out* in the upper-right corner of the window to end the session.

Context

If an administrator has configured the automatic logout feature, SAP ASE Cockpit logs you out if your session is idle (no typing or mouse movement) for longer than the timeout period.

If no automatic logout period is configured,

- A login session left open on a screen that refreshes (a monitor screen or a data collection job screen, for example) remains open indefinitely.
- A login session left open on a screen that does not change expires after 30 minutes. The next time you make a request of the server, SAP ASE Cockpit logs you out.

3.5 Registering and Authenticating an SAP ASE Cockpit Agent

Register and authenticate the SAP ASE Cockpit agent for a managed server.

Context

The SAP ASE Cockpit agent runs on a managed server and is installed automatically as part of the SAP ASE server.

To perform certain administrative tasks, including starting and stopping an SAP ASE server, and adding secondary nodes, you must register and authenticate the server's SAP ASE Cockpit agent.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, click *ASE Servers*.
3. In the left pane, do one of:
    - Click the arrow to the right of the name.
    - Click the *Actions* button.
4. Select *Properties*.

5. In the left pane, select *Agent*.
6. Enter the ASE server agent port number (the default port is 4992) and click *Register*.
7. Specify the user name and password, then click *Authenticate* .
   The default user name for the agent is uafadmin.
8. Enter the agent user (the default is uafadmin) and password (created during the installation process).

Next Steps

For instructions on changing the password for the agent's default uafadmin account, see *Changing the uafadmin Password*

Related Information

Changing the uafadmin or sccadmin Password [page 77]

3.5.1 Viewing Agent Connection Information

Display read-only connection information for the SAP ASE Cockpit agent.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, click *ASE Servers*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. Select *Agent* from the left pane.
   The SAP ASE cockpit server properties are:

Server Property	Description
Port number	Port number on the host machine the agent is running. Default is 4992.
User name	User name for authentication of the agent. Default is `<uafadmin>`.
Version/build	Version of the cockpit with which the agent is associated.
Home	Installation directory of the SAP ASE cockpit.

Server Property	Description
Started	The time at which the server was started.

The SAP ASE Cockpit agent properties are:

Property	Description
Version/build	Version of the server with which the agent is associated.
Home	Home directory of the agent.
Server name	The name of the SAP ASE server with which the agent is associated.
Status	Status of the SAP ASE Cockpit Agent: Running, Stopped, Unknown.
Startup command	The time at which the server was started.

3.6 Technical User

The Cockpit Technical User account is a dedicated login used for creating and scheduling collection jobs, monitoring, and triggering alerts.

> **i** Note
>
> Do not use the `CREATE USER` statement to create the account.

The technical user is created during installation of SAP ASE.

You can create a technical user from SAP ASE Cockpit under the following scenarios:

- The creation of the technical user failed during the installation process.
- You are provided a private SAP ASE Cockpit build. In this case, you will need to override the original ASEMAP directory which will remove the technical user account that was created during the installation of SAP ASE.

You can update the Cockpit Technical User account from SAP ASE Cockpit which will re-create the schedule jobs for the managed resource.

> **i** Note
>
> Do not use the technical user account to log in to SAP ASE Cockpit. The technical user account should only be used for creating and scheduling collections, monitoring, and triggering alerts.

3.6.1 Creating the Technical User

Create the account under which collections and alerts run.

Prerequisites

The technical user is created during installation of each SAP ASE system. You can create a technical user from SAP ASE Cockpit if the creation of the technical user failed during the installation process, or you have installed a private SAP ASE Cockpit build.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, click *ASE Servers*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Create Cockpit Technical User*.
5. Click *Technical User Credentials*.
6. On the Add Technical User - Technical User Credentials page, enter a password for the default user cockpit_user.
7. Click *Finish*.

3.7 Login Accounts and Roles

SAP ASE Cockpit uses SAP ASE authentication, but also includes predefined login accounts and roles.

A login account identifies a user who can connect to SAP ASE Cockpit. Because SAP ASE Cockpit uses SAP ASE authentication, any user can log in.

SAP ASE Cockpit comes with predefined login accounts which can only be used to authenticate against the SAP ASE Cockpit Agent. Do not use these user accounts to log in to the SAP ASE Cockpit.

Login Name	Description
sccadmin	SAP ASE Cockpit Agent
uafadmin	SAP ASE Cockpit Agent

A role is a predefined profile that can be assigned to a login account or a group. Roles control the access rights for login accounts. Because the SAP ASE authentication mechanism is used for SAP ASE Cockpit login, SAP ASE roles are used for restricting access to various administration and monitoring capabilities in SAP ASE

Cockpit. An SAP ASE user who has both sa_role and mon_role is automatically granted the privilege to configure SAP ASE Cockpit settings.

4 Configure SAP ASE Cockpit

There are several options available to configure SAP ASE Cockpit.

> **i** Note
>
> These additional options are over and above the minimum configuration described in *Get Started with SAP ASE Cockpit*.

4.1 Configuring the E-mail Server

Specify the e-mail server for SAP ASE Cockpit to send alert notifications.

Prerequisites

Membership in the sa_role and mon_role.

Procedure

1. In SAP ASE Cockpit, click the *Cockpit Settings* icon ( ).
2. Select *General Settings*.
3. Click the *E-mail* tab.
4. Enter the name of the e-mail server.
5. Change the default e-mail server port only in consultation with your e-mail administrator.
6. (Optional) Send a test email to verify the e-mail server is correctly configured.
7. (Optional) Click *Customize e-mail settings* to display options for setting the domain name and e-mail sender for alert e-mail notifications.
   a. Enter your domain name (for example, mycompany.com).

      Most e-mail servers do not require SAP ASE Cockpit to provide an explicit domain name. Try providing a domain name here if your first attempt to configure e-mail alerts fails.
   b. Change the default e-mail sender name.

      This name appears in the "From" field of SAP ASE Cockpit e-mail alert messages. Do not use spaces; use hyphens or underscore characters instead.

> → Tip
>
> If you have multiple SAP ASE Cockpit servers, configure their sender names so you can identify which SAP ASE Cockpit an alert is coming from. For example, `Cockpit_Boston` or `Cockpit_test11`.

c. If you entered anything in the *E-mail Domain name* or *E-mail sender name* fields, click *Apply* to make the test e-mail option reappear.
d. To dispatch a test message, enter an e-mail address in the *Test e-mail address* field and click *Send*. If the test e-mail is received, you have properly configured the server for e-mail alert notifications.

8. Click *OK* to update any changes and close the Cockpit Settings page.

4.2 Configuring the ASE Agent Plug-In

The ASE agent plug-in is configured by the SAP ASE installer by default. However, you can manually configure the ASE agent plug-in properties values for SAP ASE and HADR components by editing the `agent-plugin.xml` file.

Procedure

1. Shutdown the SAP ASE cockpit.
2. Copy the contents of:

Option	Description
Windows	`%SYBASE%\COCKPIT-4\templates\com.sybase.ase\` to %SYBASE%\COCKPIT-4/<servername>
UNIX	`$SYBASE/COCKPIT-4/templates/com.sybase.ase` to `$SYBASE/COCKPIT-4/<<servername>>`.

3. Navigate to:

Option	Description
Windows	`%SYBASE%\COCKPIT-4\plugins\<server_name>`
UNIX	`$SYBASE/COCKPIT-4/plugins/<server_name>`

4. Configure the ASE agent plug-in by editing the `properties` section of the `agent-plugin.xml` configuration file to specify the SAP ASE server specific environment values.

   For example, this sets the value of `ase.home`:

```
<set-property property="ase.home" value="/rel/sap_ase/ASE-16_0”
```

when:

Option	Description
Windows	○ %SYBASE% is `/rel/sap_ase` ○ %SYBASE_ASE% is `ASE-16_0`
UNIX	○ $SYBASE is `/rel/sap_ase` ○ $SYBASE_ASE is `ASE-16_0`

5. Encrypt the passwords for the server components. See *Encrypting a Password*.
6. Start the SAP ASE cockpit.

Related Information

Encrypting a Password [page 78]

4.2.1 ASE Agent Plug-In Properties

Manually edit the `agent-plugin.xml` file properties values for SAP ASE and HADR components.

Table 1: agent-plugin.xml Property Values for SAP ASE

Property	Description
`ase.heartbeat.timer`	Interval (in seconds) between heartbeat/ping to check component status.
`ase.home`	Value of $SYBASE_ASE.
`ase.interfaces.pathspec`	SAP ASE interfaces file path.
`ase.maintain.connection`	Maintain connections to components (true or false).
`ase.password`	Password (encrypted).
`ase.port`	Port number.
`ase.server.log`	Error log file path.
`ase.server.name`	Server name.
`ase.start.command`	Start up script file path.
`ase.user`	SAP ASE user name.
`com.sybase.home`	File path to the $SAP/SYBASE home directory.

Table 2: agent-plugin.xml Property Values for HADR components. Do not set for non-HADR environments.

Properties	Description
`rma.home`	File path to the Registering the Replication Management Agent (RMA) home directory.
`rma.log.dir`	RMA logs file path.
`rma.password`	RMA password (encrypted).
`rma.port`	RMA port number.
`rma.start.command`	RMA startup script file path.
`rma.user`	RMA user name.
`rs.home`	Replication Server directory path.
`rs.interfaces.pathspec`	Replication Server interfaces file path.
`rs.password`	Replication Server password (encrypted).
`rs.port`	Replication Server port number.
`rs.server.log`	Replication Server error log file path.
`rs.server.name`	Replication Server server name.
`rs.start.command`	Replication Server startup script file path.
`rs.sybase.home`	File path to the Replication Server home directory.
`rs.user`	Replication Server user name.

The following is an example `agent-plugin.xml` file:

```
<properties>
<set-property property="ase.heartbeat.timer" value="60" />
<set-property property="ase.heartbeat.update.time" value="2015-06-15 23:37:37
+0000" />
<set-property property="ase.home" value="/rel/SAP_16/ASE-16_0" />
<set-property property="ase.interfaces.pathspec" value="/rel/SAP_16/
interfaces" />
<set-property property="ase.maintain.connection" value="true" />
<set-property property="ase.password" value="1-
iW99uLnZPem46WW1pmaeQQLWNpOQI2yhwIK+aMkQR3UZdGPf/VYoUZIHr/Jt5CLWCWWpw=" />
<set-property property="ase.port" value="5000" />
<set-property property="ase.server.log" value="/rel/SAP_16/ASE-16_0/install/
SAPserver.log" />
<set-property property="ase.server.name" value="SAP" />
<set-property property="ase.start.command" value="/rel/SAP_16/ASE-16_0/install/
RUN_SAP" />
<set-property property="com.sybase.home" value="/rel/SAP_16" />
<set-property property="rma.start.command" value="/rel/SAP_16/DM/RMA-15_5/bin/
RunContainer.sh" />
<set-property property="rma.user" value="DR_admin" />
<set-property property="rs.home" value="/rel/SAP_16/DM/REP-15_5" />
```

```
<set-property property="rs.interfaces.pathspec" value="/rel/SAP_16/DM/
interfaces" />
<set-property property="rs.password" value="1-
AAAAEgQQYBSzIuoWCUoDJiWmaeQQLWNpOQI2yhwI0999
QR3UZdGPf/VkiS6u9MmkymO21YoUZIHr/Jt5CLWCWWpw=" />
<set-property property="rs.port" value="5005" />
<set-property property="rs.server.log" value="/rel/SAP_16/DM/SAP_REP_ADRS/
ADR_REP_ADRS.log" />
<set-property property="rma.user" value="DR_admin" />
<set-property property="rs.server.name" value="SAP_REP_ADRS" />
<set-property property="rs.start.command" value="/rel/SAP_16/DM/SAP_REP_ADRS/
RUN_SAP_REP_ADRS.sh" />
<set-property property="rs.sybase.home" value="/rel/SAP_16/DM" />
<set-property property="rs.user" value="sa" />
```

Related Information

Changing the uafadmin or sccadmin Password [page 77]

4.3 Configuring Retrieval Thresholds for SAP ASE Cockpit

Set limits on the time SAP ASE Cockpit waits for data to load or on the number of rows it loads.

Prerequisites

Membership in the sa_role and mon_role.

Context

Performing some tasks may cause the SAP ASE Cockpit to load a large amount of data, which can be time-consuming and can place a heavy load on your network. SAP ASE Cockpit mitigates this problem by displaying partial results and by displaying placeholders called message rows when data takes longer than a specified number of seconds to retrieve, or exceeds a specified number of rows. The data retrieval options let you specify those numbers.

This data retrieval scheme reduces network traffic, since result sets that exceed the specified row count are not transmitted unless you ask for them by expanding a message row. By displaying partial results and message rows for data from slow-responding systems, the scheme also minimizes the time you spend waiting.

Procedure

1. In SAP ASE Cockpit, click the *Cockpit Settings* icon ( ).
2. Select *General Settings*.
3. Click the *EXPLORE* workset.
4. Set the timeout for data retrieval in seconds.

   When SAP ASE Cockpit is not able to return all requested data within this period of time, it displays any data it has received and generates message rows in place of the missing results. SAP ASE Cockpit replaces message rows with real data as soon as the data arrives.
5. Set the row count.

   When a request returns results that exceed the specified row count, SAP ASE Cockpit displays a message row in place of the expected results. You can expand the message row by selecting it, clicking the dropdown arrow, and selecting *Expand*.
6. Click *OK* to update any changes and close the Cockpit Settings page.

4.4 Configuring the Automatic Logout Timer

Set SAP ASE Cockpit to end login sessions when users are inactive for too long.

Prerequisites

Membership in the sa_role and mon_role.

Procedure

1. In SAP ASE Cockpit, click the *Cockpit Settings* icon ( ).
2. Select *General Settings*.
3. Click the *Auto-Logout* tab.
4. Enter the number of minutes after which an idle user will be automatically logged out.

   Enter 0 or leave the box empty to disable automatic logout.
5. Click *OK* to update any changes and close the Cockpit Settings page.

4.5 Repository

The SAP ASE Cockpit embedded repository stores information related to managed systems, as well as user preference data, operational data, statistics, and alert configuration.

You can back up the repository database on demand, schedule automatic backups, restore the repository from backups, and configure repository purging options. Full and incremental backups are available. A full backup copies the entire repository. An incremental backup copies the transaction log, capturing any changes since the last full or incremental backup.

By default, SAP ASE Cockpit saves backups as follows:

- Each full backup is stored in its own subdirectory in `%SYBASE%\backup`.
- Each incremental backup is stored in a file in `%SYBASE%\backup\incremental`.

SAP recommends that you periodically move backup files to a secondary storage location to prevent the installation directory from becoming too large.

Scheduling Backups of the Repository [page 44]
Configure full and incremental backups of the repository to occur automatically.

Configuring Repository Purging [page 46]
Change repository purging options.

Suspending a Scheduled Backup [page 47]
Suspend or resume a scheduled backup.

Modifying the Backup Schedule [page 48]
Change the backup schedule.

Forcing an Immediate Backup [page 49]
Perform an unscheduled full or incremental backup of the repository.

Restoring the Repository from Backups [page 49]
Load backup files into the repository database to revert undesirable changes or to recover from a catastrophic failure.

4.5.1 Scheduling Backups of the Repository

Configure full and incremental backups of the repository to occur automatically.

Prerequisites

- Determine your backup strategy, including when to perform full backups and incremental backups. For example, you might schedule incremental backups every day and a full backup every Saturday.
- Membership in the sa_role and mon_role.

Context

A full backup copies the entire repository. An incremental backup copies the transaction log, capturing any changes since the last full or incremental backup.

Procedure

1. In SAP ASE Cockpit, click the *Cockpit Settings* icon ( ).
2. In the left pane, select *Repository*.
3. In the right pane, choose:
   - *Incremental Backup*
   - *Full Backup*
4. To change the directory in which the backup is stored, click *Browse*, and navigate to the desired directory.
5. Select *Schedule a Regular Backup*.
6. Specify a *Start date* or click the calendar and select a date.
7. Use the *Time* and *AM/PM* controls to specify the time to start the backup.
8. Use the *Repeat interval* control to specify how often the backup occurs.
9. (Optional) To purge the repository after each backup, select *Run a repository purge after the backup completes*.
   a. If you include purging in the backup schedule, select the *Size Management* tab and unselect *Automatically purge the repository periodically* to disable automatic purging.
10. Click *Apply* to save the schedule.

Next Steps

Set purging options on the Size Management tab.

Task overview: Repository [page 44]

Related Information

Configuring Repository Purging [page 46]
Suspending a Scheduled Backup [page 47]
Modifying the Backup Schedule [page 48]
Forcing an Immediate Backup [page 49]
Restoring the Repository from Backups [page 49]

4.5.2 Configuring Repository Purging

Change repository purging options.

Prerequisites

Membership in the sa_role and mon_role.

Context

As you decide how to purge your repository, consider that:

- Purging keeps the repository from absorbing too much disk space.
- By default, purging is enabled. It occurs once a day and purges data older than one day.
- Statistics and alert history can help you detect trends in server performance and user behavior. The SAP ASE Cockpit statistics chart can graph performance data over a period of a year or more if the data is available. If you have enough disk space, consider saving data for a longer period of time or disabling the purging of statistics or alert history.
- Changing the purge frequency and other options might affect SAP ASE Cockpit performance.

> **i** Note
>
> If you configure purging as part of a scheduled backup of the repository, disable automatic purging on the Size Management tab.

Procedure

1. In SAP ASE Cockpit, click the *Cockpit Settings* icon ( ).
2. In the left pane, select *Repository*, and then click the *Size Management* tab in the right pane.
3. To turn automatic purging on or off, click *Automatically purge the repository periodically*.
   Turn this option off if purging is configured as part of your scheduled full or incremental backups.
4. Click purge options to turn them on or off:
   - *Purge statistics*
   - *Purge alert history*
5. In *Purge data older than*, enter the number of days after which to purge repository data.
6. Click *OK* to update any changes and close the Cockpit Settings page.

Task overview: Repository [page 44]

Related Information

Scheduling Backups of the Repository [page 44]
Suspending a Scheduled Backup [page 47]
Modifying the Backup Schedule [page 48]
Forcing an Immediate Backup [page 49]
Restoring the Repository from Backups [page 49]

4.5.3 Suspending a Scheduled Backup

Suspend or resume a scheduled backup.

Prerequisites

Membership in the sa_role and mon_role.

Procedure

1. In SAP ASE Cockpit, click the *Cockpit Settings* icon ( ).
2. In the left pane, select *Repository*, and then in the right pane click the tab for the type of backup to modify.
3. Select or unselect *Schedule a Regular Backup*.
   When you unselect this option, the scheduling area is grayed out and scheduled backups no longer occur. However, the schedule is preserved and you can reinstate it at any time.
4. Click *OK* to update any changes and close the Cockpit Settings page.

Task overview: Repository [page 44]

Related Information

Scheduling Backups of the Repository [page 44]
Configuring Repository Purging [page 46]
Modifying the Backup Schedule [page 48]
Forcing an Immediate Backup [page 49]
Restoring the Repository from Backups [page 49]

4.5.4 Modifying the Backup Schedule

Change the backup schedule.

Prerequisites

Membership in the sa_role and mon_role.

Procedure

1. In SAP ASE Cockpit, click the *Cockpit Settings* icon ( ).
2. In the left pane, select *Repository*, and then in the right pane click the tab for the type of backup to modify.
3. To suspend or resume the backup schedule, select or unselect *Schedule a Regular Backup*.
   When you unselect this option, the scheduling area is grayed out and scheduled backups no longer occur. However, the schedule is preserved and you can reinstate it at any time.
4. To change the backup schedule, edit the *Start date*, *Time*, *Repeat interval*, or units. You can also select or unselect *Run a repository purge after the backup completes*.
5. Click *OK* to update any changes and close the Cockpit Settings page.

Task overview: Repository [page 44]

Related Information

Scheduling Backups of the Repository [page 44]
Configuring Repository Purging [page 46]
Suspending a Scheduled Backup [page 47]
Forcing an Immediate Backup [page 49]
Restoring the Repository from Backups [page 49]

4.5.5 Forcing an Immediate Backup

Perform an unscheduled full or incremental backup of the repository.

Prerequisites

Membership in the sa_role and mon_role.

Procedure

1. In SAP ASE Cockpit, click the *Cockpit Settings* icon ( ).
2. In the left pane, select *Repository*, and then in the right pane click the tab for the type of backup to run.
3. Click *Back up Now*.
4. Click *Yes* at the confirmation prompt to begin the backup.
5. Click *OK* to acknowledge when the backup is complete.

Task overview: Repository [page 44]

Related Information

Scheduling Backups of the Repository [page 44]
Configuring Repository Purging [page 46]
Suspending a Scheduled Backup [page 47]
Modifying the Backup Schedule [page 48]
Restoring the Repository from Backups [page 49]

4.5.6 Restoring the Repository from Backups

Load backup files into the repository database to revert undesirable changes or to recover from a catastrophic failure.

Context

If you configured SAP ASE Cockpit to store backups somewhere other than the default location, change the source directory in the copy commands in this procedure.

Procedure

1. Log out of the SAP ASE Cockpit console, if running.
2. Shut down the SAP ASE Cockpit server.
3. Copy the most recent full backup from and to:

Option	Description
UNIX	`$SYBASE/COCKPIT-4/backup` `    to $SYBASE/COCKPIT-4/services/Repository/db`

   For example:

   UNIX:

```
cp /opt/sap/COCKPIT-4/backup/repository.270110161105/repository.db
/opt/sap/COCKPIT-4/services/Repository/db
```

4. If you have no incremental backups to load:
   a. Copy the log file from and to:

Windows	`%SYBASE%\COCKPIT-4\backup\incremental`
	`\<generated_directory_name>`
	`    to %SYBASE%\COCKPIT-4\services\Repository`

UNIX	`$SYBASE/COCKPIT-4/backup/incremental/`
	`<generated_directory_name>`
	`    to $SYBASE/COCKPIT-4/services/Repository`

   For example:

   UNIX:

```
cp /opt/sap/COCKPIT-4/backup/repository.270110161105/repository.log
/opt/sap/COCKPIT-4/services/Repository
```

   b. Skip to step 6 [page 50].

5. (Optional) To load incremental backups, start the repository database using the `-ad` option, which directs it to load transaction logs (incremental backups) from the `incremental` directory. (The database loads full backups automatically.) For example:

   UNIX:

```
cd /opt/sap/COCKPIT-4/services/Repository
../../bin/sa/bin_<platform>/dbsrv11 repository -ad
/opt/sap/COCKPIT-4/backup/incremental
```

   The repository database loads the full backup and any subsequent incremental backups present in the `incremental` directory. Incremental backups are loaded in date order. After loading and saving, the database shuts down.
6. Start the SAP ASE Cockpit server.

If you loaded incremental backups, SAP ASE Cockpit starts normally (that is, no further recovery occurs). If you copied a full backup to the `Repository` directory, the database recovers the repository from the full backup.

Task overview: Repository [page 44]

Related Information

Scheduling Backups of the Repository [page 44]
Configuring Repository Purging [page 46]
Suspending a Scheduled Backup [page 47]
Modifying the Backup Schedule [page 48]
Forcing an Immediate Backup [page 49]

4.6 Logging

Logging helps SAP ASE Cockpit administrators identify and track errors and other system events by recording messages about the events in log files.

SAP ASE Cockpit maintains these logs:

Client log	captures messages about activities in the browser-based client components. These messages are generated by the component product modules to display information that is pertinent to the user but not critical enough to warrant a pop-up. SAP ASE Cockpit also uses the client log to trace client browser operations.
Server logs	capture messages about activities during the initialization sequence, such as starting services; auditing messages recording logins and logouts; errors such as missed scheduled events; and other events on the server. Server logs include: • Component logs, which record only events concerning individual product modules.
Repository log	captures information about inserts and updates that have occurred in the SAP ASE Cockpit repository, a SQL Anywhere database. This log is in `COCKPIT-4\log\repository.log`.
Alert services log	captures information about alert service status and events, including execution of alert-triggered scripts (start time, end time, and status and exit codes). This log is in `COCKPIT-4\log\alert-server.log`.

Viewing SAP ASE Cockpit Event Logs [page 52]
View event logs for the SAP ASE server.

Viewing the SAP ASE Cockpit Client Log [page 52]
Display the event log for the current session of your SAP ASE Cockpit browser client.

Changing the SAP ASE Cockpit Logging Level [page 53]
Adjust the logging level that determines which events SAP ASE Cockpit records in the server logs. This task requires you to restart SAP ASE Cockpit.

Viewing the SAP ASE Server and Agent Logs [page 55]
View, filter, copy, and paste from SAP ASE server and agent log snapshots in the SAP ASE Cockpit.

Managing Flag Definitions [page 56]
Flag definitions provide additional searching capabilities for error log entries.

4.6.1 Viewing SAP ASE Cockpit Event Logs

View event logs for the SAP ASE server.

Procedure

1. Navigate to:

Option	Description
Windows	`%SYBASE%\COCKPIT-4\plugins\ASEMAP\log`
UNIX	`$SYBASE/COCKPIT-4/plugins/ASEMAP/log`

2. Display the `ASEMAP.log` file using a log viewer or another method of your choice.
3. Look for entries of interest such as login attempts or the failure of a service to start.

Task overview: Logging [page 51]

Related Information

Viewing the SAP ASE Cockpit Client Log [page 52]
Changing the SAP ASE Cockpit Logging Level [page 53]
Viewing the SAP ASE Server and Agent Logs [page 55]
Managing Flag Definitions [page 56]

4.6.2 Viewing the SAP ASE Cockpit Client Log

Display the event log for the current session of your SAP ASE Cockpit browser client.

Context

In the SAP ASE Cockpit, do either of the following to display the client log:

- Enter `Ctrl+Alt+L`.
- Open the *MONITOR* workset and click the warning or error icon in the bottom right of the window.

> **i** Note
>
> If there have been no new warnings or errors since the last time the log was viewed, the icon does not appear.

To exit the client log, press `Esc`.

Task overview: Logging [page 51]

Related Information

Viewing SAP ASE Cockpit Event Logs [page 52]
Changing the SAP ASE Cockpit Logging Level [page 53]
Viewing the SAP ASE Server and Agent Logs [page 55]
Managing Flag Definitions [page 56]

4.6.3 Changing the SAP ASE Cockpit Logging Level

Adjust the logging level that determines which events SAP ASE Cockpit records in the server logs. This task requires you to restart SAP ASE Cockpit.

Context

If you are having a problem with SAP ASE Cockpit, you might be able to discover the cause of the problem by changing the server logging level so that more events are recorded.

These are several logging levels, from highest to lowest. The higher the level, the more serious an event must be to be logged. Each level includes all the levels above it—for example, if you set the logging level to WARN, you log events for the WARN, ERROR, and FATAL levels.

Procedure

1. Shut down the SAP ASE Cockpit server.
2. Restart the SAP ASE Cockpit server using the -m option to change the logging level. In `COCKPIT-4/bin`, enter:

```
cockpit -m <logging-level>
```

Valid logging levels are:

OFF	Nothing is logged. This is the highest level.
FATAL	Logs only very severe error events that lead the server to abort. This is the highest level at which events are logged.
ERROR	Logs error events that might allow the server to continue running.
WARN	Logs potentially harmful situations. WARN is the default logging level during normal operation (that is, after system initialization).
INFO	Logs informational messages that track the progress of the server in a coarse-grained fashion. INFO is the default logging level during the system initialization process.
DEBUG	Logs a larger set of events that provides a finer-grained picture of how the server is operating. This level is recommended for troubleshooting.
ALL	Logs all loggable events. This is the lowest level.

3. Examine the server log for clues about what might be causing the problem.
4. When you have resolved the problem, set the logging level back to WARN, the default. Your log may become unmanageably large if you leave it at the DEBUG or ALL level.

> **Note**
>
> These commands, which must be executed in the installation directory, start SAP ASE Cockpit with the logging level set to `DEBUG`:
>
UNIX	Execute: `bin/cockpit -m DEBUG`

Task overview: Logging [page 51]

Related Information

Viewing SAP ASE Cockpit Event Logs [page 52]
Viewing the SAP ASE Cockpit Client Log [page 52]
Viewing the SAP ASE Server and Agent Logs [page 55]
Managing Flag Definitions [page 56]

4.6.4 Viewing the SAP ASE Server and Agent Logs

View, filter, copy, and paste from SAP ASE server and agent log snapshots in the SAP ASE Cockpit.

Prerequisites

Register and authenticate the agent to enable error log viewing. Registering and Authenticating an SAP ASE Cockpit Agent [page 33]

Context

The SAP ASE agent log records agent activities and may help diagnose issues.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, click *ASE Servers*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *View Error Log*.
5. You can:

Table 3: AP ASE Server and Agent Logs

Auto Refresh	Auto Refresh allows new log messages to be added to the error log viewer as they occur.
Filter the entries	To filter the entries for specific text, click in the Filter messages field and enter a word or phrase to isolate server messages containing the entry. For example, enter "memory" to find all log output pertaining to memory usage. Any text that matches what you entered is highlighted. Click the X to clear the Filter messages field.
Sort columns	Sort the columns in ascending or descending order.
Navigate through messages	Click the next or previous flag arrows to navigate to the messages that are flagged. To navigate to a specific flag type, click the Flag type arrow before clicking the next or previous arrows.

Task overview: Logging [page 51]

Related Information

Viewing SAP ASE Cockpit Event Logs [page 52]
Viewing the SAP ASE Cockpit Client Log [page 52]
Changing the SAP ASE Cockpit Logging Level [page 53]
Managing Flag Definitions [page 56]

4.6.5 Managing Flag Definitions

Flag definitions provide additional searching capabilities for error log entries.

Prerequisites

Register and authenticate the agent to enable error log viewing. Registering and Authenticating an SAP ASE Cockpit Agent [page 33]

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, click *ASE Servers*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *View Error Log*.
5. Click *Show Search Options*.
6. Click *Show Flag Definitions*.
7. To add a new flag definition, click *Add*.
   a. Specify a descriptive name or phase for the definitions. For example, "Abnormal connection termination."
   b. Enter a search phase for the definition. For example, "Abnormal termination."
      User-defined regular expressions are persistently saved.
   c. Select the flag type to associate with the expression and click *OK*.
8. You can remove or edit a definition by selecting the expression from the flag definition list, clicking *Edit* or *Remove*, making the appropriate changes, and clicking *OK*.
9. Enable or disable individual flag definitions by clicking the check box in the corresponding Enable column.
10. Enable or disable all definitions by clicking *Enable All* or *Disable All*.
11. Click *Apply* to save your changes.

Task overview: Logging [page 51]

Related Information

Viewing SAP ASE Cockpit Event Logs [page 52]
Viewing the SAP ASE Cockpit Client Log [page 52]
Changing the SAP ASE Cockpit Logging Level [page 53]
Viewing the SAP ASE Server and Agent Logs [page 55]

4.6.5.1 Importing Flag Definitions

You can add flag definitions to a server by importing a list of definitions from a target server.

Prerequisites

Register and authenticate the agent to enable error log viewing. Registering and Authenticating an SAP ASE Cockpit Agent [page 33]

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, click *ASE Servers*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *View Error Log*.
5. Click *Show Search Options*.
6. Click *Show Flag Definitions*.
7. Click *Add*.
8. (Optional) To merge the definition list on the source server with the definition lists on the target servers, unselect *Overwrite existing flag definitions*. The merge is based on the following:
   - If the regular expression of the source definition does not exist in the list of the target definitions, the source definition is appended to the target list.
   - If the regular expression of the source definition does exist in the list of the target definitions, the source definition is not appended to the list, regardless of the state.
9. Click *OK* to save your changes.

4.6.5.2 Exporting Flag Definitions

To apply the same rules across multiple servers, export a list of flag definitions.

Prerequisites

Register and authenticate the agent to enable error log viewing. Registering and Authenticating an SAP ASE Cockpit Agent [page 33]

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, click *ASE Servers*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *View Error Log*.
5. Click *Show Search Options*.
6. Click *Show Flag Definitions*.
7. Click *Export*.

   You see a list of qualified target servers (those that are agent-authenticated, and listed in the perspective resource view), in the Export Flag Definitions dialog.
8. Select the target servers.

   By default, the flag definitions on the target servers are replaced by the definition list on the source server, including each definition's state of enabled or disabled.
9. (Optional) To merge the definition list on the source server with the definition lists on the target servers, unselect *Overwrite existing flag definitions*. The merge is based on the following:
   - If the regular expression of the source definition does not exist in the list of the target definitions, the source definition is appended to the target list.
   - If the regular expression of the source definition does exist in the list of the target definitions, the source definition is not appended to the list, regardless of the state.
10. Click *OK* to save your changes.

4.7 Configuring Ports

Use the `cockpit --port` command to assign SAP ASE Cockpit services to new ports.

Prerequisites

Check for port conflicts between SAP ASE Cockpit and other software running on the same host.

Context

SAP ASE Cockpit cannot function properly if other services use its ports. If you discover a conflict with any port listed in the right column below, you can either reconfigure the other service's port or reconfigure SAP ASE Cockpit as described here.

Port Name	Description	Service Names	Property Names	Default Port
db	Database port	SccSADataserver Messaging Alert	com.sybase.asa.server.port messaging.db.port alert.database.port	4638
http	Web HTTP port	EmbeddedWebContainer	http.port	4282
https	Web HTTPS (secure HTTP) port	EmbeddedWebContainer	https.port	4283
msg	Messaging port	Messaging	messaging.port	4993
rmi	RMI port	RMI	port	4992
tds	Tabular Data Stream™ port (used to communicate with other SAP database products)	Tds	tdsPort	4998

Procedure

1. Shut down SAP ASE Cockpit.
2. Execute `cockpit --info ports` to display a list of SAP ASE Cockpit services, their properties, and their assigned ports.
3. To reassign a port, enter a command in one of these formats:

   ```
   cockpit --port <port-name>=<port-number>
   ```

```
cockpit --port <service-name>:<property-name>=<port-number>
```

Use the first, simpler format unless you want to configure the database services to use different ports. (By default, they all use the same port.)

4. Start SAP ASE Cockpit.
5. Execute `cockpit --info ports` again to confirm that the port has been reassigned.

Note

Set all three database services (data server, messaging, and database alert) to the same port, `4639`. (The database services belong to the internal repository.)

```
cockpit --port db=4639
```

Set only the database messaging service to port 4639.

```
cockpit --port Messaging:messaging.db.port=4639
```

Set the HTTP port to `9292`.

```
cockpit --port http=9292
```

Set the main SAP ASE Cockpit messaging service to port `4994`.

```
cockpit --port msg=4994
```

Set the RMI port to `4993`

```
cockpit --port rmi=4993
```

Set the Tabular Data Stream port to `4997`.

```
cockpit --port tds=4997
```

Note

`cockpit` commands that include a port-setting option (`-p` or `--port`) do not start SAP ASE Cockpit. To start SAP ASE Cockpit, execute a separate `cockpit` command.

4.8 Configuring Memory Usage

Determine whether you need to configure how much memory SAP ASE Cockpit uses, and if so which configuration method to use.

Context

It is not usually necessary to configure memory usage for SAP ASE Cockpit. This table lists memory options you can set and circumstances under which you should consider changing them.

Value	Modify When	Guidelines
Set maximum memory available for Cockpit. `COCKPIT_MEM_MAX` – if you are running SAP ASE Cockpit as a UNIX service or starting SAP ASE Cockpit from the command line.	• You need to prevent SAP ASE Cockpit from using more than a given amount of memory. • SAP ASE Cockpit fails to start and may display an error: `Could not create the Java Virtual machine.` • An OutOfMemory error says SAP ASE Cockpit is out of heap space. • A warning message about system memory appears during the start process. • The machine where SAP ASE Cockpit is installed has less than 4GB of memory. (Starting SAP ASE Cockpit on a machine with less than 4GB of memory triggers the startup warning message about system memory.)	On machines with less than 4GB of memory, set maximum memory to 256MB or more. Default value: none. (On machines with 4GB or more of memory, maximum memory is set dynamically and is effectively limited only by the amount of system memory available.)
Set initial memory available for Cockpit. `COCKPIT_MEM_INIT` – if you are running SAP ASE Cockpit as a UNIX service or starting SAP ASE Cockpit from the command line.	Increase the initial memory used by Cockpit when the default value is insufficient.	When set, the value for `COCKPIT_MEM_INIT` overrides the default value. When not set, the default value for initial memory is 128MB.

You can change memory options in three ways:

- For SAP ASE Cockpit started from the command line – execute commands to set one or more environment variables before executing the `cockpit` command to start SAP ASE Cockpit. When you use this method, your changes to the memory options last only as long as the current login session. This method is useful for testing new option values.
- For the SAP ASE Cockpit service – modify a file used by the SAP ASE Cockpit service. When you use this method, your changes to the memory options persist—SAP ASE Cockpit uses them every time it starts as a service.

- If `COCKPIT_MEM_INIT` or `COCKPIT_MEM_MAX` are set as environment variables before executing `cockpit.sh` or `cockpitd`, they will be used for setting the memory usage when starting the Cockpit server.

4.8.1 Changing a Memory Option on the Command Line

Before you start SAP ASE Cockpit server from the command line, you can issue a command to change the value of a memory option temporarily.

Context

Changes made using this method last only as long as the current login session. This method is useful for testing new option values.

Procedure

1. If SAP ASE Cockpit server is running, shut it down.
2. Set the environment variable. Specify a size in megabytes, but do not indicate the units in the command.

   UNIX example:

   ```
   bash$ export COCKPIT_MEM_MAX=512
   ```
3. Use the `cockpit` command to start SAP ASE Cockpit server.

4.8.2 Changing a Memory Option for an SAP ASE Cockpit Windows Service

Add a `jvmopt` command to the `cockpit.properties` file to change a memory option (-Xmx or -XX:MaxPermSize) for an SAP ASE Cockpit Windows service.

Context

When you use this method to set memory options, your changes are permanent—SAP ASE Cockpit uses them every time it starts as a service.

Procedure

1. If SAP ASE Cockpit server is running, shut it down.
2. Open the SAP ASE Cockpit properties file:
   `%SYBASE%\COCKPIT-4\bin\cockpit.properties`
3. Add (or modify, if it already exists) a `jvmopt` line specifying the memory size in Java format. Use m for megabytes or g for gigabytes.
   For example:
   ```
   jvmopt=-Xmx512m
   ```
4. Save the file and start the SAP ASE Cockpit Windows service.

4.8.3 Changing a Memory Option for an SAP ASE Cockpit UNIX Service

To change a memory setting for an SAP ASE Cockpit UNIX service, add the appropriate environment variable (`<COCKPIT_MEM_MAX>` or `<COCKPIT_MEM_PERM>`) to the cockpit.sh script.

Context

When you use this method to set memory options, your changes are permanent—SAP ASE Cockpit uses them every time it starts as a service.

Procedure

1. If SAP ASE Cockpit is running, shut it down.
2. Navigate to `$SYBASE/COCKPIT-4/bin` and open `cockpitd`.
3. Add the environment variable at the top of the file (after the comments). Specify a size in megabytes but do not indicate the units in the command.
   For example:
   ```
   COCKPIT_MEM_MAX=512
   export COCKPIT_MEM_MAX
   ```
4. Save the file and start the SAP ASE Cockpit UNIX service.

4.9 SAP ASE Cockpit Console

The console is a command-line interface for displaying details about the status of the SAP ASE Cockpit server, its ports, plug-ins, and services.

When you use the `cockpit` command to start SAP ASE Cockpit, it displays start-up messages and then displays the console prompt.

> **i** Note
>
> The console prompt does not appear if you start SAP ASE Cockpit as a service, if you direct the output of `cockpit` to a file, or if you start SAP ASE Cockpit in the background.

4.9.1 Console Commands

Use the SAP ASE Cockpit console to get status information on SAP ASE Cockpit and its ports, plug-ins, and services.

help Command [page 64]
Display syntax information for one or more SAP ASE Cockpit console commands.

info Command [page 65]
Display information about specified parts of the SAP ASE Cockpit server.

shutdown command [page 67]
Stop the SAP ASE Cockpit server if it is running.

status Command [page 67]
Display the status of the SAP ASE Cockpit plug-in, or service components of SAP ASE Cockpit.

4.9.1.1 help Command

Display syntax information for one or more SAP ASE Cockpit console commands.

Syntax

```
help [<command_name>]
```

Parameters

command_name

(optional) use with `status`, `info`, or `shutdown`. If you omit `<command_name>`, `help` returns information on all the console commands.

Examples

Example 1

returns information on the `status` command:

```
help status
```

Parent topic: Console Commands [page 64]

Related Information

info Command [page 65]
shutdown command [page 67]
status Command [page 67]

4.9.1.2 info Command

Display information about specified parts of the SAP ASE Cockpit server.
If you enter `info` with no parameters, it returns information for every parameter.

Syntax

```
info [-a | --sys]
[-D | --sysprop [<system-property>]]
[-e | --env [<environment-variable>]]
[-h | --help]
[-m | --mem]
[-p | --ports]
[-s | --services]
```

Parameters

-a | --sys

(optional) list all the services known to SAP ASE Cockpit, indicate whether each service is enabled, and list other services on which each service depends.

-D | --sysprop [<system-property>]

(optional) display information about the specified Java system property. Omit the system-property argument to return a list of all Java system properties and their values.

-e | --env [<environment-variable>]

(optional) list all the environment variables in the SAP ASE Cockpit Java VM process environment. Omit the environment-variable argument to return a list of environment variables and their values.

-h | --help

(optional) display information about the `info` command.

-m | --mem

(optional) display information about the server's memory resources.

-p | --ports

(optional) list all the ports on which the SAP ASE Cockpit services listen, indicate whether each port is in use, and show the service running on each port.

-s | --services

(optional) list all SAP ASE Cockpit services, indicate whether each service is enabled, and list other services on which each service depends.

Examples

Example 1

displays information about ports on this SAP ASE Cockpit server:

```
info -p
```

Parent topic: Console Commands [page 64]

Related Information

help Command [page 64]
shutdown command [page 67]
status Command [page 67]

4.9.1.3 shutdown command

Stop the SAP ASE Cockpit server if it is running.

Syntax

```
shutdown
```

Examples

Example 1

shuts down SAP ASE Cockpit:

```
shutdown
```

Parent topic: Console Commands [page 64]

Related Information

help Command [page 64]
info Command [page 65]
status Command [page 67]

4.9.1.4 status Command

Display the status of the SAP ASE Cockpit plug-in, or service components of SAP ASE Cockpit.

Syntax

```
status
[-h | --help]
[-p | --plugin [<plugin-name>]]
[-s | --service [<service-name>]]
```

Parameters

-h | --help

display information about the `info` command.

-p | --plugin [<plugin-name>]

display the status of the specified SAP ASE Cockpit plug-in. Omit the plugin-name argument to return a list of plug-ins.

-s | --service [<service-name>]

display the status of the specified SAP ASE Cockpit service (for example, the Alert service or the Messaging service). Omit the service-name argument to return a list of services.

Examples

Example 1

displays status information on the Repository service:

```
status --service Repository
```

Parent topic: Console Commands [page 64]

Related Information

help Command [page 64]
info Command [page 65]
shutdown command [page 67]

4.10 Setting Server Configuration Parameters

View or change the details of configuration parameters.

Prerequisites

Depending on the configuration parameter, membership in a specific role may be required.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, select *Server Configuration*.
   You see a parameter table. Editable columns are indicated by a pencil icon.
3. Filter and sort the configuration parameters using one or more of these methods:
   - Click the *Show configuration parameters for*dialog.
   - Type the parameter name or a portion of the name in the text field.
   - Click *Show non-default configuration parameters*.
   - Click a column header to sort the data by that column.
4. Select the server configuration parameter to configure. For example, increase or decrease the size of the procedure cache by selecting the *procedure cache size* parameter, or of the statement cache by selecting *statement cache size* parameter.
   a. Enter the new value for the configuration parameter.
      If the value is invalid, you see an error message. Some parameters require a restart; the changed value is in the Pending Value column until you restart the server.
   b. Click *Save All* to update the server with the new values or *Reset All* to restore the original values for the resource.
5. (Optional) To reset a value to the previously configured value, click the reset icon that appears after you have edited a field.

5 Security

Manage permissions and security features such as encryption, users, logins, login profiles, roles, and groups.

5.1 Managing Permissions

Grant command permissions or object permissions to or revoke them from users, groups, or roles.

Permission	Grantee or Object	Links
Create Command Permissions	You can grant permission to use these commands to or revoke it from users, groups, or roles: • `create default` • `create function` • `create procedure` • `create role` • `create table` • `create view`create encryption key (shown only if 'enable encrypted columns' configuration is on for server) • `create encryption key` (shown when the `enable encrypted columns` configuration parameter is enabled)	Setting Command Permissions for a Group [page 121] Setting Command Permissions for a Role [page 143] Setting Command Permissions for a User [page 128]
Object Permissions – Owners	You can grant object permissions to or revoke them from a user, group, or role.	Granting Object Permissions to a Role [page 139] Revoking Object Permissions from a Role [page 140] Granting Object Permission to a User [page 126] Revoking Object Permissions from a User [page 127] Granting Object Permissions to a Group [page 118] Revoking Object Permission from a Group [page 119]

Permission	Grantee or Object	Links
Object Permissions – Objects	For tables, you can set these permissions: • `select` • `insert` • `delete` • `update` • `references` • `transfer` • `truncate table` • `update statistics` • `delete statistics` • `decrypt` (shown when the `enable encrypted columns` configuration parameter is enabled)	Setting Table or Column Permissions [page 209]
	For stored procedures, scalar functions and extended stored procedures, you can grant or revoke execute permission.	Granting Execute Permission on an Extended Stored Procedure [page 406] Revoking Execute Permission on an Extended Stored Procedure [page 406] Granting Execute Permission on a Scalar Function [page 411] Revoking Execute Permission on a Scalar Function [page 411] Granting Execute Permission on a Stored Procedure [page 397] Revoking Execute Permission on a Stored Procedure [page 398]
	For column encryption key and database encryption keys, you can grant or revoke select permission.	Granting Encryption Permissions to Roles, Users and Groups [page 96].
	For views, you can set these permissions: • `select` • `insert` • `delete` • `update`	Granting Permissions on Views [page 360] Revoking Permissions on Views [page 361]

Permission	Grantee or Object	Links
	For precomputed results, you can grant or revoke execute permission.	Granting Permissions [page 387] Revoking Permissions [page 388] Granting Precomputed Result Set Permissions to a Specific User [page 388] Revoking Precomputed Result Set Permissions to a Specific Use [page 389]

5.1.1 Enabling Granular Permissions

Granular permissions enable you to grant system privileges; allowing you to construct site-specific roles with privileges to match your requirements, and let you restrict system administrators and database owners from accessing user data.

Prerequisites

- The ASE_SECDIRS license is required.
- You must have sso_role privileges to turn on granular permissions, and the `manage security configuration` system privilege to turn off granular permissions
- The system privilege `manage server permissions` is required to grant the following permissions:
  - `checkpoint`
  - `dump database`
  - `load database`
  - `online database`
  - `own database`
  - `use database`
- The system privilege `manage security permissions` is required to access the `sybsecurity` database.
- To generate DDL for encryption keys, logins, and roles:
  - You must have the `select any system catalog` privilege on the master database to generate DDL for logins or roles.
  - For encryption keys, you must have `select any system catalog` privilege on the database where the encryption key resides.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *Server Configurations*.
3. Set the configuration parameter `enable granular permissions` to 1 and click *Save All*.

   When `enable granular permissions` is enabled:
   - Checks for permissions are conducted and only users with the appropriate permissions see the menu options for setting those permissions. For example, the Change Password option is available only if you have `manage any encryption key` permission or if you are the key owner for the column encryption key.
   - System-defined roles (sa_role, sso_role, oper_role, and replication_role) are explicitly granted a set of default privileges. You have the option to revoke explicitly granted system privileges from system-defined roles.
   - The system privilege `manage security permissions` is required to restore dbo user privileges.

   By default, the sa_role is granted the system privilege `own any database`. This privilege allows a system administrator to become the database owner of any user database. However, database owners can revoke the `own any database` privilege from the sa_role.

   `select any system catalog` is not an automatically granted privilege, even if you can access system catalogs. If you have sso_role, you are automatically given the `manage security permissions` privilege when granular permission is enabled. Once you have the `manage security permissions` permission, you can grant the `select any system catalog` privilege to yourself or other users to allow access to generate DDL.

   For complete information about how to manage granular permissions in SAP ASE, see the *Security Administration Guide*.

Related Information

Creating a Stored Procedure [page 395]
Reorganizing Tables at the Database Level [page 198]
Reorganizing Tables [page 201]
Reorganizing Indexes [page 205]
Reorganizing Table Partitions [page 203]
Reorganizing Index Partitions [page 207]
Restoring System Roles [page 135]
Granting Privileges to a Role [page 141]
Revoking Privileges from a Role [page 142]
Granting Privileges to a User [page 129]
Revoking Privileges from a User [page 128]
Granting Privileges to a Group [page 120]
Revoking Privileges from a Group [page 121]

5.2 SAP ASE Cockpit User Management

User Management allows the storage of some additional user information for SAP ASE Cockpit specific tasks.

Any valid user in the managed system can log in to SAP ASE Cockpit. You cannot prevent a valid user from initially logging in to a managed system, but you can disable subsequent access. You can also maintain email addresses for alert notification.

5.2.1 Disabling and Enabling a User in SAP ASE Cockpit

Prevent a valid user in a managed system from logging in to SAP ASE Cockpit.

Prerequisites

Membership in the sa_role and mon_role.

Context

You cannot prevent a valid managed system user from initially logging into SAP ASE Cockpit, but you can prevent subsequent access.

> → Tip
>
> The technical user account should never be used to log in. To enforce this, SAP recommends that you disable this account in SAP ASE Cockpit. Disabling the technical user account has no impact on the account's ability to collect data.

Procedure

1. In SAP ASE Cockpit, click the *Cockpit Settings* icon ( ).
2. In the left pane, select *User Management*, and then select the *General* tab.
3. Select or clear *Login disabled*.
4. Click *OK*.

5.2.2 Deleting a User in SAP ASE Cockpit

Remove a user from the list of registered SAP ASE Cockpit users.

Prerequisites

Membership in the sa_role and mon_role.

Context

> **i** Note
>
> Use extreme care when deleting a user from SAP ASE Cockpit. Do not delete the technical user account.

There should be little need to delete users under User Management as doing so does not prevent access to SAP ASE Cockpit. To prevent a user from accessing SAP ASE Cockpit, disable the users.

Procedure

1. In SAP ASE Cockpit, click the *Cockpit Settings* icon ( ).
2. In the left pane, select *User Management*.
3. In the right pane, click *Delete*.
4. At the confirmation prompt, click *Yes*.
5. Click *OK*.

5.2.3 Defining an Email Address in SAP ASE Cockpit

Add a user's email address to be used for alert notification.

Prerequisites

Membership in the sa_role and mon_role.

Context

If an email address is entered under *ALERT* > *NOTIFY*, the user record under User Management is automatically updated, and vice versa.

Procedure

1. In SAP ASE Cockpit, click the *Cockpit Settings* icon ( ).
2. In the left pane, select *User Management*, and then select the *User Info* tab.
3. Add a valid email address and click *OK*.

5.2.4 Updating User Information in SAP ASE Cockpit

Add details such as name, phone, and email address for a user who has successfully logged in to a managed system.

Prerequisites

Membership in the sa_role and mon_role.

Context

> **i** Note
>
> User information is stored in the SAP ASE Cockpit repository. It is not updated to the user account in the managed system.

Procedure

1. In SAP ASE Cockpit, click the *Cockpit Settings* icon ( ).
2. In the left pane, select *User Management*, and then select the *User Info* tab.
3. Add the user information and click *OK*.

5.3 Changing the uafadmin or sccadmin Password

You can change the passwords of the administrative login accounts for the cockpit (`sccadmin`) and the cockpit agent (`uafadmin`).

Prerequisites

You have already encrypted the new password. See Encrypting a Password [page 78].

Procedure

1. In a text editor, open the `csi_config.xml` file:

Option	Description
UNIX	`$SYBASE/COCKPIT-4/conf/csi_config.xml`

2. Search for the account name: `Default SCC agent admin account: uafadmin` or `sccadmin`.
3. Paste the new encrypted password into the value field of the password line. It looks similar to this—be sure to paste inside the double quotes:

   ```
   <options name="password" value="{SHA-256:WNATpqw76zA=}GYeAKdTRiIh1VcqmWv1k/
   A2pcXSHfLUBr9boP03ArKE=" />
   ```

4. Save the file and exit.
5. To make the new password take effect, restart the SAP ASE Cockpit server or agent on which the changes were made.

Related Information

ASE Agent Plug-In Properties [page 40]

5.3.1 Encrypting a Password

Use the `passencrypt` utility to encrypt passwords and other values that must be kept secure while stored in text files.

Context

`passencrypt` uses the SHA-256 hash algorithm for passwords used in the PreConfiguredLoginModule in `csi_config.xml`.

Procedure

1. Open a command window and change to the `COCKPIT-4\bin` directory.
2. Execute the `passencrypt` utility:

Option	Description
Windows	`passencrypt.bat`
UNIX	`passencrypt -csi`

3. Enter your new password at the resulting prompt.
   `passencrypt` encrypts the password you enter (which does not appear on the screen) and displays the password in encrypted form. Copy the encrypted password and paste where needed.

5.4 Role Assignment in SAP ASE Cockpit

SAP ASE Cockpit automatically grants administrative or monitoring privileges for SAP ASE.

Monitoring privileges are automatically assigned to users who have mon_role privileges on SAP ASE, which lets them perform monitoring tasks for that server.

Administration privileges are automatically assigned to users who have sa_role privileges on an SAP ASE server, which lets them perform certain administrative tasks for that server.

Checks for role validation are performed every 30 minutes. The resource must be authenticated. If you authenticate a resource without having mon_role privileges, are warning appears indicating that you cannot perform monitoring tasks or configure alerts on the server.

> **i** Note
>
> If a role is revoked from outside of SAP ASE Cockpit, the change is not registered until the next role-check occurs. If a role is revoked from within SAP ASE Cockpit, the change is registered immediately.

5.5 Encrypted Authentication for SAP ASE

SAP ASE Cockpit uses encrypted passwords to connect to SAP ASE servers that are configured for network password encryption.

If you have configured an SAP ASE server to use network password encryption by setting `net password encryption reqd`, SAP ASE Cockpit establishes a connection to the server using a password that is encrypted during network transmission.

See *Reference Manual: Configuration Parameters*.

5.6 Manage Encryption Keys

You can encrypt database columns using keys that are created with user-defined or login passwords.

Encryption Keys

In each database, you can create a key that encrypts columns. Creating a key on each database minimizes cross-database key integrity problems. Such key problems can happen in distributed systems, particularly when you are dumping and loading, or mounting and unmounting databases.

To create or modify encryption keys:

- Verify that you have a valid SAP ASE encryption feature license (ASE_ENCRYPTION)
- Set the `enable encrypted columns` parameter to 1.
- Ensure that you have the appropriate privileges. With:
  - Granular permissions enabled – you must have the following privilege or privileges based on the encryption key type:
    - column encryption key – `create encryption key` or `manage column encryption key`
    - master key – `manage master key`
    - database encryption key – `manage database encryption key`

    You must have the `manage any encryption key` privilege to create an encryption key for another user.
  - Granular permissions disabled – you must have sso_role, keycustodian_role, or execute permission on the `create encryption key` command.
    You must have sso_role to create an encryption key for another user.

If you are a key owner, allow other users to access encryption keys by either:

- Creating an encryption key with a user-defined password and sharing it with each user who accesses key-encrypted data, or
- Giving each user a copy of the base encryption key, and allowing him or her to change the key-copy password.

Encryption Keys with User-Defined Passwords

Using encryption keys with user-defined passwords creates a highly secure system in which even database owners and system administrators cannot access encrypted data. You can also require that the key encryption method itself use a user-defined password.

SAP ASE provides recovery for lost base-key passwords.

When data is encrypted, system security officers, key-custodians, and users with permission to create encryption keys can also create base keys. System security officers can also grant base key creation permission to users who have no other permissions.

The creator of the base key is the "key owner." To control access to encrypted data, only key owners and system security officers can change the base-key password.

Encryption Keys with Login Passwords

To prevent users from having to keep multiple passwords, you can authorize users to access encrypted data using their login password. Using login passwords to access key-encrypted data:

- Gives users access to encrypted data without requiring them to explicitly supply passwords.
- Involves fewer passwords for users to track.
- Reduces the need for the key custodian to replace lost passwords.

Key Copies

Key owners can allow data access to other users by making copies of the base key—called key copies. A key copy is an additional password for the base key that can be changed as soon as it is assigned to a user, or key-copy owner. Only the key-copy owner can change the key-copy password.

You can make key copies for designated users if you are the base-key owner or a system security officer. Key copies of the base key are not new keys themselves; they are additional passwords for the base key. Key-copy assignees should change their user-defined password for as soon as the key copy is assigned to them.

The key copy is encrypted with the login password as soon as the assignee logs in and accesses the key copy.

> **i** Note
>
> The base key can be encrypted by the system encryption password or a user-defined password. Key copies can be encrypted by a login password or by a user-defined password. The recovery key copy can be encrypted only by a user-defined password. Keys that are encrypted with the system encryption password cannot have key copies.

Key recovery requires you to create a special key copy, called the recovery key, that is designated for the recovery of the base key. If you lose your password, use the recovery key to access the base key.

Related Information

Creating an Encrypted Database [page 240]
Encrypting an Existing Database [page 241]
Suspending the Encryption Process [page 242]
Resuming the Encryption Process [page 242]
Decrypting an Encrypted Database [page 243]
Suspending the Decryption Process [page 244]
Resuming the Decryption Process [page 244]
Creating a Master Key [page 84]
Creating a Database Encryption Key [page 94]

5.6.1 Dual Control and Split Knowledge

Manage dual-control and split-knowledge encryption.

You can use a combination of system keys at the database level, called the master key and the dual-master key. You must have sso_role or keycustodian_role to create the master key and dual master key. The master key and the dual master key must have different owners.

You can provide passwords for the master keys using the Supply Password option for encryption keys. You can also use the Execute SQL option to provide the password using SQL. The passwords to both these keys are not stored in the database.

Master and dual-master keys act as key encryption keys (KEKs), and protect other keys, such as column encryption keys and service keys. Once created, master and dual-master keys become the default protection method for column encryption keys. There can only be one master and one dual-master key for a database.

The dual-master key is needed only for dual control of column encryption keys. Once the master key is created, it replaces the system encryption password as the default key encryption key for user-created keys.

A composite key, comprising the master key and dual-master key, provides dual control and split-knowledge security for all user-created keys. Alternately, you can create a composite key using the master key and the column encryption key's password. When master and dual-master keys are configured in a database, the combination is used to encrypt passwords when you issue `create table`, `alter table` or `select into` commands specifying dual control.

Related Information

Master Key Properties [page 85]
Creating a Master Key [page 84]
Modifying a Master Key Password [page 86]

5.6.2 Creating a System Encryption Password

SAP ASE encrypts keys using the Advanced Encryption Standard (AES) algorithm. The system encryption password is encrypted and stored in the database.

Prerequisites

- Verify that you have a valid SAP ASE encryption feature license (ASE_ENCRYPTION)
- Set the `enable encrypted columns` parameter to 1.
- Ensure that you have the appropriate privileges. With:
  - Granular permissions enabled – you must have the `manage database encryption key` privilege. You must have the `manage any encryption key` privilege to modify or create an encryption key for another user.
  - Granular permissions disabled – you must have sso_role, keycustodian_role, or execute permission on the `create encryption key` command.
    You must have sso_role to modify or create an encryption key for another user.

Context

The security of encryption keys might be compromised if the system encryption password is too short or easy to guess.

> **i** Note
>
> Keys that are encrypted using the system encryption password cannot have key copies.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Encryption Keys*.
3. Click *System Encryption Passwords*.
4. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *New*.
6. On the Introduction page, select the database containing the keys that the system encryption password encrypts.
7. On the Password page, enter a new password and confirm the password.

8. (Optional) Click *Summary* to verify your selected options.

5.6.3 Modifying a System Encryption Password

Change or delete the system encryption password.

Prerequisites

- Verify that you have a valid SAP ASE encryption feature license (ASE_ENCRYPTION)
- Set the `enable encrypted columns` parameter to 1.
- Ensure that you have the appropriate privileges. With:
  - Granular permissions enabled – you must have the `manage database encryption key` privilege. You must have the `manage any encryption key` privilege to modify or create an encryption key for another user.
  - Granular permissions disabled – you must have sso_role, keycustodian_role, or execute permission on the `create encryption key` command.
    You must have sso_role to modify or create an encryption key for another user.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Encryption Keys*.
3. Click *System Encryption Passwords*.
4. In the right pane, select a system encryption password, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Change Password*.
6. Enter the old and new passwords, and confirm the new password.

5.6.4 Creating a Master Key

Create the master key for the database.

Prerequisites

- Verify that you have a valid SAP ASE encryption feature license (ASE_ENCRYPTION)
- Set the `enable encrypted columns` parameter to 1.
- Ensure that you have the appropriate privileges. With:
  - Granular permissions enabled – you must have the `manage master key` privilege.
    You must have the `manage any encryption key` privilege to modify or create an encryption key for another user.
  - Granular permissions disabled – you must have sso_role, keycustodian_role, or execute permission on the `create encryption key` command.
    You must have sso_role to modify or create an encryption key for another user.

Context

The master key:

- Is a database-level key, created by a user with sso_role or keycustodian_role.
- Is used as a key encryption for user-defined encryption keys.
- Replaces the system-encryption password as the default key encryption key (KEK) for user-defined keys.

  > **i** Note
  >
  > SAP recommends that you do not create system encryption passwords after you have created master keys.

- Can be used with the dual master key as a composite key to provide dual control and split knowledge for all user-created keys. Alternatively, the master key can be used as a composite key with a column encryption key's explicit password.
- Can be altered to add key copies. Master key copies provide access to the dual-master key for unattended start-up, to support recovery of the master key, and to allow users other than the base-key owner to set the encryption password.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Encryption Keys*.
3. Click *Master Keys*.

4. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *New*.
6. On the Introduction page, select the database for which the encryption key is being defined.
7. On the Password page, enter a new password and confirm the password.
8. (Optional) Click *Summary* to verify your selected options.

Related Information

Modifying a Master Key Password [page 86]
Dual Control and Split Knowledge [page 81]
Master Key Properties [page 85]
Manage Encryption Keys [page 79]

5.6.5 Master Key Properties

Display or modify master key and key copy properties.

Prerequisites

- Verify that you have a valid SAP ASE encryption feature license (ASE_ENCRYPTION)
- Set the `enable encrypted columns` parameter to 1.
- Ensure that you have the appropriate privileges. With:
  - Granular permissions enabled – you must have the `manage master key` privilege.
    You must have the `manage any encryption key` privilege to modify or create an encryption key for another user.
  - Granular permissions disabled – you must have sso_role, keycustodian_role, or execute permission on the `create encryption key` command.
    You must have sso_role to modify or create an encryption key for another user.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Encryption Keys*.
3. Click *Master Keys*.

4. In the right pane, select a master key, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Properties*.
6. View or modify the properties.

Pages	Properties
General	○ Name – change the name of the master key. ○ Owner – change the owner of the master key. ○ Has key recovery – indicates that the key has a recovery copy. ○ Master key startup file – specifies the master key automatic start-up copy. The automatic startup copy is used to access the master or dual-master keys when a server, configured for `automatic master key access`, is started. ○ Has automatic startup – indicates that the master key has an automatic start-up copy.
Key Copies	Assignees and other information about keys – lists the types of passwords and assignees for the key, and information about whether the key is recoverable.

Related Information

Dual Control and Split Knowledge [page 81]
Creating a Master Key [page 84]
Modifying a Master Key Password [page 86]

5.6.6 Modifying a Master Key Password

Modify existing passwords or regenerate the master key.

Prerequisites

- Verify that you have a valid SAP ASE encryption feature license (ASE_ENCRYPTION)
- Set the `enable encrypted columns` parameter to 1.
- Ensure that you have the appropriate privileges. With:
  - Granular permissions enabled – you must have the `manage master key` privilege.
    You must have the `manage any encryption key` privilege to modify or create an encryption key for another user.

- Granular permissions disabled – you must have sso_role, keycustodian_role, or execute permission on the `create encryption key` command.
  You must have sso_role to modify or create an encryption key for another user.

Context

- Use Change Password when a password is compromised.
- Use Regenerate to periodically change key encryption keys (KEKs), which is recommended as good key management. The master or dual-master key is replaced with a new value and all column encryption keys that are encrypted by the master or dual-master keys are reencrypted.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Encryption Keys*.
3. Click *Master Keys*.
4. In the right pane, select a master key, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Choose one of:
   - *Change Password*.
     Enter the old and new passwords, and confirm the new password. Optionally, you can choose to control encryption with a user-defined password.

     > **i** Note
     >
     > If a key has key copies, you cannot modify the key to encrypt it with the system encryption password.
   - *Supply Password*, to set the master key.
   - *Regenerate*, to re-create the master key and the keys it protects.

Related Information

Creating a Master Key [page 84]
Dual Control and Split Knowledge [page 81]
Master Key Properties [page 85]

5.6.7 Creating a Column Encryption Key

Create a column encryption key using a specified encryption method.

Prerequisites

- Verify that you have a valid SAP ASE encryption feature license (ASE_ENCRYPTION)
- Set the `enable encrypted columns` parameter to 1.
- Ensure that you have the appropriate privileges. With:
  - Granular permissions enabled – you must have the `create encryption key` or `manage column encryption key` privilege.
    You must have the `manage any encryption key` privilege to modify or create an encryption key for another user.
  - Granular permissions disabled – you must have sso_role, keycustodian_role, or execute permission on the `create encryption key` command.
    You must have sso_role to modify or create an encryption key for another user.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Encryption Keys*.
3. Click *Column Encryption Keys*.
4. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *New*.
6. On the Introduction page, specify:

Option	Description
Select a database	Select the database for which the encryption key is being defined.
Select an owner	Select an owner for the encryption key.

7. On the Encryption Key Name page, enter a unique name for encryption key.
8. On the Algorithm page, select parameters for the Advanced Encryption Standard (AES) encryption algorithm:

Option	Description
Key length	Choose 128, 192, or 256, depending on the level of security you need.

Option	Description
Set this key as the database default key	Setting the key as the default key allows user to create encrypted columns without specifying the key.
Encrypt with user defined password	Encryption is controlled with a user-defined password.
With dual control	Encryption is controlled with both the master key and a user-defined password. **i Note** If you select dual control, the master key must already exist in the database, and you must supply the master key password.
Encrypt with master key	Enable encryption using the master key.
Encrypt with system encryption password	Enable encryption using the system encryption password.

9. On the Parameter of init vector, pad page, select:

Option	Description
Initialization vector padding	Select either null or random. Use initialization vector padding to increase the security of encrypted data by increasing the cryptographic variance of the cipher text.
Pad value	Select the pad value to be either random or null. If pad is set to random, the datatype padding is used when the length is smaller than one block.

10. (Optional) Click *Summary* to verify your selected options.

Related Information

Modifying a Column Encryption Key Password [page 92]
Modifying a Master Key Password [page 86]
Column Encryption Keys Properties [page 89]

5.6.8 Column Encryption Keys Properties

Display or modify column encryption key and key copy properties.

Prerequisites

- Verify that you have a valid SAP ASE encryption feature license (ASE_ENCRYPTION)
- Set the `enable encrypted columns` parameter to 1.

- Ensure that you have the appropriate privileges. With:
  - Granular permissions enabled – you must have the `create encryption key` or `manage column encryption key` privilege.
    You must have the `manage any encryption key` privilege to modify or create an encryption key for another user.
  - Granular permissions disabled – you must have sso_role, keycustodian_role, or execute permission on the `create encryption key` command.
    You must have sso_role to modify or create an encryption key for another user.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Encryption Keys*.
3. Click *Column Encryption Keys*.
4. In the right pane, select the column encryption key, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Properties*.
6. View or modify the properties:

Pages	Properties
General	○ Name – change the name of the encryption key. ○ Owner – change the owner of the encryption key. ○ Default – select this key as the default key to allow users to create encrypted columns without specifying the key. ○ Has key recovery – indicates that the key has a recovery copy. ○ Init vector – use the initialization vector padding to increase the security of encrypted data by increasing the cryptographic variance of the cipher text. ○ Pad – if pad is set to random, the datatype padding is used when the length is less than one block.

Key Copies	○ Assignees and other information about keys – list the types of passwords, whether the key is recoverable.
	○ Key-copy management:
	  ○ Create a new key copy.
	  ○ Delete a key copy.

Object Permissions	○ Grantees and other object information – list the grantees and grantee types for the key, and information whether select is granted. ○ Permissions – modify permissions to users, groups, or roles.

Pages	Properties
Dependencies	Encrypted columns – list the columns encrypted by this key, and their databases and tables.

Related Information

Creating a Column Encryption Key [page 88]
Modifying a Column Encryption Key Password [page 92]
Modifying a Master Key Password [page 86]

5.6.9 Creating a Key Copy

Create key copies specifying an encryption method.

Prerequisites

- Verify that you have a valid SAP ASE encryption feature license (ASE_ENCRYPTION)
- Set the `enable encrypted columns` parameter to 1.
- Ensure that you have the appropriate privileges. With:
  - Granular permissions enabled – you must have the `create encryption key` or `manage column encryption key` privilege.
    You must have the `manage any encryption key` privilege to modify or create an encryption key for another user.
  - Granular permissions disabled – you must have sso_role, keycustodian_role, or execute permission on the `create encryption key` command.
    You must have sso_role to modify or create an encryption key for another user.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Encryption Keys*.
3. Click *Column Encryption Keys*.
4. In the right pane, select a column encryption key, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Properties*.

6. In the left pane, click the arrow to the right of Key Copies and select *New*.
7. On the Select Assignee page, specify:

Option	Description
Password for base key	Enter the password for the base key.
Assign to	Enter the assignee for the key copy. The assignee cannot be the key owner.
Set as recovery	Designate this key copy as the recovery-key copy.

8. On the Set Key Copy Password page, specify:

Option	Description
Encrypt with user defined password	Enter and confirm a password
Login password	Use the existing login password.

9. (Optional) Click *Summary* to verify your selected options.

5.6.10 Modifying a Column Encryption Key Password

Change the encryption key, with the option of adding dual control.

Prerequisites

- Verify that you have a valid SAP ASE encryption feature license (ASE_ENCRYPTION)
- Set the `enable encrypted columns` parameter to 1.
- Ensure that you have the appropriate privileges. With:
  - Granular permissions enabled – you must have the `create encryption key` or `manage column encryption key` privilege.
    You must have the `manage any encryption key` privilege to modify or create an encryption key for another user.
  - Granular permissions disabled – you must have sso_role, keycustodian_role, or execute permission on the `create encryption key` command.
    You must have sso_role to modify or create an encryption key for another user.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Encryption Keys*.
3. Click *Column Encryption Keys*.

4. In the right pane, select a column encryption key, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Choose one of:
   - *Change Password*.
     Enter the old and new passwords, and confirm the new password

     > **i Note**
     >
     > If a key has key copies, you cannot modify the key to encrypt it with the system encryption password.

     Select an encryption method:

Option	Description
Encrypt with user defined password	Encryption is controlled with a user-defined password.
With dual control	Encryption is controlled with both the master key and a user-defined password. **i Note** If you select dual control, the master key must already exist in the database, and you must supply the master key password.
Encrypt with master key	Enable encryption using the master key.
Encrypt with system encryption password	Enable encryption using the system encryption password.

   - *Supply Password*, to set the master key password.
6. (Optional) Click *Summary* to verify your selected options.

Related Information

Creating a Column Encryption Key [page 88]
Modifying a Master Key Password [page 86]
Column Encryption Keys Properties [page 89]

5.6.11 Creating a Database Encryption Key

Create a database encryption key using a specified encryption method.

Prerequisites

- Verify that you have a valid SAP ASE encryption feature license (ASE_ENCRYPTION)
- Set the `enable encrypted columns` parameter to 1.
- Ensure that you have the appropriate privileges. With:
  - Granular permissions enabled – you must have the `manage database encryption key` privilege. You must have the `manage any encryption key` privilege to modify or create an encryption key for another user.
  - Granular permissions disabled – you must have sso_role, keycustodian_role, or execute permission on the `create encryption key` command.
    You must have sso_role to modify or create an encryption key for another user.

> **Note**
>
> Before you create a database encryption key (DEK), create a key encryption key (KEK). The KEK can be a master key or dual master key; these both protect the database encryption key (DEK). See *Using Database-Level Master and Dual Master Keys* in the *Encrypted Columns Users Guide*.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Encryption Keys*.
3. Click *Database Encryption Keys*
4. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *New*
6. On the Introduction screen, select an owner for the encryption key.
7. On the Encryption Key Name page, enter a unique name for encryption key.
8. On the Algorithm screen, select *with dual master key* if there is a dual master key in the `master` database.
9. (Optional) Click *Summary* to verify your selected options.

Related Information

Manage Encryption Keys [page 79]

5.6.12 Database Encryption Keys Properties

Display the properties of database encryption keys.

Prerequisites

- Verify that you have a valid SAP ASE encryption feature license (ASE_ENCRYPTION)
- Set the `enable encrypted columns` parameter to 1.
- Ensure that you have the appropriate privileges. With:
  - Granular permissions enabled – you must have the `manage database encryption key` privilege. You must have the `manage any encryption key` privilege to modify or create an encryption key for another user.
  - Granular permissions disabled – you must have sso_role, keycustodian_role, or execute permission on the `create encryption key` command.
    You must have sso_role to modify or create an encryption key for another user.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Encryption Keys*.
3. Click *Database Encryption Keys*
4. In the right pane, select a database encryption key, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Properties*.
6. View or modify the properties.

Pages	Properties
General	○ Name – change the name of the encryption key. ○ Type – indicates that this is a database encryption key. ○ Database – indicates what database the encryption key is for. The default is `master`, since the database encryption key is created only in the `master` database. ○ Owner – you can change the owner of the encryption key if you have change permission. ○ Creation date – shows when the encryption key was created. ○ ID – shows the ID number of the encryption key.

Pages	Properties
	○ Key length (bits) – shows the key length, in bits. The only valid value is 256. ○ Key algorithm – shows the algorithm. For database encryption keys, the only valid value is AES. ○ Initialization vector – shows the initialization vector for the database encryption key. The only valid value is "random." ○ Encrypted by – indicates that the database encryption key was created by the master key. If you used a dual-master key, to create the database encryption key with dual control selected, you can change the setting if you have change permission.
Object Permissions	○ Grantees and other object information – list the grantees and grantee types for the key, and information whether `select` is granted. ○ Permissions – modify permissions to users, groups, or roles.
Dependencies	Encrypted databases – list the databases encrypted by this key.

5.6.13 Granting Encryption Permissions to a Role, User, or Group

Grant permission to access the encryption key.

Prerequisites

You must have the `manage any encryption key` privilege to create an encryption key for another user.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Encryption Keys*.
3. In the left pane, click either:
   - *Column Encryption Keys* – to grant permissions for the column encryption key.
   - *Database Encryption Keys* – to grant permissions for the database encryption key.
4. In the right pane, select an encryption key, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.

5. Select *Properties*.
6. In the left pane, click *Object Permissions*.
7. Click *Grant* to allow other users, groups, or roles to access the encryption key.
8. On the Welcome page, select whether to grant permission to users, groups, or roles.
9. On the Grantee page, select the grantee from the list of possible users, groups, or roles.
10. On the Permissions page, select the key permissions to be granted.
11. (Optional) Click *Summary* to verify your selected options.

5.6.14 Deleting an Encryption Key

Delete encryption keys.

Prerequisites

- Verify that you have a valid SAP ASE encryption feature license (ASE_ENCRYPTION)
- Set the `enable encrypted columns` parameter to 1.
- Ensure that you have the appropriate privileges. With:
  - Granular permissions enabled – you must have the following privilege or privileges based on the encryption key type:
    - column encryption key – `create encryption key` or `manage column encryption key`
    - master key – `manage master key`
    - database encryption key – `manage database encryption key`

    You must have the `manage any encryption key` privilege to create an encryption key for another user.
  - Granular permissions disabled – you must have sso_role, keycustodian_role, or execute permission on the `create encryption key` command.
    You must have sso_role to create an encryption key for another user.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Encryption Keys*.
3. Click one of:
   - *Column Encryption Keys*
   - *Database Encryption Keys*
   - *Master Keys*
4. In the right pane, select one or more items, and do one of:
   - Click the arrow to the right of the name.

- Click the *Actions* button.

Use *Shift-click* or *Control-click* to select multiple items.

5. Select *Delete*.
6. Click *Yes* to confirm the deletion.

5.6.15 Generating DDL for an Encryption Key

Generate a DDL script for encryption keys.

Prerequisites

When granular permissions is enabled, you must have `select any system catalog` privilege on the database where the encryption key resides.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Encryption Keys*.
3. Click one of:
   - *Column Encryption Keys*
   - *Database Encryption Keys*
   - *Master Keys*
4. In the right pane, select an encryption key, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Generate DDL*.
6. (Optional) Click *Save* to export and save the DDL statement.

   You can save the DDL in an external file on your local file system.

5.7 Manage Login Profiles

You can manage login accounts with login profiles that define attributes for individual logins, a subset of logins, or all logins.

A login profile is a collection of attributes that are specific to login accounts. You can manage login accounts attributes by creating login profiles and associating the profile with a login account. You can manage attributes

for many login accounts by defining a login profile as: the default for all login accounts, a subset of login accounts, or individual login accounts.

When you create or modify a login profile, you can:

- Assign a default database and default language
- Assign an authentication mechanism
- Track the last login
- Define a stale login inactivity period
- Execute a login script

Login profiles attributes are associated with login accounts using this precedence:

1. Attribute values from a login profile that is bound to the login
2. Attribute values from a default login profile
3. Values that have been specified using `sp_passwordpolicy` under these circumstances:
   - A default login profile does not exist
   - A login profile has not been defined and bound to the account
   - The login profile is set to be ignored
4. The default value for the attribute

5.7.1 Creating a Login Profile

Create a login profile to manage attributes of login accounts.

Prerequisites

Ensure that you have the appropriate privileges:

- Granular permissions enabled – you must be a user with the `manage any login profile` privilege.
- Granular permissions disabled – you must be a user with sso_role.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Login Profiles*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.
5. On the Login Profile Name page, specify:

Option	Description
Login Profile Name	The name of the login profile.
With attributes derived from an existing login account	Transfers existing login account values to a new login profile.
As default for all login accounts	Use the login profile as the default for all login accounts on the selected servers.

6. (Optional) On the Default Database page, specify:

Option	Description
Specify default database	Choose a database to be used as the default for the login profile.
(Optional) Use common default database for the login profile on all servers	Select a default database. The list of available of databases depends on the databases that are common on all servers that have been selected. If there are no servers on this list, there are no common databases available.
(Optional) Use default database for the login profile on individual server	Select a default database.

7. (Optional) On the Default Language page, specify:

Option	Description
Specify default language	Choose a language to be used as the default for the login profile.
(Optional) Use common default language for the login profile on all servers	Select the default language. us_english is the default language, but you can install locale character sets. The additional installed languages and the default language constitute the list of available languages.
(Optional) Use default language for the login profile on individual server	Select the default language.

8. (Optional) On the Authentication page, specify:

	Description
Specify an authentication method	Choose an authentication mechanism for the login profile.
(Optional) Use common authentication for the login profile on all servers	Select the authentication method. If you select ANY (the default) as the authentication mechanism, a check is performed for a defined external authentication mechanism. If one exists, it is used. Otherwise, the ASE mechanism is used.
(Optional) Use default authentication for the login profile on individual server	Select the authentication method.

9. (Optional) On the More Options page, specify:

Option	Description
Track last login	Specify whether to enable last login updates. The default is to track the last login.
Stale login inactivity period	Specify the length of time a login account can remain inactive before it is locked due to inactivity.
Login script	Specify a script to be invoked on login.

10. (Optional) Click *Summary* to verify your selected options.
11. Click *Finish* to create the login profile.

5.7.2 Login Profile Properties

Display or modify login profile properties.

Prerequisites

Ensure that you have the appropriate privileges:

- Granular permissions enabled – you must be a user with the `manage any login profile` privilege.
- Granular permissions disabled – you must be a user with sso_role.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Login Profiles*.
3. In the right pane, select a login profile, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. View or modify the properties.

Pages	Properties
General	○ Default database – if not specified, the master database. ○ Default language – if not specified, us_english is the default.

Pages	Properties
	○ Authentication – specify the external authentication mechanism: ○ ANY ○ ASE ○ KERBEROS ○ LDAP ○ PAM If you select ANY (the default) as the authentication mechanism, a check is performed for a defined external authentication mechanism. If one exists, it is used. Otherwise, the ASE mechanism is used. ○ Track last login – specify whether to enable last login updates. The default is to track the last login. ○ Stale login inactivity period – specify the length of time a login account can remain inactive before it is locked due to inactivity. ○ Login script – specify a script to be invoked on login.
Logins	Displays the login accounts that are bound to the selected login profile.
Roles	You can add or remove roles that have been granted to the selected login profile.

5.7.3 Removing Roles Granted to a Login Profile

Remove roles from login profiles.

Prerequisites

To grant or revoke predicated privileges, set the configuration parameter `enable predicate privileges` to 1.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Login Profiles*.
3. In the right pane, select a login profile, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.

5. In the left pane, click *Roles*.
6. In the right pane, select a role and click *Remove*.

5.7.4 Granting Roles to a Login Profile

Add roles to a login profile.

Prerequisites

To grant or revoke predicated privileges, set the configuration parameter `enable predicate privileges` to 1.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Login Profiles*.
3. In the right pane, select a login profile, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Roles*.
6. In the right pane, click *Add...* and select a role from the pop-up window.
7. (Optional) Click *With activation predicate* and enter an expression for the activation predicate.
8. (Optional) Select *Active By Default* to indicate the role must be automatically activated on login.

5.7.5 Displaying Logins Assigned to a Login Profile

Display login profiles and the bindings of login accounts to login profiles.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Login Profiles*.
3. In the right pane, select a login profile, and do one of:

- Click the arrow to the right of the name.
- Click the *Actions* button.

4. Select *Properties*.
5. In the left pane, click *Logins*.
   You can find additional details about the login profile in the General and Roles properties options.

5.7.6 Transferring Login Attributes to a Login Profile

Use attributes of an existing login account to create a login profile.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Login Profiles*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.
5. On the Login Profile Name page, specify the name of the login profile.
6. Select *With attributes derived from an existing login account*.
7. (Optional) Click *As default for all login accounts* to set the new login profile or profiles as the default for all login accounts on the selected servers.
8. (Optional) On the Select Login Name window, select the login account from which to derive attributes and choose one of:
   - *Use common login on all servers*, then select the login account.
     The list of available of login accounts is based on login accounts that are common on all of the servers that have been selected. An empty list indicates that there are no common login accounts.
     A login profile is created on each server, based on the attributes of the common login account. The name of the login profile is the same on each server.
   - *Use login account on individual server*, then select the login accounts.
     A login profile is created on each server, based on the attributes from different login accounts. The name of the login profile is the same on each server.

5.7.7 Deleting a Login Profile

Delete a login profile to drop it from the database.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Login Profiles*.
3. In the right pane, select a login profile, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Delete*.
5. (Optional) From the Confirm Delete Login Profile window, select *Drop with override* to forcefully drop login profiles that are bound to login accounts. Login accounts that are bound to the deleted login profile are reassigned to the default login profile.
6. (Optional) Select *Preview* to view the properties of the login profile.

5.7.8 Generating DDL for a Login Profile

Generate a DDL script for a login profile.

Prerequisites

You must have the `select any system catalog` privilege on the master database.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Login Profiles*.
3. In the right pane, select a login profile, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Generate DDL*.
5. (Optional) Click *Save* to export and save the DDL statement.

   You can save the DDL in an external file on your local file system.

5.8 Manage Logins

Each SAP ASE user must have a login account that is identified by a unique login name and a password.

To access a server, users must have a login account with a unique name and password. When a login account is added to one or more servers, the account is given a unique system user ID, which identifies the users regardless of the server being used. Once a login account is created, a user account is created for users to access individual database. Login profiles can be associated with a login account to manage attributes such as the default database, default language, authentication mechanism, tracking the login, setting inactivity periods, and invoking login scripts.

The options for managing login accounts are:

- Grant roles to logins
- Map users to logins
- Map client users to logins
- Assign login profiles to login accounts
- Lock login accounts
- Expire login accounts
- Set the number of failed logins
- Configure passwords parameters at the server level
- Change the password for a specific login

5.8.1 Creating a Login

Create a login account for each user.

Prerequisites

Ensure that you have the appropriate privileges. With:

- Granular permissions enabled – you must have the `manage any login privilege` to alter login accounts in general. To modify a login account's password, you must have the `change password privilege` or be the account owner.
- Granular permissions disabled – you must be a user with sso_role. The account owner is allowed to modify the account's password and full name.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Logins*.

3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.
5. On the Login Name window, enter a name for the login account you want to create, then enter a password.
6. (Optional) Enter a full name for the account.
   Specifying a full name for the account allows easier identification of the account owner.
7. On the Login Profile page, specify:

Option	Description
Ignore login profile in creating login	A login profile is not designated for the login.
Use common login profile for the login on the server	This option is available only when an existing login profile is available.
Use different login profile for the login on individual server	This option is available only when an existing login profile is available.

8. (Optional) On the Default Database window, choose one of:

Option	Description
Use common default database for the login on all servers	Choose a default database.
Use default database for the login on individual server	Select a server from the list of available servers.

9. (Optional) On the Optional Parameters page, select the default language for the new login account.
10. On the Database Access window, select the databases that the login account can access.
    This step adds a user account of the same name as the login to the selected database.
11. (Optional) Click *Summary* to verify your selected options.

5.8.2 Login Properties

Display or modify login properties, such as set password parameters, add users to a login, and grant logins to a role.

Prerequisites

Ensure that you have the appropriate privileges. With:

- Granular permissions enabled – you must have the `manage any login privilege` to alter login accounts in general. To modify a login account's password, you must have the `change password privilege` or be the account owner.
- Granular permissions disabled – you must be a user with sso_role. The account owner is allowed to modify the account's password and full name.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Logins*.
3. In the right pane, select a login, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. View or modify the properties.

Pages	Properties

General	○ Full name – allows for easier identification name for the login account.
	○ Default database – if not specified, the master database.
	○ Default language – if not specified, us_english is the default.
	○ Authentication – specify the external authentication mechanism:
	  ○ ANY
	  ○ ASE
	  ○ KERBEROS
	  ○ LDAP
	  ○ PAM
	If you select ANY (the default) as the authentication mechanism, a check is performed for a defined external authentication mechanism. If one exists, it is used. Otherwise, the ASE mechanism is used.
	○ Temp DB binding – binds logins to a temporary database in the default temporary database group.

Parameters	○ Invalid password or NULL – specify a new password for the login account. ○ Password has expired – the account owner must change the login password. ○ Account is locked – lock the login account. ○ Password last set – indicates when the password was changed. ○ Max failed logins – the number of login attempts allowed, after which the account is locked. ○ Min password length – minimum password length required for the login account. ○ Password expiration intervals (days) – the number of days until the password expires. ○ CPU time accumulated – the amount of CPU time used by the login. ○ I/O time accumulated – the amount of time spent processing input and output operations used by the login.

Pages	Properties
Databases Owned	Displays a list of databases that are owned by the specified login account.
Roles	Displays a list of roles granted to the account. You can add or remove roles that have been granted to the selected login. Click *Predicates* to view the role activation SQL text for predicates.
Users	Displays a list of users or aliases that are bound to the account. You can add or remove users to or from the account.
Client Mapping	Displays a list of client users mapped to the account. You can add or remove client users to or from the account.

5.8.3 Mapping Users to Logins

Map user accounts to logins.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Logins*.
3. In the right pane, select a login, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Users*.

   Users currently mapped to the selected login account are listed in the right pane.
   - Click *Add*, then select one or more users to map to the login.
   - Select one or more users, then click *Remove* to remove users from a login account.
   - Click *Properties* to see the attributes and properties assigned to a user.

Related Information

Assigning Login Profiles to a Login [page 113]
Granting Roles to a Login [page 110]
Removing Roles from a Login [page 110]

5.8.4 Removing Roles from a Login

Remove roles granted to login accounts.

Prerequisites

To grant or revoke predicated privileges, set the configuration parameter `enable predicate privileges` to 1.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Logins*.
3. In the right pane, select a login, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Roles*.
6. In the right pane, select a role and click *Remove*.

Related Information

Mapping Users to Logins [page 109]
Assigning Login Profiles to a Login [page 113]
Granting Roles to a Login [page 110]

5.8.5 Granting Roles to a Login

Add roles to login accounts.

Prerequisites

To grant or revoke predicated privileges, set the configuration parameter `enable predicate privileges` to 1.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Logins*.
3. In the right pane, select a login, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Roles*.
6. In the right pane, click *Add* and select one or more roles from the dialog.
7. (Optional) Click *With activation predicate* and enter an expression for the activation predicate.
8. (Optional) Select *Active By Default* to indicate the role must be automatically activated on login.

Related Information

Mapping Users to Logins [page 109]
Assigning Login Profiles to a Login [page 113]
Removing Roles from a Login [page 110]

5.8.6 Configuring Login Password Properties

Manage password properties for login accounts.

Prerequisites

Ensure that you have the appropriate privileges. With:

- Granular permissions enabled – you must have the `manage any login privilege` to alter login accounts in general. To modify a login account's password, you must have the `change password privilege` or be the account owner.
- Granular permissions disabled – you must be a user with sso_role. The account owner is allowed to modify the account's password and full name.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.

2. In the left pane, expand *ASE Servers* > *Security* > *Logins*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Configure Login Passwords*.
5. On the Configuration page, select one or more password complexity options from the list.
6. On the Expiration page, specify:

Option	Description
Expire login account passwords	When selected, the owners of the login accounts must change the login password.
Expire passwords	Specify specific logins or identify pattern matching.
Select the login whose password is to be expired	Expire passwords for specific login accounts.
Specify pattern matching characters for logins	Expire passwords for login accounts matching specified characters.
Expire stale passwords	Expire passwords that have not been changed by a specified date.

7. On the Lock Inactive Accounts page, check *Lock inactive login accounts* to locked accounts due to inactivity, and specify the number of days the account can remain inactive before the account is locked.

> **i** Note
>
> To lock inactive accounts, *enable last login updates* on the Configuration screen must be checked.

Related Information

Changing a Login Password [page 112]

5.8.7 Changing a Login Password

Change passwords and parameters for login accounts.

Prerequisites

Ensure that you have the appropriate privileges. With:

- Granular permissions enabled – you must have the `manage any login privilege` to alter login accounts in general. To modify a login account's password, you must have the `change password privilege` or be the account owner.

- Granular permissions disabled – you must be a user with sso_role. The account owner is allowed to modify the account's password and full name.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Logins*.
3. In the right pane, select a login, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Parameters*, and specify:

Option	Description
Change password	Enter the current password for the login and the new password.
Expire password	Immediately expires the password.
Lock Account	
Max failed logins	Number of login attempts allowed, after which the login account is locked.
Min password length	Minimum password length required.
Password expiration interval	Password expiration interval. Default is 0, meaning the password never expires.

Related Information

Configuring Login Password Properties [page 111]

5.8.8 Assigning Login Profiles to a Login

Manage attributes of login accounts by assigning a login profile to an individual login, a subset of logins, or all logins.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.

2. In the left pane, expand *ASE Servers* > *Security* > *Logins*.
3. In the right pane, select a login, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *General*.
6. Unselect *Ignore login profile*.
7. Select a login profile from the drop-down list.

Related Information

Mapping Users to Logins [page 109]
Granting Roles to a Login [page 110]
Removing Roles from a Login [page 110]

5.8.9 Deleting a Login

Delete a login to remove it from the database.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Logins*.
3. In the right pane, select one or more items, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.

   Use *Shift-click* or *Control-click* to select multiple items.
4. Select *Delete*.
5. Click *Yes* to confirm the deletion.

5.8.10 Generating DDL for a Login

Generate a DDL script for a login.

Prerequisites

You must have the `select any system catalog` privilege on the master database.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Logins*.
3. In the right pane, select a login and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Generate DDL*.
5. (Optional) Click *Save* to export and save the DDL statement.

   You can save the DDL in an external file on your local file system.

5.9 Manage Groups

You can grant permissions to groups to access database objects.

The database owner grants and revokes group encryption permissions.

When SAP ASE is configured to restrict decrypt permission, only the system security officer can grant decrypt permission on tables, columns, and views. When restricted decrypt permission is turned off, the system security officer or the database owner can grant decrypt permission.

Command permissions allow the group to execute `create` commands. Database owners can assign command permissions to groups in the databases they own.

> **i** Note
>
> SAP ASE Cockpit reports only explicitly granted and revoked permissions as well as those that users obtain by belonging to a group. For example, permissions associated with a login role are not reported.

5.9.1 Creating a Group

A group can have members with specific permissions. You grant and revoke permissions and authorities for a group in the same manner as you do for users.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Groups*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.
5. On the Introduction page, select the database in which to create a group.
6. On the Group Name page, specify the name of the group to create.

Related Information

Creating a User [page 123]
Transferring Ownership of a Database Object [page 124]

5.9.2 Group Properties

Display or modify group properties, such as which users belong to a group, or permissions for the group.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Groups*.
3. In the right pane, select a group, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. View or modify the properties.

Pages	Properties
General	Users – to change the users in your group, use: ○ Add – select a user and click Apply to add the user to your group. ○ Remove – select a user and click Apply.
Command Permission	Permissions to create database objects – select the permissions to grant the group: ○ `create default` ○ `create procedure` ○ `create rule` ○ `create table` ○ `create view` ○ `create encryption key`
Object Permission	Permissions to access database objects – use the Grant Permission and Revoke Permission wizards to grant or revoke permissions and predicated privileges for specific database operations such as `insert`, `delete`, `update`, `reference`, and `decrypt` for specific database objects. Decrypt permission is visible if `encrypted columns` is enabled in the server. Transfer permission is visible if `incremental transfer` is enabled on the table.

5.9.3 Adding or Removing Users to or from a Group

Add users to a group, view users who belong to a group, or remove users from a group.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Groups*.
3. In the left pane of the Administration Console, expand *ASE Servers* > *Security* > *Groups*.
4. In the right pane, select a group, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Properties*.
6. On the General page, add or remove users:

- To add users, click *Add* and select the users from the dialog box..
- To remove users from a group, select the users and click *Remove*.

5.9.4 Granting Object Permissions to a Group

Grant database object permissions to a group.

Prerequisites

To grant or revoke predicated privileges, set the configuration parameter `enable predicate privileges` to 1.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Groups*.
3. In the right pane, select a group, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Object Permissions*.
   Object permissions that are currently granted to the selected group are listed in the right pane.
6. In the right pane, click the drop-down list and select an object type to filter the objects.
7. Click *Grant* and select the objects from the dialog box.
   You see the Grant Permission Wizard.
8. On the Welcome page, select an object type on which to grant permissions.
9. On the Objects and Options page, select the table and columns on which to grant permissions.
10. On the Permissions page, select the type of permissions to grant.
11. (Optional) Click *With predicated privileges*.
    a. Enter the `where` search conditions.
       The search conditions act as a row filter, with the `where` clause specified on `select`, `update`, or `delete`. Search conditions can use all syntax allowed in a generic `where` clause.
    b. (Optional) Enter a correlation name.
       The correlation name is an alias for referencing columns in the selected table within the `where` clause.
    c. (Optional) Enter a name for the predicate.
12. (Optional) Click *Summary* to see the SQL statements for your command.

5.9.5 Revoking Object Permissions from a Group

Revoke database object permissions from a group.

Prerequisites

To grant or revoke predicated privileges, set the configuration parameter `enable predicate privileges` to 1.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Groups*.
3. In the right pane, select a group, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Object Permissions*.
   Object permissions that are currently granted to the selected group are listed in the right pane.
6. In the right pane, click the drop-down list and select an object type to filter the objects.
7. Select the object from which to revoke permission, then click *Revoke*.
   In the Revoke Permissions window, each type of permission is listed. Currently granted permissions are indicated by a check mark. Permissions with predicated privileges are indicated by the letter "p" under a check mark.
8. Choose one of:
   - Click *Revoke all permission* to revoke all permissions shown in the Revoke Permissions window.
   - Click individual cells to revoke the currently granted permissions. The cell changes to show an "x," indicating that the permission type is no longer granted.
   - Click *Revoke all permission with predicate* to revoke all permissions with a predicate shown in the Revoke Permissions window.

   Click *Predicate* to see details of the predicate search condition.
9. (Optional) Click *Preview* to see the SQL statements for your command.

5.9.6 Granting Privileges to a Group

Grant system privileges to groups.

Prerequisites

- To grant or revoke privileges, set the configuration parameter `enable granular permissions` to 1.
- To grant or revoke predicated privileges, set the configuration parameter `enable predicate privileges` to 1.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Groups*.
3. In the right pane, select a group, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Privileges*.
6. In the right pane, click *Grant*.
7. Select the privilege from the Privileges dialog that you want to grant to the group and click *OK*.
   Only those privileges that are specific to groups and privileges that you are allowed to grant appear in the Privileges dialog.
8. (Optional) Click *Preview* to see the SQL statements for your command.

Related Information

Revoking Privileges from a Group [page 121]
Enabling Granular Permissions [page 72]

5.9.7 Revoking Privileges from a Group

Revoke system privileges from groups.

Prerequisites

- To grant or revoke privileges, set the configuration parameter `enable granular permissions` to 1.
- To grant or revoke predicated privileges, set the configuration parameter `enable predicate privileges` to 1.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Groups*.
3. In the right pane, select a group, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Privileges*.
6. Select the privilege that you want to revoke from the group and click *Revoke*.

Related Information

Granting Privileges to a Group [page 120]
Enabling Granular Permissions [page 72]

5.9.8 Setting Command Permissions for a Group

Grant or revoke command permissions to or from a group.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Groups*.

3. In the right pane, select a group, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Command Permissions*.
   Commands that are currently granted to the selected group are listed in the right pane.
6. Grant or revoke commands:
   - To grant command permissions for the selected roles, click *Grant* and select one or more commands.
   - To revoke command permissions for the selected roles, select a command and click *Revoke*.

5.9.9 Deleting a Group

Delete a group to remove it from the database.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Groups*.
3. In the right pane, select one or more items, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.

   Use *Shift-click* or *Control-click* to select multiple items.
4. Select *Delete*.
5. Click *Yes* to confirm the deletion.

5.9.10 Generating DDL for a Group

Generate a DDL script for a login.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Groups*.
3. In the right pane, select a group and do one of:
   - Click the arrow to the right of the name.

- Click the *Actions* button.

4. Select *Generate DDL*.
5. (Optional) Click *Save* to export and save the DDL statement.

   You can save the DDL in an external file on your local file system.

5.10 Manage Users

Add a new user to a SAP ASE database and manage database object access and ownership of database objects.

5.10.1 Creating a User

Create a new user on a database.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Users*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.
5. On the Introduction page, select a database on which to create a user.
6. On the User Name page, select the login to which the user will be assigned and enter a name for the new user.
7. (Optional) On the Group Name page, select a group to which the user will be assigned.
8. (Optional) Click *Summary* to verify your selected options.

Related Information

Creating a Group [page 116]
Transferring Ownership of a Database Object [page 124]

5.10.2 Transferring Ownership of a Database Object

Change ownership of database objects.

Prerequisites

Ownership of dbo-owned objects can be transferred only by users with an sso_role. Users cannot also have sa_role and users cannot be a database owner (dbo)

Context

You can also search for referencing objects in the current, or other databases, that will be affected if the selected object is transferred to a different owner. If referencing objects exist, you can generate the SQL scripts to create these objects with the new owner. You can also compare the scripts to create the object with the old and new owners.

To transfer object ownership with referencing objects, first save the script that creates referencing objects with the new owner, then click through the wizard to transfer the database object ownership. When the transfer is complete, run the script to modify ownership of the referencing objects.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Users*.
3. In the right pane, select a user, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Transfer Database Object*.
5. On the Introduction page, select the type of objects to be transferred to a new owner.
6. On the Select Object page, select the specific objects. Click *Preserve Permissions* to retain the old permissions for those objects.
7. Select one of these new owner options:
   - *Select the new user name* – when you choose this option, you must also specify additional information:
     - In the Database to Search screen, select the databases to be searched for objects that reference the object for which you are changing the owner.
     - In the Object References screen, you can:
       - Save the script that is automatically generated for referencing objects – you must run the saved script, outside of SAP ASE Cockpit, to create new instances of the referenced objects with the updated owners.

> **Note**
>
> Run the script only after you have changed the owner, that is, after the Transfer Database Object wizard has completed.

  - Compare the two scripts (one that creates the object with the old owner and the other with the new owner) – click the Name field of the row containing the object, then click the icon that appears. Upon comparing the two scripts, select *Accept* to retain the object in the list of referencing objects included in the script, or *Reject* to remove the corresponding object entries from the script.
- *Select the new login name* – change the loginame value (in system catalog `sysobjects`) of the selected objects only.
  To be available for selection, a login must meet these conditions:
  - If the current owner is guest, the login name must be valid, cannot have sa_role, and the login suid cannot be in the `sysusers` or `sysaliases` tables.
  - If the current owner is dbo, the login name must be valid, the login suid must be either in the `sysaliases` table that is aliased to the dbo, or have sa_role.
  - If the current owner is anyone else other than guest or dbo, the login name must be valid and the login suid must be in the `sysaliases` table that is aliased to the current owner.

8. (Optional) Click *Summary* to verify your selected options.

Related Information

Creating a Group [page 116]
Creating a User [page 123]

5.10.3 Users Properties

Display or modify user properties, such as permissions to access database objects and commands, and login aliases.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Users*.
3. In the right pane, select a user, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. View or modify the properties.

Pages	Properties
General	Select from the list of groups to change the group for the user.
Objects Owned	Select the database objects that your user owns in this database.
Command Permissions	Permissions to create database objects.
Object Permissions	Permissions to access database objects – use the Grant Permission and Revoke Permission wizards to grant or revoke permissions and predicated privileges for specific database operations such as `insert`, `delete`, `update`, `reference`, and `decrypt` for specific database objects such as tables, procedures, and so on.
Login Aliases	Logins – to change login aliases: ○ Add – select a login and click Apply to add the login to your user alias. ○ Remove – select the login from the list, and click Remove, then Apply.

5.10.4 Granting Object Permissions to a User

Grant database object permissions to a user.

Prerequisites

To grant or revoke predicated privileges, set the configuration parameter `enable predicate privileges` to 1.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Users*.
3. In the right pane, select a user, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Object Permissions*.
6. In the right pane, click the drop-down list and select an object type to filter the objects.
7. Click *Grant* and select the objects from the dialog box.
   You see the Grant Permission Wizard.
8. On the Welcome page, select an object type on which to grant permissions.
9. On the Objects and Options page, select the table and columns on which to grant permissions.
10. On the Permissions page, select the type of permissions to grant.
11. (Optional) Click *With predicated privileges*.

a. Enter the `where` search conditions.
   The search conditions act as a row filter, with the `where` clause specified on `select`, `update`, or `delete`. Search conditions can use all syntax allowed in a generic `where` clause.
b. (Optional) Enter a correlation name.
   The correlation name is an alias for referencing columns in the selected table within the `where` clause.
c. (Optional) Enter a name for the predicate.

12. (Optional) Click *Summary* to see the SQL statements for your command.

5.10.5 Revoking Object Permissions from a User

Revoke database object permissions from a user.

Prerequisites

To grant or revoke predicated privileges, set the configuration parameter `enable predicate privileges` to 1.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Users*.
3. In the right pane, select a user, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Object Permissions*.
   Object permissions that are currently granted to the selected group are listed in the right pane.
6. In the right pane, click the drop-down list and select an object type to filter the objects.
7. Select the object from which to revoke permission, then click *Revoke*.
   In the Revoke Permissions window, each type of permission is listed. Currently granted permissions are indicated by a check mark. Permissions with predicated privileges are indicated by the letter "p" under a check mark.
8. Choose one of:
   - Click *Revoke all permission* to revoke all permissions shown in the Revoke Permissions window.
   - Click individual cells to revoke the currently granted permissions. The cell changes to show an "x," indicating that the permission type is no longer granted.
   - Click *Revoke all permission with predicate* to revoke all permissions with a predicate shown in the Revoke Permissions window.

   Click *Predicate* to see details of the predicate search condition.

9. (Optional) Click *Preview* to see the SQL statements for your command.

5.10.6 Setting Command Permissions for a User

Grant or revoke command permissions to or from a user.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Users*.
3. In the right pane, select a user, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Commands*.
   Commands that are currently granted to the selected user are listed in the right pane.
6. Grant or revoke commands:
   - To grant command permissions for the selected roles, click *Grant* and select one or more commands.
   - To revoke command permissions for the selected roles, select a command and click *Revoke*.

5.10.7 Revoking Privileges from a User

Revoke system privileges from users.

Prerequisites

Set the configuration parameter `enable predicate privileges` to 1.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Users*.
3. In the right pane, select a user, and do one of:
   - Click the arrow to the right of the name.

- Click the *Actions* button.

4. Select *Properties*.
5. In the left pane, click *Privileges*.
6. Select one or more privileges and click *Revoke*.

Related Information

Granting Privileges to a User [page 129]
Enabling Granular Permissions [page 72]

5.10.8 Granting Privileges to a User

Grant system privileges to users at the server or database level.

Prerequisites

Set the configuration parameter `enable predicate privileges` to 1.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Users*.
3. In the right pane, select a user, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Privileges*.
6. In the right pane, click *Grant*.
   Only those privileges that are specific to the selected users and privileges that you are allowed to grant appear in the Grant Privileges menu.
7. Select one or more privileges from the Grant Privileges menu and click *OK*.

Related Information

Revoking Privileges from a User [page 128]

Enabling Granular Permissions [page 72]

5.10.9 Deleting a User

Delete a user to remove it from the database.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Users*.
3. In the right pane, select one or more items, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.

   Use *Shift-click* or *Control-click* to select multiple items.
4. Select *Delete*.
5. Click *Yes* to confirm the deletion.

5.10.10 Generating DDL for a User

Generate a DDL script for a user.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Users*.
3. In the right pane, select a user and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Generate DDL*.
5. (Optional) Click *Save* to export and save the DDL statement.

   You can save the DDL in an external file on your local file system.

5.11 Manage Roles

Manage permissions to multiple login accounts by creating roles and granting roles to logins.

Ensure that you have the appropriate privileges. With:

- Granular permissions enabled – you must have the `manage roles` privilege.
- Granular permissions disabled – you must be a user with sso_role.

Create roles as a convenient way to grant and revoke permissions to several logins. A role can be granted to a login account or another role.

When creating or modifying roles, these options are available:

- Choose permission access for object types or command type
- Expire passwords
- Set mutually exclusive roles
- Set role hierarchy
- Assign logins to roles
- Set passwords

Permissions

Permissions granted to roles override permissions granted to users or groups. For example, if John is granted the role of system security officer and individual permissions of sales accounts, he can still access the sales accounts if his individual permissions are revoked because his role permissions override his user permissions.

Hierarchical Roles

A system security officer can define role hierarchies such that a role can be assigned to another role. For example, the chief financial officer role might contain both the financial analyst and the salary administrator roles.

Mutually Exclusive Roles

Roles can be defined to be mutually exclusive. The supported exclusive types are:

- Membership – one user cannot be granted two different roles. For example, the system administrator and system security officer roles can be defined as mutually exclusive for membership; that is, one user cannot be granted both roles.
- Activation – one user cannot activate, or enable, two different roles. For example, a user might be granted both the senior auditor and the equipment buyer roles, but is not permitted to have both roles enabled simultaneously.

5.11.1 Creating a Role

Create a user-defined role.

Prerequisites

Ensure that you have the appropriate privileges. With:

- Granular permissions enabled – you must have the `manage roles` privilege.
- Granular permissions disabled – you must be a user with sso_role.

Context

Grant login to one or more roles, or grant roles to other roles.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Roles*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.
5. On the Role Name page, specify the name of the role to create.
6. (Optional) Click *Set password* and enter a password for the role.
7. (Optional) Click *Summary* to verify your selected options.

5.11.2 Role Properties

Display or modify role properties, such as passwords, logins assigned to roles, permissions, hierarchically mapped roles, and mutually exclusive roles.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.

2. In the left pane, expand *ASE Servers* > *Security* > *Roles*.
3. In the right pane, select a role, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. View or modify the properties.

Pages	Properties
General	Password – the system security officer can set or expire a password for a role.
Logins	Add or remove logins assigned to a role.
Login Profile	Add or remove login profiles assigned to a role
Hierarchy	Create roles that are hierarchically mapped or aliased to another role.
Exclusivity	Control privileges of roles by defining the roles as mutually exclusive.
Command Permissions	Grant or revoke command permissions for the selected role.
Object Permissions	Grant or revoke object permissions and predicated privileges for a selected role.
Privileges	Grant or revoke system privileges to roles at the server or database level.

5.11.3 Activating a Role

The system security officer or user assigned the role can determine whether to activate roles granted by default at login.

Context

Roles may or may not be active at login, depending on the default set for a role.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the right pane, select a server, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.

3. Select *Role Activation*.
4. To activate or deactivate a role, select or unselect its *Activate role* check box.

   Activate roles only when you need them, and turn them off when you no longer need them. For example, when the sa_role is active, you assume the identity of database owner within any database that you use.
5. Supply a password if the role requires a password to be activated.

5.11.4 Expiring Role Passwords

Expire the password for a role.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Roles*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Expire Role Passwords*.
5. On the Expiration page, specify:

Option	Description
Expire role passwords	When selected, the owner of the role must change the password.
Expire passwords	Specify specific role or identify pattern matching.
Select the role whose password is to be expired	Expire passwords for specific roles.
Specify pattern matching characters for roles	Expire passwords for roles matching specified characters.
Expire stale passwords	Expire passwords that have not been changed by a specified date.

5.11.5 Restoring System Roles

Return system role privilege to the default system-defined values.

Prerequisites

With granular permissions enabled, you must have `manage security permissions` system privilege to restore system roles and `manage server permissions` to restore sa_role privileges.

Context

These system roles can be restored: sa_role, sso_role, oper_role, replication_role, keycustodian_role.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Roles*.
3. In the right pane, select a role, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Restore System Role*.
5. Choose to restore the privileges for the selected role on the current database or for all online databases and click *OK*.

Related Information

Enabling Granular Permissions [page 72]

5.11.6 Creating Role Hierarchy

To manage permissions or privileges for one or more logins, you can grant roles hierarchically.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Roles*.
3. In the right pane, select a role, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Hierarchy*.
6. In the right pane, click *Assign*.
7. From the Role dialog, select one or more roles.
   You see a folder, which you can expand to see the roles assigned to the top-level role. The top-level role is automatically granted all permission and privileges of the lower-level roles.

5.11.6.1 Managing Mutually Exclusive Roles

Use mutually exclusive roles to control or restrict permissions or privileges.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Roles*.
3. In the right pane, select a role, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Exclusivity*.
   You see a list of roles that are mutually exclusive to the selected role.

Option	Description
Add	Add mutually exclusive roles. Specify the type: ○ Membership indicates that one user cannot be granted two different role. ○ Activation indicates that one user cannot activate, or enable, two different role.
Remove	Remove mutually exclusive roles
Properties	Displays the properties of the selected role.

Related Information

Setting Command Permissions for a Role [page 143]
Granting Object Permissions to a Role [page 139]
Revoking Object Permission from a Role [page 140]

5.11.7 Assigning Login Profiles to a Role

Assign a login profile to a role.

Prerequisites

To grant or revoke predicated privileges, set the configuration parameter `enable predicate privileges` to 1.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Roles*.
3. In the right pane, select a role, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Login Profile*.
6. In the right pane, click *Add*.
7. Select one or more login profiles.

8. (Optional) Click *With activation predicate* and enter an expression for the activation predicate.
9. (Optional) Select *Active By Default* to activate the login profile automatically on login.

5.11.8 Removing Login Profiles Assigned to a Role

Remove login profiles currently assigned to a role.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Roles*.
3. In the right pane, select a role, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Login Profile*.
6. Select one or more login profiles.
7. Click *Remove*.

5.11.9 Assigning Logins to a Role

Assign one or more logins to a role.

Prerequisites

To grant or revoke predicated privileges, set the configuration parameter `enable predicate privileges` to 1.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Roles*.
3. In the right pane, select a role, and do one of:
   - Click the arrow to the right of the name.

- Click the *Actions* button.

4. Select *Properties*.
5. In the left pane, click *Logins*.
6. In the right pane, click *Add*.
7. Select one or more logins from the dialog box.
8. (Optional) Click *With activation predicate* and enter an expression for the activation predicate.
9. (Optional) Select *Active By Default* to activate the login account automatically on login.

5.11.10 Removing Logins Assigned to a Role

Remove login accounts assigned to roles.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Roles*.
3. In the right pane, select a role, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Logins*.
6. Select one or more logins.
7. Click *Remove*.

5.11.11 Granting Object Permissions to a Role

Use object access permissions to regulate the use of specific commands that access specific database objects.

Prerequisites

To grant or revoke predicated privileges, set the configuration parameter `enable predicate privileges` to 1.

To grant or revoke privileges, set the configuration parameter `enable granular permissions` to 1.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Roles*.
3. In the right pane, select a role, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Object Permissions*.
6. In the right pane, select a database and click the drop-down list to select an object type to filter the objects.
7. Click *Grant* and select the objects from the dialog box.
   You see the Grant Permission Wizard.
8. On the Welcome page, select an object type on which to grant permissions.
9. On the Objects and Options page, select the table and columns on which to grant permissions.
10. On the Permissions page, select the type of permissions to grant.
11. (Optional) Click *With predicated privileges*.
    a. Enter the `where` search conditions.
       The search conditions act as a row filter, with the `where` clause specified on `select`, `update`, or `delete`. Search conditions can use all syntax allowed in a generic `where` clause.
    b. (Optional) Enter a correlation name.
       The correlation name is an alias for referencing columns in the selected table within the `where` clause.
    c. (Optional) Enter a name for the predicate.
12. (Optional) Click *Summary* to see the SQL statements for your command.

Related Information

Setting Command Permissions for a Role [page 143]
Managing Mutually Exclusive Roles [page 136]
Revoking Object Permission from a Role [page 140]

5.11.12 Revoking Object Permission from a Role

Revoke database object permissions from a role.

Prerequisites

To grant or revoke predicated privileges, set the configuration parameter `enable predicate privileges` to 1.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Roles*.
3. In the right pane, select a role, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Object Permissions*.
   Object permissions that are currently granted to the selected group are listed in the right pane.
6. In the right pane, select a database and click the drop-down list to select an object type to filter the objects.
7. Select the object from which to revoke permission, then click *Revoke*.
   In the Revoke Permissions window, each type of permission is listed. Currently granted permissions are indicated by a check mark. Permissions with predicated privileges are indicated by the letter "p" under a check mark.
8. Choose one of:
   - Click *Revoke all permission* to revoke all permissions shown in the Revoke Permissions window.
   - Click individual cells to revoke the currently granted permissions. The cell changes to show an "x," indicating that the permission type is no longer granted.
   - Click *Revoke all permission with predicate* to revoke all permissions with a predicate shown in the Revoke Permissions window.

   Click *Predicate* to see details of the predicate search condition.
9. (Optional) Click *Preview* to see the SQL statements for your command.

Related Information

Setting Command Permissions for a Role [page 143]
Managing Mutually Exclusive Roles [page 136]
Granting Object Permissions to a Role [page 139]

5.11.13 Granting Privileges to a Role

Grant system privileges to roles.

Prerequisites

- To grant or revoke privileges, set the configuration parameter `enable granular permissions` to 1.

- To grant or revoke predicated privileges, set the configuration parameter `enable predicate privileges` to 1.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Roles*.
3. In the right pane, select a role, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Privileges*.
6. In the right pane, select a database and click *Grant*.
7. Select the privileges from the dialog box that you want to grant to the group and click *OK*.
8. (Optional) Click *Preview* to see the SQL statements for your command.

Related Information

Revoking Privileges from a Role [page 142]
Enabling Granular Permissions [page 72]

5.11.14 Revoking Privileges from a Role

Revoke system privileges from roles.

Prerequisites

- To grant or revoke privileges, set the configuration parameter `enable granular permissions` to 1.
- To grant or revoke predicated privileges, set the configuration parameter `enable predicate privileges` to 1.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.

2. In the left pane, expand *ASE Servers* > *Security* > *Roles*.
3. In the right pane, select a role, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Privileges*.
6. In the right pane, select a database, then the privileges that you want to revoke from the group and click *Revoke*.

Related Information

Granting Privileges to a Role [page 141]
Enabling Granular Permissions [page 72]

5.11.15 Setting Command Permissions for a Role

Manage login account privileges by granting command permissions to a selected role.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Roles*.
3. In the right pane, select a role, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Command Permissions*.
6. Select a database on which the selected roles will have permission to execute commands.
   - To grant command permissions for the selected roles, click *Grant* and select one or more commands.
   - To revoke command permissions for the selected roles, select a command and click *Revoke*.

Related Information

Managing Mutually Exclusive Roles [page 136]
Granting Object Permissions to a Role [page 139]
Revoking Object Permission from a Role [page 140]

5.11.16 Generating DDL for a Role

Generate a DDL script for a role.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Roles*.
3. In the right pane, select a role and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Generate DDL*.
5. (Optional) Click *Save* to export and save the DDL statement.
   You can save the DDL in an external file on your local file system.

5.11.17 Deleting a User-Defined Role

Delete a role to remove it from the database.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Roles*.
3. In the right pane, select one or more items, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.

   Use *Shift-click* or *Control-click* to select multiple items.
4. Select *Delete*.
5. Click *Yes* to confirm the deletion.

6 Alerts in SAP ASE

Monitor and manage alerts in a SAP ASE environment.

Alerts are categorized into three key performance areas (KPA): Availability, Performance, and Capacity. Each KPA is composed of several key performance indicators (KPI). Data is collected at defined intervals and alerts triggered when the KPI exceeds the predefined thresholds or state. By default, all alerts are enabled. You can customize the threshold of each alert and disable alerts not required. You cannot add additional alerts to a KPA.

Data for KPIs is collected using these collection jobs:

- Availability Statistics (APCA default collection)
- Performance Statistics (APCA default collection)
- Capacity Statistics (APCA default collection)

6.1 Monitor and Resolve Alerts

The Alert Monitor page displays a dynamically updated list of active alerts, which can be resolved by entering a resolution description.

Active alerts for all priorities display by default, sorted by priority (high to low).

For the current session, you can:

- Display for all alerts or only those resolved
- Filter by priority
- Sort by various parameters in ascending or descending order. You cannot subsort the list.

Each alert remains on the Alert Monitor page until it has been resolved. The alert record indicates its original timestamp and the age field is updated to reflect the amount of time elapsed since the alert was initially triggered.

Active alerts appear in color, with a status of Active. When the condition that triggered the alert is resolved, and the KPI returns to the expected range, the system automatically changes the status of the alert to Resolved and creates a resolution record. Resolved alerts appear in grey. SAP ASE Cockpit stores details on the last 10 resolved alerts for each KPI. You can also manually change the status of an alert, but if the KPI has not returned to the expected range, the alert reappears.

To manually change an alert status, click *Resolve*, enter a mandatory description, and click *Finish*.

> **i Note**
>
> The *Finish* button is unavailable until a description is entered.

Once set to resolved, an alert status cannot be changed. The resolved alert disappears if Active Alerts Only is selected; otherwise, the alert turns grey, but remains visible.

Select *Resolved Alerts Only* or *All Alerts* to view resolved alerts.

6.2 Setting Alert Notification

A nonadministrative SAP ASE Cockpit user can set an email address for notification.

Prerequisites

- The email server and port must be configured to enable email notification. See *Configuring the E-mail Server*.
- At least one notification email address must be defined by an administrative user before a nonadministrative user can enter an email address.
- A technical user account exists.

Context

Once set, notification is sent when any enabled alert is triggered. You cannot select specific alerts for notification (for example, notification sent for a Resource State alert, but not a Total CPU Usage alert). You can also elect to be notified if an alert is not resolved before its escalation period has expired.

If a nonadministrative user modifies the email address, the modified address is appended to the notification list, but the original email address is not removed. It must be manually removed by an administrative user. If only a notification check mark is changed, administrative user action is not required; the email address is automatically added to or removed from the notification list. It is the responsibility of the nonadministrative user to notify the administrative user of the change.

If an administrative user modifies a nonadministrative user email address, the notification check marks become deselected on the Notify page of the nonadministrative user, and the email address does not reflect the address change. However, the nonadministrative user does receive email notification using the modified address.

SAP ASE Cockpit validates the format of the email address but not the address itself. The Apply button is unavailable when the format of an address is invalid.

Each managed system must have its own notification email addresses defined; notification addresses are specific to the managed system, not SAP ASE Cockpit.

> **i** Note
>
> An administrative SAP ASE Cockpit user can set additional notification parameters. See *Managing Alert Notification Settings*.

Procedure

1. In SAP ASE Cockpit, click the *ALERT* workset.
2. Click *NOTIFY*.

   > **i** Note
   >
   > When you click the ALERT workset for the first time in the current session, there may be a delay before the NOTIFY option appears.

3. Type an email address for alerts.
4. Specify the type of notification to receive:

Option	Description
Alert notifications	Select to receive alert notifications.
Escalation notifications	Select to receive escalation notifications.

5. Click *Apply*, and wait for notification changes to update.

6.3 Managing Alert Notification Settings

An administrative SAP ASE Cockpit user can set his or her email address for notification and define additional notification attributes for alerts.

Prerequisites

- The email server and port must be configured to enable email notification. See *Configuring the E-mail Server*.
- A technical user account exists.

Context

At least one notification email address must be defined by an administrative user before a nonadministrative user can enter an email address.

If a nonadministrative user modifies the email address, the modified address is appended to the notification list, but the original email address is not removed. It must be manually removed by an administrative user. If only a notification check mark is changed, administrative user action is not required; the email address is automatically added to or removed from the notification list.

If an administrative user modifies a nonadministrative user email address, the notification check marks become deselected on the Notify page of the nonadministrative user, and the email address does not reflect

the address change. However, the nonadministrative user does receive email notification using the modified address.

SAP ASE Cockpit validates the format of the email address but not the address itself. The Apply button is unavailable when the format of an address is invalid.

Procedure

1. In SAP ASE Cockpit, click the *ALERT* workset.
2. Click *NOTIFY*.

   > **i Note**
   >
   > When you click the ALERT workset for the first time in the current session, there may be a delay before the NOTIFY option appears.

3. Adjust the alert notification options, as needed:

Setting	Description
Notification: Enabled	Enable email notification when an alert is triggered.
Email	Email addresses to receive notification when an alert is triggered. Separate multiple addresses by semicolons.
Escalation period	The elapsed time period, in minutes, in which an alert must be resolved before an escalation email notification is sent.
Escalation email	Email address to receive notification in the event an alert remains unresolved once the escalation period has elapsed. Separate multiple addresses by semicolons.
Script Execution: Enabled	Associate a script file to the triggering of an alert.
Script path	The path to a script to execute in the event an alert is raised, but controlled by suppression. For example, if suppression is 10 minutes and the alert is on a 1 minute interval, the script runs once every 10 minutes.
Storm Suppression	Suppress email notifications and script execution for a period of time specified, in minutes, if an alert continues to fire.

4. Click *Apply*, and wait for notification changes to update.

6.4 Configuring Alerts

You can enable and disable alerts as well as configure the trigger thresholds for each alert.

Prerequisites

Membership in the sa_role and mon_role.

Context

Modifications to alert thresholds take effect the next time the monitoring interval is reached.

> **i** Note
>
> If a message appears indicating the technical user account does not exist, and it was created in the current session, log out and back in to the SAP ASE Cockpit console using the current user (not the technical user account).

Procedure

1. In SAP ASE Cockpit, click the *ALERT* workset.
2. Click *CONFIGURE*.

   > **i** Note
   >
   > When you click the ALERT workset for the first time in the current session, there may be a delay before the CONFIGURE option appears.
3. To enable or disable an alert, select or unselect the box in the Enabled column.
4. To modify the thresholds of an alert, click *Edit* and adjust the levels. Click *Finish* to save the changes.

6.5 SAP ASE Alert and Data Collections Summary

Lists and describes alerts you can configure for SAP ASE data collection.

Alerts are based on the same key performance indicators (KPIs) that are collected for APCA monitor displays and the Statistics Chart.

Table 4: Availability (KPI: ASE Availability Statistics)

Name	Unit	Description	Alert
Available Connections	Count	Available connections on the server.	Yes
Number of Blocked Processes	Count	Number of currently blocked processes that have been blocked for more than 5 seconds. The heat chart uses this metric to display server status.	Yes
Number of Database Dump Failures	Count	Number of failed database dumps.	Yes
Number of Suspended Processes	Count	Number of processes that are currently suspended. The heat chart uses this metric to display server status.	Yes
Server Availability Status	Status	Status of the SAP ASE server. Values of most interest are stopped and running.	Yes
Server Device IO Rate	I/O per second	Total number of I/O operations performed by all devices on the server during the current collection cycle.	Yes
Server Percent CPU Utilization	Percentage	Average CPU utilization percentage across all active engines on the server.	Yes

Table 5: HADR Availability (KPI: HADR Availability Statistics - applies only to HADR enabled servers)

Name	Unit	Description	Alert
State of primary Replication Server	Status	Status of the primary Replication server.	Yes
State of Fault Manager	Status	Status of the fault manager: running or stopped.	Yes
State of RMA	Status	Status of the replication management agent (for primary and remote site respectively): running or stopped.	Yes
State of remote Replication Server	Status	Status of the remote Replication server.	Yes
Failover Initiated	Status	Status of an initiated failover.	Yes
Synchronous to Asynchronus Replication	Status	Status of the change from synchronous to asynchronous replication	Yes
Suspended Replication	Status	Status of suspended replication	Yes
Down Replication	Status	Status of replication	Yes
Fault Manager Hibernate	Status	Status of the hibernating Fault Manager	Yes
No Contact for Primary Host Agent	Status	Primary SAP Host Agent cannot be contacted	Yes
No Contact for Standby Host Agent	Status	Standby SAP Host Agent cannot be contacted	Yes

Table 6: Performance (KPI: ASE Performance Statistics)

Name	Unit	Description	Alert
Average Blocked Process Wait Time	MS	Average time, in milliseconds, that the current blocked processes have waited.	Yes

Name	Unit	Description	Alert
Cache Hit Ratio	Percentage	Hit ratio in the data cache during the current collection cycle.	Yes
Device APF Reads	Per second	Rate of asynchronous prefetch read operations per second on the selected device.	No
Device IO Rate	I/O per second	Rate of I/O operations per second on this device.	Yes
Device IO Response Time	MS	Response time, in milliseconds, for I/O operations performed on this device.	Yes
Engine CPU Utilization	Percentage	CPU utilization for this engine as a percentage.	Yes
Long Running Transaction Execution Time	Seconds	Execution time of longest running transaction	Yes
Number of Address Locks	Count	Number of address-level locks server-wide.	Yes
Number of Cache Misses	Count	Number of times that a needed page was not found in a cache and had to be read from disk.	No
Number of Cache Searches	Count	Number of cache searches, including hits and misses for all caches combined.	No
Number of Critical Flags Last Collection	Count	Number of critical flags received during the collection cycle.	Yes
Number of Deadlocks	Count	Number of deadlocks on the server since the most recent execution of the collection.	Yes
Number of Error Flags Last Collection	Count	Number of error flags received during the collection cycle.	Yes
Number of Information Flags Last Collection	Count	Number of information flags received during the collection cycle.	Yes
Number of Locks	Count	Total number of active locks of all types on the server.	Yes
Number of Packets Received in Network IO	Count	Number of packets received during the current collection cycle.	Yes
Number of Packets Sent in Network IO	Count	Number of packets sent during the current collection cycle.	Yes
Number of Page Locks	Count	Number of page-level locks server-wide.	Yes
Number of Row Locks	Count	Number of row-level locks server-wide.	Yes
Number of Server Transactions	Count	Total number of transactions during the current collection cycle.	Yes
Number of Table Locks	Count	Number of table-level locks server-wide.	Yes
Number of Warning Flags Last Collection	Count	Number of warning flags received during the collection cycle.	Yes
Procedure Cache Hit Ratio	Percentage	Hit ratio in the procedure cache.	Yes

Name	Unit	Description	Alert
Statement Cache Hit Ratio	Percentage	Hit ratio in the statement cache during the current collection cycle.	Yes
Segment Space Usage	MB	Change in megabytes in the amount of space used by this segment since the last refresh.	No
sp_who Response Time	MS	Time, in milliseconds, the `sp_who` stored procedure takes to return a response. `sp_who` is called each time collection_ase_histmon is executed to collect performance statistics.	Yes
Thread System CPU Utilization	Percentage	CPU utilization percentage in handling system level operations for each thread.	Yes
Thread Total CPU Utilization	Percentage	Total CPU utilization obtained by adding Thread User CPU Utilization and Thread System CPU Utilization.	Yes
Thread User CPU Utilization	Percentage	CPU utilization percentage in handling user committed queries for each thread.	Yes

Table 7: HADR Performance (KPI: HADR Statistics - applies only to HADR enabled servers)

Name	Unit	Description	Alert
Bytes written by RSI thread	KB per minute	Number of bytes written by RSI thread per minute.	No
Bytes Received by EXEC thread	KB per minute	Number of bytes received by EXEC thread per minute.	No
DIST to DSI Latency	MS	Latency time from DIST thread to DSI thread.	No
DSI Commands	Minute	Number of commands per minute in DSI thread.	No
DSI to RDB Latency	MS	Latency time from DSI thread to RDB thread.	No
DSI Transactions	Minute	Number of transaction per minutes in DSI thread.	No
EXEC to DIST Latency	MS	Latency time from EXEC thread to DIST thread.	No
Free Transaction Log Space	Percentage	Percentage of free transaction log space.	No
Log Records processed by Rep Agent	Minute	Number of log records processed by Rep Agent per minute.	No
Log Records scanned by Rep Agent	Minute	Number of log records scanned by Rep Agent per minute.	No
PDB to EXEC Latency	MS	Latency time from PDB thread to EXEC thread.	No
Primary ASE Transaction Log Backlog	MB	Primary backlog of the transaction log.	Yes

Name	Unit	Description	Alert
Percentage of Free Transaction Log Space	Percentage	Percentage of free transaction log space.	Yes
Overall Ticket Latency	MS	The latency times at various points in the path between the primary database and the replicate database.	Yes
Percentage of Device Usage in Remote RS	Percentage	Percentage of device usage in the remote Replication server.	Yes
Percentage of Device Usage in Primary RS	Percentage	Percentage of device usage in the primary Replication server.	Yes
State of a replication path	Status	The state of the replication path between a primary and a replicate database.	Yes
Primary Replication Queue Backlog	MB	Primary Replication Server queue backlog statistics.	Yes
Remote Replication Queue Backlog	MB	Remote Replication Server queue backlog statistics.	Yes

Table 8: Capacity (KPI: ASE Capacity Statistics)

Name	Unit	Description	Alert
Configured Resource Additional Network Memory	Percentage	Maximum size of additional memory that can be used for network packets that are larger than the default packet size.	Yes
Configured Resource Audit Queue Size	Percentage	The audit queue holds audit records generated by user processes until the records can be processed and written to the audit trail.	Yes
Configured Resource Compression Info Pool Size	Percentage	Size of the memory pool used for compression.	Yes
Configured Resource Disk IO Structures	Percentage	Initial number of disk I/O control blocks SAP ASE allocates at start-up.	Yes
Configured Resource Memory Per Worker Process	Percentage	Amount of memory used by worker processes.	Yes
Configured Resource Number of Aux Scan Descriptors	Percentage	Number of auxiliary scan descriptors available in a pool shared by all users on a server.	Yes
Configured Resource Number of Locks	Percentage	Total number of available locks for all users on SAP ASE.	Yes
Configured Resource Number of Mailboxes	Percentage	Number of mailbox structures allocated by SAP ASE.	Yes
Configured Resource Number of Messages	Percentage	Number of message structures allocated by SAP ASE	Yes

Name	Unit	Description	Alert
Configured Resource Number of Open Indexes	Percentage	Maximum number of indexes that can be used simultaneously on SAP ASE.	Yes
Configured Resource Number of Open Objects	Percentage	Maximum number of objects that can be open simultaneously on SAP ASE	Yes
Configured Resource Number of Open Partitions	Percentage	Number of partitions that SAP ASE can access at one time.	Yes
Configured Resource Number of Sort Buffers	Percentage	Amount of memory allocated for buffers used to hold pages read from input tables and perform index merges during sorts.	Yes
Configured Resource Number of User Connections	Percentage	Maximum number of user connections that can simultaneously be connected to SAP ASE.	Yes
Configured Resource Number of Worker Processes	Percentage	Maximum number of worker processes that SAP ASE can use at any one time for all simultaneously running parallel queries.	Yes
Configured Resource Permission Cache Entries	Percentage	Number of cache protectors per task.	Yes
Configured Resource Procedure Cache Size	Percentage	Size of the procedure cache. The procedure cache is used while running stored procedures.	Yes
Device Space Free	Percentage	Total amount of free space, in megabytes, on this device.	Yes
Segment Space Free	Percentage	Amount, in megabytes, of free space in the segment; collected separately for each segment.	Yes
Server tempdb Free Space	Percentage	Amount, in megabytes, of free space in the tempdb database.	Yes

> **i Note**
>
> The configured resource alerts are based on the percentage of the configured resource that is in use rather than a fixed quantity of the resource. These alerts can be configured to fire when the percent utilization of any of the configurable resources exceeds a configured threshold that may affect server capacity or performance. For example, you can configure an alert whenever the number of locks in use is 80% or more of the configured number of locks. This alert definition does not need to be changed if you increase or decrease the number of locks configured on the server.

7 Collection Jobs

Statistics collection jobs provide the data that appears on the Statistics Chart on the MONITOR workset. Some collection jobs are also used to manage and monitor alerts on the ALERTS workset.

Data gathered by collection jobs appears on the Statistics Chart page on the MONITOR workset. If you attempt to view data for a collection job that has not been created, `No data was found for statistic` appears.

The Availability Statistics, Performance Statistics, and Capacity Statistics collection jobs are scheduled by default. Additional collection jobs can be created and scheduled as needed.

You can define job schedules as one-time or repeating, and modify the schedule for a job based on a number of attributes such as repeat interval, date and time. Statistics gathering consumes system resources intensively; the more collection jobs you run, the greater the burden on your server. The data is stored in the repository. The job history displays the status of jobs executed each day.

All collections jobs run using the technical user account.

7.1 Adding a New Schedule to a Job

Besides the default collection job, you can create and schedule additional data collection jobs.

Prerequisites

You must have sa_role and mon_role.

Procedure

1. In SAP ASE Cockpit, click the *Cockpit settings* icon ( ).
2. Select *Collection Jobs*.
3. Select the job.
4. Click *Add Schedule*.
5. Specify details for the new schedule:

Field	Description
Name	A name for this schedule

Field	Description
Description	A description of this schedule

6. Choose to start the job *Now* or *Later*. If you choose *Later*, specify the start date and time.
7. Specify the duration of this schedule. The job can run:
   - *Once*
   - *Repetitively* at an interval you specify

Field	Description
Repeat interval	Time period (in seconds, minutes, hours, or days) between job executions

   - *Until* a stop date that you specify, at an interval you specify

Field	Description
Repeat interval	Time period (in seconds, minutes, hours, or days) between job executions
Stop date	Date and time the job should stop running

     > **i Note**
     >
     > Enter dates and times using your local time. SAP ASE converts your times for remote time zones if necessary.

   You cannot change the duration of a schedule (the once/repetitively/until setting) after you create it. To change the schedule duration, delete and recreate the schedule.
8. Click *Finish* to save the schedule.
9. Click *OK*.

7.2 Executing and Stopping a Collection Job

You can run or stop a data collection job.

Procedure

1. In SAP ASE Cockpit, click the *Cockpit Settings* icon ( ).
2. In the left pane, select *Collection Jobs*.
3. Select a job in the Job Name column.
4. On the General tab:
   - To execute a job immediately, click *Execute*.
   - To stop a job, click *Stop*, then click *Yes* to confirm.

→ Tip

If the General tab is grayed out, you have selected a schedule (child) rather than a job (parent) in the Collection Jobs table. Select the parent job to enable the General tab.

7.3 Resuming and Suspending a Collection Job

You can resume or suspend a data collection job.

Prerequisites

Context

⚠ Caution

Data gathered by the Availability Statistics, Performance Statistics, and Capacity Statistics collections is used to trigger alerts. If you suspend one of these collection jobs, no new collection data is gathered on which to trigger new alerts until you resume the collection job.

Procedure

1. In SAP ASE Cockpit, click the *Cockpit Settings* icon ( ).
2. Select *Collection Jobs*.
3. Select a job in the Job Name column.
4. On the General tab:
   - To resume a job, click *Resume*.
   - To suspend a job, click *Suspend*, then click *Yes* to confirm the suspension.

→ Tip

If the General tab is grayed out, you have selected a schedule (child) rather than a job (parent) in the Collection Jobs table. Select the parent job to enable the General tab.

7.4 Viewing Collection Job Schedule Details

Display schedule details from a data collection job.

Context

You can only view schedule details; you cannot modify them.

Procedure

1. In SAP ASE Cockpit, click the *Cockpit Settings* icon ( ).
2. Select *Collection Jobs*.
3. Expand a job in the Job Name column.
   If there is no arrow to the left of the job's name, this job has no schedules.
4. Select a schedule in the Schedule Name column.
   The name, description, start and end dates, and repeat interval appear on the Schedule tab.
5. Click *OK*.

7.5 Modifying the Data Collection Interval for a Job

You can modify the repeat interval for which a data collection is scheduled.

Prerequisites

You must have sa_role and mon_role.

Procedure

1. In SAP ASE Cockpit, click the *Cockpit settings* icon ( ).
2. Select *Collection Jobs*.
3. Expand a scheduled job in the Job Name column.

> **Note**
>
> If there is no arrow to the left of the job name, the job is not scheduled.

4. Select the scheduled job in the Schedule Name column.
5. On the *Schedule* tab, modify the Repeat interval field.
6. Expand a job folder and select a schedule.
7. On the *Schedule* tab, modify the Repeat interval field.
8. Click *OK* to update any changes and close the Cockpit Settings page.

7.6 Viewing the Job Execution History

View a data collection job execution history.

Procedure

1. In SAP ASE Cockpit, click the *Cockpit settings* icon ( ).
2. Select *Collection Jobs*.
3. Select a job in the Job Name column.
4. Click the *History* tab.

8 Monitor SAP ASE

You can monitor the availability and performance of a local server.

Once an application is running, the system administrator should monitor performance and may choose to customize and fine-tune the system by changing server configuration parameters.

8.1 Monitor Access Permission

You must be a member of mon_role to view statistics on the MONITOR tab.

Prerequisites

To gather monitoring data, you must have mon_role.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security*.
3. In the left pane, expand *ASE Servers* > *Security* > *Logins*.
4. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Properties*.
6. In the left pane, click *Roles*.
7. On the Login Properties page, click *Add* and select mon_role from the list of roles.
8. Click *OK* to complete your changes.

8.2 Monitor Control Settings

Set monitoring controls for screen refresh, chart and historical SQL trend periods, and list size for alerts and historical SQL.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *Settings*.
3. Adjust the monitor settings:

Control	Description	Default
Screen Refresh Interval (seconds)	The period between refreshes of screens in the monitor. Refreshing a screen redraws it using the most recent available data.	30 seconds
Chart Trend Period (minutes)	The period of time over which data is used in historical charts on the Overview, Devices, Engines, and Segments screens, and on the Statistics Chart.	30 minutes
Alert List Size	The maximum number of alert notifications that can appear in the Alerts table on the Overview screen. When the Alerts table is full, adding a new alert notification causes the oldest notification to be removed.	100 alerts
Historical SQLs Size	The maximum number of active SQL statements that can appear in the Active SQLS table of the SQL Activity window. When the Active SQLS table is full, adding new SQL statements causes the oldest statement to be deleted.	500 statements
Historical SQLs Trend Period	The period of time during which SQL statements appear in the Active SQLS table of the SQL Activity window.	5 minutes

4. Click *Apply Settings* to complete your changes.

8.3 Displaying the Performance Overview

View the server status, details about memory usage, CPU utilization, recent alerts, and performance status.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.

2. The Overview page displays:

Option	Description
Status	Server status displays the server's name, software product and version, its hardware platform, and an indication of whether the server is running.
Engine CPU Utilization	Displays aggregate CPU utilization for all engines on this server. For information about individual server engines, see the Engines screen. Because all I/O for a process goes through one engine, CPU usage is not always evenly distributed across engines.
Device IO/Sec	Displays device I/O per second, aggregated across all devices on this server. For information about individual devices, see the Devices screen.
Memory	Displays memory usage statistics, including: ○ Amount of physical and logical memory in use ○ Amount of unused memory ○ Size of the procedure, statement, and data caches
Processes	Displays process statistics, including: ○ Max User Processes – number of processes for which this server is configured. ○ High Water Mark – highest number of processes that ran concurrently since this server started. ○ Active – processes currently running. ○ Blocked Processes – processes that are waiting for a resource, or for another process to finish. For more on processes, see the Processes screen.
Details tab	Displays information about this server, including number of days it has been running, number of deadlocks, data cache hit rate, procedure cache stalls, page and device sizes, maximum number of online engines, number of open databases, and the dates and times of the server's most recent restart and of the clearing of these counters.
Configured Resources tab	Displays usage statistics for many of the configured resources for this server: ○ Current – amount of this resource the server is currently using. ○ Run value – configured maximum for this resource. ○ Percentage – percentage of the configured maximum represented by the current use of this resource. ○ High Water Mark – maximum amount of this resource that has been used since this server started. Use the Percentage and High Water Mark columns to identify resources that might be over- or under-configured.
Wait Events	Displays a list of server-wide wait events, which can be very useful in performance tuning. Information about the wait events includes the number of waits, wait time, average wait time, and wait description.

Option	Description
Licenses tab	Displays information about software licenses on this server or cluster instance.
Alerts tab	Displays, for this server, all alert notifications that have occurred since the monitor view was opened. If any alerts have occurred since you last looked at the Alerts tab, a yellow warning icon appears on the tab. You can use the Alert List Size property on the Settings screen to control the number of alerts that appears.

3. (Optional) If data collections are running, move the mouse over the Engine CPU Utilization graph to display precise figures (values, times, and dates) for points on the curve.
4. (Optional) Move your mouse over the Device IO/Sec graph to display precise figures (values, times, and dates) for points on the curve.
5. In the right pane, select page tabs to display:
   - Details
   - Configured Resources
   - Wait Events
   - Licenses
   - Alerts

   a. Click Auto Refresh to allow additional log messages and performance details to be added to the viewer as they occur.
   b. Click Options to manage the table view, and copy and select data.

8.4 Graphing Performance Counters: the Statistics Chart

To show performance trends, generate a graph for any set of performance counters over a specified period of time.

Prerequisites

Verify that statistical data to be graphed has been collected. To verify data collection, go to the Collection Jobs page and check the History tab for a collection job.

Context

> → Tip
>
> Data collections start running when a server is authenticated. A recently authenticated server might not have accumulated enough data to make a useful graph.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *Statistic Chart*.
3. Expand the folders in the Statistics tab and select the key performance indicator (KPI) you want to graph.
4. Click *Graph Statistic* or drag the KPI onto the Chart tab.
   The Chart tab displays the graphed data, while the KPI with its corresponding value and the date and time it was collected appear in the Data tab.
5. (Optional) Repeat to add KPIs to the graph.
6. (Optional) Use the slider at the bottom of the Chart tab to control the amount of time covered by the graph, ranging from a minute to a year.
7. (Optional) Use <<, <, >, and >> to move the displayed graph to an earlier or later time. Increments depend on how the slider is set.

   > → Tip
   >
   > The statistics chart displays data covering a fixed period of time, and that period does not change automatically. If you are viewing the most recent statistics and want to keep the graph current, adjust the displayed time period as new statistics are collected.

8. (Optional) You can click the date/time labels that appear above the slider. Use these to change the start and end time and the chart time span.
9. (Optional) Click *Clear Graph* to remove all the graphed statistics and start anew.

Results

> i Note
>
> You can graph a maximum of five statistics with no more than two distinct units of measure. By default, only 24 hours of statistics are available; change the repository purge options to save statistics for a longer period.

8.5 Monitor Caches

Monitor cache size, statistics, and cache activity.

8.5.1 Data Cache Statistics and Details

The Data Caches table shows the size and level of activity in each data cache, including hit rate (the percentage of database requests that can be answered from the cache), volatility, number of partitions in this cache, relaxed replacement, and physical reads and writes.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *Caches*.
3. Click the *Data Caches* tab.
4. Select a cache.
   The tabs at the bottom of the screen are populated with information about the selected cache.
5. Click the tabs at the bottom of the screen for details about *Pool Information*, *Cached Objects*:

Option	Description
Pool Information	Shows information about the pools of different sizes that optimize I/O in the selected cache. Details include size, usage, reread ratio, physical and dirty reads, pages touched, buffers to MRU (most recently used), and buffers to LRU (least recently used). The Buffers to MRU and Buffers to LRU columns show buffers added to the ends of the buffer list. The oldest buffers (the least recently used) are flushed first.
Cached Objects	Lists the tables in the selected data cache and their size, in kilobytes. Click the *Cached Size* column heading to sort the table by size.

8.5.2 Procedure Cache Statistics and Details

The Procedure Cache tab displays information about the contents of the procedure cache, which is a memory pool used for stored procedures and a variety of other objects.

Context

The functions that use the procedure cache are called modules—there are over 20 modules in the system.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *Caches*.
3. Click the *Procedure Cache* tab.
4. View the details of the procedure cache in the sections, Procedure Cache Summary, Top 10 Procedure Cache Module User, and Cached Procedures:

Option	Description
Top 10 Procedure Cache Module Users	Shows the modules that use the cache most heavily. The Procedural Objects module contains stored procedures; there is also a module for the statement cache. Use the bar chart to see which parts of the system are using the procedure cache.
Cached Procedures	Lists the stored procedures in the cache (in the Procedural Objects Module). For each stored procedure, it gives the name, database name, cached size, owner's name, compile date, and plan ID.

8.5.3 Statement Cache Statistics and Details

The Statement Cache tab displays information about SQL queries and query plans stored in the statement cache.

Prerequisites

Statement cache monitoring is controlled by the two configuration options `enable stmt cache monitoring` and `statement cache size`. For the Statement Cache tab to appear, the statement cache must be configured in SAP ASE and the `enable stmt cache monitoring` option must be turned on in SAP ASE.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, select *Caches*.
3. Click the *Statement Cache* tab.
4. View the details of the statement cache in the sections, Statement Cache Summary, Cached Statements, and Cache Statement Text:

Option	Description
Statement Cache Summary	Shows details about the size, hit count, and traffic in the cache.
Cached Statements	Lists SQL statements by statement ID (SSQLID), and gives the owner name, use count, CPU time, elapsed time to execute, and logical and physical I/O figures for each query.
Cached Statement Text	Shows the query selected in the Cached Statements table.

8.5.4 In-memory Storage Statistics and Details

The in-memory storage tab displays information about server in-memory caches, the devices that are created from this cache, and the databases on these devices.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, select *Caches*.
3. Click the *In-memory Storage* tab.
4. Select a cache in the In-memory Storage table.
   The In-memory Storage table shows details of in-memory storage, including the size and unused size, in megabytes, and the number of partitions
5. Click the tabs to display *In-memory Devices*, *In-memory Databases*, or *Cached Objects* details.

Option	Description
In-memory Devices	Shows information about the devices that are created from in-memory storage. Details include name, size, space used, start page and number of pages of memory usage.
In-memory Database	Shows information such as name and size of databases that are created on in-memory cache.

Option	Description
Cached Objects	Lists the tables and table indexes in the selected data cache, and their cached size, in kilobytes. Click the *Cached Size* column heading to sort the table by size.

8.6 Monitor Databases

Display database statistics and monitor database activity.

8.6.1 Displaying Database Resources and Status

Find out when a database's most recent backup started, whether it failed, whether a backup is currently in progress, and more.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *Databases*.
3. In the right pane, click on a database name.

   The Databases table lists the type, durability, and DML logging status for each database. Also included for each database is the ID, backup status, whether the transaction log is full, and whether there are suspended processes. Processes may be suspended when the transaction log fills up. If a database is unavailable, for example, because it is quiesced or is offline, the Name column includes the reason.

   The type of database is indicated for temporary, in-memory, proxy and archive databases, and left blank for all other databases. The Durability column indicates if a database is recoverable.

   The tabs at the bottom of the screen are populated with information on the database you selected. When you select a database, space usage is calculated before any data is shown; for a large database, this calculation may take 30 seconds or more.
4. View the details of the database by clicking on the tabs:

Option	Description
Details	Displays information about space usage, including pie charts for data segments and log segments. If this database does not have a log segment, the pie chart on the right shows combined data and log segment usage.

Option	Description
Running Processes	Displays information about processes that are currently using this database, including the process ID, login, host, command, and transaction name. Click a process ID in the SPID column to switch to the Processes view's information about that process.
Devices Used	Displays information about devices on which this database stores its data, including the device name, the amount of space used on that device, and the usage allocation (data or log). Click a device in the Name column to switch to the Devices view's information about that device.
Segments Used	Displays information about segments used by this database, including the segment name, the size of the segment in megabytes, and the amount of free space in the segment. Click a segment in the Name column to switch to the Segments view's information about that segment.
Unused Indexes	Lists indexes in this database that have not been used since the server was last restarted.
Frequently Used Tables	Displays information about tables in this database that have been used since the server was last restarted, including the table name, index ID, logical and physical reads, lock requests and waits, and contention statistics.

8.6.2 Displaying Information About Segments Used by a Database

View details about devices that make up each segment, the tables and indexes used, and space usage.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *Databases*.
3. In the right pane, click on a database name.

   The tabs at the bottom of the window are populated with information about the database you selected.
4. Click the *Segments Used* tab.
5. Click the segment name link.
   The tabs at the bottom of the screen are populated with information about the selected segment.
6. Click the tabs to see information about space usage on the segment, devices that make up the segment, and tables and indexes that are allocated on the segment.
7. If the database uses more than one segment, return to the Databases screen to identify and click through to the remaining segments.

8.6.3 Viewing Database Statistics

View database statistic details such as data and empty page counts, space utilization, and other statistics for a selected database.

Context

> **i** Note
>
> To execute this command, you must have an agent configured for your SAP ASE server.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*
3. Select one of:
   - *User Databases*
   - *System Databases*
   - *Temporary Databases*
   - *Proxy Databases*
   - *Archive Databases*
   - *In-Memory Databases*
   - *In-Memory Temporary Databases*
4. In the right pane, select a database, and do one of:.
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Display Statistics*.
6. Click *Finish* to initiate the statistic display process.
7. (Optional) Click *Save* in the Display Statistics Messages window to save the message text.

Related Information

Changing Database Ownership [page 256]
Modifying Database Storage Allocations [page 257]
Modifying the Transaction Log Cache and the Log I/O Buffer Size [page 258]
Changing Database Options [page 259]
Database Properties [page 246]

8.7 Monitor Devices

Display information about all devices that store databases server. A device can be an entire disk drive, or any part of a disk or file system.

8.7.1 Displaying Device Statistics and Determine I/O Response Time

Monitor device statics and determine how long it takes a device to respond to I/O requests and what its I/O rate is.

Context

High response time can indicate problems in the functioning of the physical device or the storage layer, problems with the configuration of the storage layer, or that the device is busy.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *Devices*.
3. In the right pane, click on a device name.
4. Click on the tabs to view the space usage and IO response time for the selected device:

Option	Description
Details	○ A pie chart showing space usage on the selected device. Includes used and unused space, in megabytes, and as percentages of all the available space on the device. The title above the chart indicates the total available space. ○ Device IO/Sec – a line graph showing the rate of I/O per second on the selected device over the current trend period. The graph shows the sum of reads, writes, and asynchronous prefetch (APF) reads. Because the graph shows a rate, and the read, write, and APF read figures in the table are changes since the last refresh, the values do not correspond. **i Note** Device IO/Sec graph for in-memory devices is not displayed.

Option	Description
Advanced	○ Device IO Response Time – a line graph showing the response time, in milliseconds, for I/O operations performed on the selected device. ○ Device APF Reads/Sec – a line graph showing the rate of asynchronous prefetch read operations, per second, on the selected device. APF reads indicate that table scans are taking place. **i Note** The Advanced tab is not displayed for in-memory devices.

The Devices table includes device semaphore statistics. The device semaphore controls access to device I/O; a high ratio of Device Semaphore Waits to Device Semaphore Requests indicates contention. If IO Wait Time is high enough to cause concern, you can redistribute the data on the physical devices.

8.8 Monitor Engines

View the current condition of the database and track performance as conditions change.

8.8.1 Displaying Engine Utilization

View CPU utilization percentages, I/O processing, number of connections, garbage collector's maximum queue size and counts, and the operating system process identifier (OS PID) for each engine.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *Engines*.
3. In the right pane, click on an engine number.
4. Click on the tabs to view the I/O processing, garbage collection tables, and the engine CPU utilization:

Option	Description
IO Processing table	Provides counts of disk I/O checks, checks without waits, polls, and completed operations over the current trend period.
Garbage Collection table	For the current trend period, provides the garbage collector's maximum queue size and counts of pending items, high water mark items, and overflows.

Option	Description
Engine CPU Utilization graph	A line graph showing CPU utilization for this engine as a percentage. If the server is performing poorly, use the information from this graph to determine how busy the engines are.

8.9 Monitor Threads

Monitor thread for resource planning.

SAP ASE assigns tasks to thread pools, and all thread pools have threads. Each thread pool includes a scheduler that assigns tasks to threads.

SAP ASE contains both system-created and user-created thread pools. All system-defined thread pools start with the `syb_ prefix` (for example `syb_default_pool`). Names for user-defined thread pools cannot start with the `syb_ prefix` and must follow the naming conventions for objects

8.9.1 Displaying Thread Pool Details

Display thread pool details, CPU utilization, associated kernel task, and the threads associated with specific thread pools.

Prerequisites

You must start the server in threaded mode.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *Threads*.
3. In the right pane, click on a thread number.
   The lower portion of the right pane is updated with the details of the selected thread.
4. Click on the tabs to view information about affinity and number of ticks, CPU utilization, and the kernel task name associated with the thread pool:

Option	Description
Details	Displays information about affinity and number of ticks in the selected thread, including: ○ Total number of ticks ○ Number of idle ticks ○ Number of sleeping ticks ○ Number of busy ticks Also displays page faults and operating system context switches with the current thread, including: ○ Number of minor and major page faults ○ Operating system thread ID and alternative thread ID ○ Number of voluntary and forced context switches
Thread CPU Utilization	Displays graphs depicting user and system CPU utilization. **i Note** For graphs to appear, one or more data collection jobs must be scheduled.
Tasks	Displays a list of all the kernel task names and IDs associated with thread pools.

8.10 Monitor Processes

Identify resource-intensive process, blocking process, the lead blocker in a chain, and wait events and SQL queries associated with a process.

Lock icons in the SPID column of the Processes table identify processes that are blocked (a dimmed lock) or blocking (a gold lock) other processes. Other columns of the Processes table include the family ID (which is the parent SPID value), processes blocked by an SPID, CPU activity, CPU cumulative activity, disk I/O activity, and disk I/O cumulative activity.

On the Blocked Processes tab, SAP ASE Cockpit shows the lock request process that is blocking another process, not the blocking lock itself. A yellow warning icon appears on the Blocked Processes tab label when there are any blocked processes.

Table 9: Color indicators in the Processes

Color	Process State
Blue	Selected
Green	Executing a query
Yellow	Blocking another process
Red	Blocked by a lock held by another process

8.10.1 Identifying Resource-Intensive Processes

Find the user processes that are consuming the most system resources on the selected SAP ASE server.

Context

You can choose a system resource (CPU, disk I/O, incoming network traffic, or outgoing network traffic) and display information about the user processes that are using the chosen resource most intensively. For each system resource, you can rank the processes by cumulative or most recent activity values. Each bar in the graph represents the value of the selected metric for a process.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *Processes*.
   By default, the *All Processes* tab is selected. A bar graph shows the five user processes that are using the most cumulative CPU cycles.
3. Use the menu to the right of the bar graph to change the system resource. You can choose:
   - *CPU Cumulative* – cumulative CPU activity since the server started or the counter wrapped.
   - *CPU Activity* – CPU activity, per second, since the last screen refresh.
   - *Disk I/O Cumulative* – cumulative disk I/O since the server started or the counter wrapped.
   - *Disk I/O Activity* – I/O activity per second since the last screen refresh.
   - *Incoming Network Traffic Cumulative* – cumulative incoming network traffic since the server started or the counter wrapped.
   - *Incoming Network Traffic Activity* – incoming network traffic per second since the last screen refresh.
   - *Outgoing Network Traffic Cumulative* – cumulative outgoing network traffic since the server started or the counter wrapped.
   - *Outgoing Network Traffic Activity* – outgoing network traffic per second since the last screen refresh.
4. (Optional) Move your mouse over a bar in the graph to display the server process ID (SPID) and the value of the selected system resource metric for the process.
5. (Optional) Select *Only display user processes below* to filter out system processes, and display only user process information.
6. (Optional) Click a bar in the graph to highlight information about that process in the table below.
7. Select a process to display its information in the tabs.

Option	Description
Details	Details about the selected process, including the initiating program, transaction information, and network statistics.
SQL	The SQL statement and query plan for the selected process

Option	Description
Wait Events	Information about wait events for the selected process, including number of waits, wait times, and wait descriptions

8.10.2 Identifying and Terminating Blocked Processes and Blocking Processes

Find user processes that are blocked and the processes that are blocking them.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *Processes*.
3. Click the *All Processes* tab.
4. Check the table below the bar graph for rows highlighted in red, and with a lock icon, which indicate blocked processes.

   The Blocked by SPID column identifies the blocking process. Blocking processes are also shown in the table, highlighted in yellow.
5. Click a red table row to display information about the blocked process in the Details, SQL, and Wait Events tabs at the bottom of the screen.
6. (Optional) To terminate a process, select the blocking process or a set of blocking processes, right-click and select *Terminate.*
7. Click the row for the blocking process (yellow) to display its information in the tabs.

Option	Description
Details	Details about the selected process, including the initiating program, transaction information, and network statistics.
SQL	The SQL statement and query plan for the selected process
Wait Events	Information about wait events for the selected process, including number of waits, wait times, and wait descriptions

> **i** Note
>
> Identifying the lock held by a blocking process is not always straightforward. For example, the blocking process does not necessarily hold a page lock; it might hold a table lock. For this reason, the lock request process that is blocking another process is shown, not the blocking lock.

8. Click the *Blocked Processes* tab to display additional information about blocked processes, including details about the lock, the row number, the page number, and the lock configuration options.

Next Steps

For information on handling blocked processes, see the locking reports chapter of the *Performance and Tuning Series: Locking and Concurrency Control*.

8.10.3 Identifying the Lead Blocker in a Chain

Find a process that is blocking several other processes.

Context

When Process A blocks Process B, which blocks Process C—and so on—the blocking processes form a chain.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *Processes*.
3. Click *Blocked Processes*.

   You see a table with information about blocked and blocking processes, including the lock requests on the basis of which processes are blocked.
4. The table on the Blocked Processes tab has an entry for each lead blocker; click the arrow to expand the entry and show all the blocked processes in the chain.

   > **i** Note
   >
   > Identifying the lock held by a blocking process is not always straightforward. For example, the blocking process does not necessarily hold a page lock; it might hold a table lock. For this reason, the lock request process that is blocking another process is shown, not the blocking lock.
5. Select a process to display its information in the tabs.

Option	Description
Details	Details about the selected process, including the initiating program, transaction information, and network statistics.
SQL	The SQL statement and query plan for the selected process
Wait Events	Information about wait events for the selected process, including number of waits, wait times, and wait descriptions

6. (Optional) Click the *All Processes* tab at the top of the window.
   In the table below the bar graph, rows that are highlighted in yellow indicate blocking processes. Rows that are highlighted in red indicate blocked processes.

Next Steps

For information on handling blocked processes, see the *Performance and Tuning Series: Locking and Concurrency Control*.

8.10.4 Displaying the SQL Query Associated with a Process

See the SQL statement and query plan for a user process.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *Processes*.
3. Click either the *All Processes* tab or the *Blocked Processes* tab.
4. Select a process to display its information in the tabs.
5. At the bottom of the window, click the *SQL* tab.

   If the selected process is active, displays the SQL statement and query plan for the query that the process is executing.

8.10.5 Displaying Wait Events Associated with a Process

Display a list of all events a for which a process is waiting. Wait events are internal states that represent conditions that cause a process to stop.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *Processes*.
3. Click either the *All Processes* tab or the *Blocked Processes* tab.
4. Select a process to display its information in the tabs.
5. At the bottom of the window, click the *Wait Events* tab.

   Common wait events include waiting:
   - On the scheduler runnable queue for a CPU to become available
   - For disk I/O to complete
   - For a lock on a table to be released

8.11 Monitor Segments

Monitor the segments used by the server. View the name of the database that uses the segment, the database's size and unused space on the segment, and the number of thresholds.

8.11.1 Displaying Segment Details

Find reserved space figures for tables on a segment, show current space usage, and find devices mapped to a segment.

Context

You can sort tables by reserved size, which simplifies planning for a reorganization or rebuild.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *Segments*.
3. In the right pane, click a segment name.
   The tabs at the bottom of the window show information about the selected segment.
4. To sort a table by reserved size, select the table and click *Space Reserved*.
5. Click on the tabs to view details about the segment, such as devices used and tables and indexes allocated to the segment:

Option	Description
Details	Displays two charts: ○ A pie chart shows current space usage on the selected segment. Includes used and unused space, in megabytes, and as percentages of the available space on the segment. The title above the chart indicates the total available space. ○ Space Usage – a line graph shows changes in space usage on the selected segment over the current trend period.
Devices Used	Displays devices included in the selected segment and the size of each device, in megabytes. Click a name in the Device column to switch to the Devices monitoring view's information for that device.
Used Tables	Displays tables allocated on the selected segment and the reserved size of each table, in kilobytes.
Used Indexes	Displays indexes allocated on the selected segment and the table associated with each index.

8.12 Monitor Transactions

Display information about all active transactions on the selected server.

The display information includes the:

- name of the transaction
- login of the user who owns the transaction
- application that launched the transaction
- process that initiated the transaction (SPID column)
- transaction's start time
- name of the host where the transaction is running
- database it is running against

If a transaction affects more than one database, only the transaction's current database and the process that started the transaction are displayed.

8.12.1 Identifying a Transaction's Process

Display information about a currently running transaction, including the process that initiated the transaction.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *Transactions*.
3. In the right pane, click a transaction name.
4. In the SPID column, click the SPID of the process associated with your transaction. (The ID number is a link.)
   You see the Processes screen, which shows information about your transaction's parent process.

8.13 Monitor SQL Queries

Display details about recently executed SQL queries.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.

2. In the left pane, click *SQL Activity*.
   The SQL Activity window lists queries executed during the current trend period, along with details, including each query's server process identifier (spid), the login account that executed the query, the kernel process identifier (KPID), batch identifier, and execution statistics.
3. In the right pane, select a SQL query from the Active SQLs in Batch table.
   The SQL statement appears at the bottom of the screen.

> **i** Note
>
> The SQL Activity screen displays SQL text for only the most recent collection interval.

8.14 Monitor Statistics

Generate graphs based on key performance indicators and configured resources.

See *Capacity (KPI: ASE Capacity Statistics)* for a lists of configured resources that show performance trends.

Related Information

SAP ASE Alert and Data Collections Summary [page 149]

8.14.1 Viewing the Statistics Chart

To show performance trends, generate a graph for any set of performance counters over a specified period of time

Context

> **→** Tip
>
> Data collections start running when the SAP ASE Cockpit server starts and systems running on the host are auto discovered. However, recently discovered systems might not have accumulated enough data to make a useful graph.

If you attempt to view data for a collection job that has not been created, `No data was found for statistic` appears.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *Statistics Chart*.
3. Expand the folders in the Statistics tab and select the key performance indicator (KPI) you want to graph.
4. Click *Graph Statistic* or drag the KPI onto the Chart tab.
   The Chart tab displays the graphed data, while the KPI with its corresponding value and the date and time it was collected appear in the Data tab.
5. (Optional) Repeat to add KPIs to the graph.
6. (Optional) Use the slider at the bottom of the Chart tab to control the amount of time covered by the graph, ranging from a minute to a year.
7. (Optional) Use <<, <, >, and >> to move the displayed graph to an earlier or later time. Increments depend on how the slider is set.

   > → Tip
   >
   > The statistics chart displays data covering a fixed period of time, and that period does not change automatically. If you are viewing the most recent statistics and want to keep the graph current, adjust the displayed time period as new statistics are collected.

8. (Optional) You can click the date/time labels that appear above the slider. Use these to change the start and end time and the chart time span.
9. (Optional) Click *Clear Graph* to remove all the graphed statistics and start a new.

Results

> ℹ Note
>
> You can graph a maximum of five statistics with no more than two distinct units of measure. By default, only 24 hours of statistics are available; change the repository purge options to save statistics for a longer period.

8.14.2 Key Performance Indicators for SAP ASE

Lists and describes the key performance indicators (KPIs) that show performance trends.

For information about the always-on licensed option performance indicators, see HADR KPIs [page 304]

SAP ASE Statistics	KPI Name	Description	Data Collection Name
ASE Availability Statistics	Available Connections	Available Connections	ASE Availability Statistics

SAP ASE Statistics	KPI Name	Description	Data Collection Name
	Number of Blocked Processes	Number of currently blocked processes that have been blocked for more than 5 seconds. The heat chart uses this metric to display server status.	ASE Availability Statistics
	Number of Database Dump Failures	Number of failed database dumps.	ASE Availability Statistics
	Number of Suspended Processes	Number of processes that are currently suspended. The heat chart uses this metric to display server status.	ASE Availability Statistics
	Server Availability Status	Status of the SAP ASE server. Values of most interest are stopped and running.	ASE Availability Statistics
	Server Device IO Rate	Total number of I/O operations performed by all devices on the server during the current collection cycle.	ASE Availability Statistics
	Server Percent CPU Utilization	Average CPU utilization percentage across all active engines on the server.	ASE Availability Statistics
ASE Capacity Statistics	Configured Resource Additional Network Memory	Maximum size of additional memory that can be used for network packets that are larger than the default packet size.	ASE Capacity Statistics
	Configured Resource Audit Queue Size	The audit queue holds audit records generated by user processes until the records can be processed and written to the audit trail.	ASE Capacity Statistics
	Configured Resource Compression Info Pool Size	Size of the memory pool used for compression.	ASE Capacity Statistics
	Configured Resource Disk IO Structures	Initial number of disk I/O control blocks SAP ASE allocates at start-up.	ASE Capacity Statistics
	Configured Resource Memory Per Worker Process	Amount of memory used by worker processes.	ASE Capacity Statistics
	Configured Resource Number of Aux Scan Descriptors	Number of auxiliary scan descriptors available in a pool shared by all users on a server.	ASE Capacity Statistics
	Configured Resource Number of Locks	Total number of available locks for all users on SAP ASE.	ASE Capacity Statistics
	Configured Resource Number of Mailboxes	Number of mailbox structures allocated by SAP ASE.	ASE Capacity Statistics
	Configured Resource Number of Messages	Number of message structures allocated by SAP ASE	ASE Capacity Statistics
	Configured Resource Number of Open Indexes	Maximum number of indexes that can be used simultaneously on SAP ASE.	ASE Capacity Statistics

SAP ASE Statistics	KPI Name	Description	Data Collection Name
	Configured Resource Number of Open Objects	Maximum number of objects that can be open simultaneously on SAP ASE	ASE Capacity Statistics
	Configured Resource Number of Open Partitions	Number of partitions that SAP ASE can access at one time.	ASE Capacity Statistics
	Configured Resource Number of Sort Buffers	Amount of memory allocated for buffers used to hold pages read from input tables and perform index merges during sorts.	ASE Capacity Statistics
	Configured Resource Number of User Connections	Maximum number of user connections that can simultaneously be connected to SAP ASE.	ASE Capacity Statistics
	Configured Resource Number of Worker Processes	Maximum number of worker processes that SAP ASE can use at any one time for all simultaneously running parallel queries.	ASE Capacity Statistics
	Configured Resource Permission Cache Entries	Number of cache protectors per task.	ASE Capacity Statistics
	Configured Resource Procedure Cache Size	Size of the procedure cache. The procedure cache is used while running stored procedures.	ASE Capacity Statistics
	Device Space Free	Total amount of free space, in megabytes, on this device.	ASE Capacity Statistics
	Segment Space Free	Amount, in megabytes, of free space in the segment; collected separately for each segment.	ASE Capacity Statistics
	Server tempdb Free Space	Amount, in megabytes, of free space in the tempdb database.	ASE Capacity Statistics
ASE Performance Statistics	Average Blocked Process Wait Time	Average time, in milliseconds, that the current blocked processes have waited.	ASE Performance Statistics
	Cache Hit Ratio	Hit ratio in the data cache during the current collection cycle.	ASE Performance Statistics
	Device APF Reads	Rate of asynchronous prefetch read operations per second on the selected device.	ASE Performance Statistics
	Device IO Rate	Rate of I/O operations per second on this device.	ASE Performance Statistics
	Device IO Response Time	Response time, in milliseconds, for I/O operations performed on this device.	ASE Performance Statistics
	Engine CPU Utilization	CPU utilization for this engine as a percentage.	ASE Performance Statistics
	Long Running Transaction Execution Time	Execution time of longest running transaction	ASE Performance Statistics

SAP ASE Statistics	KPI Name	Description	Data Collection Name
	Number of Address Locks	Number of address-level locks server-wide.	ASE Performance Statistics
	Number of Cache Misses	Number of times that a needed page was not found in a cache and had to be read from disk.	ASE Performance Statistics
	Number of Cache Searches	Number of cache searches, including hits and misses for all caches combined.	ASE Performance Statistics
	Number of Critical Flags Last Collection	Number of critical flags received during the collection cycle.	ASE Performance Statistics
	Number of Deadlocks	Number of deadlocks on the server since the most recent execution of the collection.	ASE Performance Statistics
	Number of Error Flags Last Collection	Number of error flags received during the collection cycle.	ASE Performance Statistics
	Number of Information Flags Last Collection	Number of information flags received during the collection cycle.	ASE Performance Statistics
	Number of Locks	Total number of active locks of all types on the server.	ASE Performance Statistics
	Number of Packets Received in Network IO	Number of packets received during the current collection cycle.	ASE Performance Statistics
	Number of Packets Sent in Network IO	Number of packets sent during the current collection cycle.	ASE Performance Statistics
	Number of Page Locks	Number of page-level locks server-wide.	ASE Performance Statistics
	Number of Row Locks	Number of row-level locks server-wide.	ASE Performance Statistics
	Number of Server Transactions	Total number of transactions during the current collection cycle.	ASE Performance Statistics
	Number of Table Locks	Number of table-level locks server-wide.	ASE Performance Statistics
	Number of Warning Flags Last Collection	Number of warning flags received during the collection cycle.	ASE Performance Statistics
	Procedure Cache Hit Ratio	Hit ratio in the procedure cache.	ASE Performance Statistics
	Statement Cache Hit Ratio	Hit ratio in the statement cache during the current collection cycle.	ASE Performance Statistics
	Segment Space Usage	Change in megabytes in the amount of space used by this segment since the last refresh.	ASE Performance Statistics
	sp_who Response Time	Time, in milliseconds, the `sp_who` stored procedure takes to return a response. `sp_who` is called each time collection_ase_histmon is executed to collect performance statistics.	ASE Performance Statistics
	Thread System CPU Utilization	CPU utilization percentage in handling system level operations for each thread.	ASE Performance Statistics

SAP ASE Statistics	KPI Name	Description	Data Collection Name
	Thread Total CPU Utilization	Total CPU utilization obtained by adding Thread User CPU Utilization and Thread System CPU Utilization.	ASE Performance Statistics
	Thread User CPU Utilization	Thread User CPU Utilization	ASE Performance Statistics
Data Caches	Cache Hit Ratio	Hit ratio in the data cache during the current collection cycle.	ASE Performance Statistics
	Number of Cache Searches	Number of cache searches, including hits and misses for all caches combined.	ASE Performance Statistics
	Number of Cache Misses	Number of times that a needed page was not found in a cache and had to be read from disk.	ASE Performance Statistics
Devices	Device APF Reads	Rate per second of asynchronous pre-fetch read operations on this device.	ASE Performance Statistics
	Device IO Rate	Rate of I/O operations per second on this device.	ASE Performance Statistics
	Device IO Response Time	Response time, in milliseconds, for I/O operations performed on this device.	ASE Performance Statistics
	Device Space Free	Total amount of free space, in megabytes, on this device.	ASE Capacity Statistics
Engines	Engine CPU Utilization	Percentage of CPU cycles used by this SAP ASE engine.	ASE Performance Statistics
Segments	Segment Space Usage	Change, in megabytes, in the amount of space used by this segment since the last refresh.	ASE Performance Statistics
Threads	Thread User CPU Utilization	CPU utilization percentage in handling user committed queries for each thread.	ASE Performance Statistics
	Thread System CPU Utilization	CPU utilization percentage in handling system level operations for each thread.	ASE Performance Statistics
	Thread Total CPU Utilization	Total CPU utilization obtained by adding Thread User CPU Utilization and Thread System CPU Utilization.	ASE Performance Statistics

8.15 Monitor The HADR Environment

Use the HADR dashboard to display primary and standby servers, HADR system status, synchronization mode, and synchronization state.

8.15.1 Monitor and Administer HADR

The dashboard is the primary site for administering and monitoring the HADR system.

> **i** Note
>
> Be aware that plotting area charts can require a significant amount of time after the collection job is first scheduled. It requires at least two data points in order to plot area charts which can take approximately 10 minutes when the HADR collection interval is set to the default value of 5 minutes. For example, displaying the latency chart in the HADR Dashboard can take approximately 15 minutes after the HADR collection job is first scheduled.

To display the dashboard:

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *HADR*.

The SAP ASE Cockpit dashboard displays two boxes representing two replication systems, each surrounding a smaller box representing the primary or standby server. Primary servers are displayed in a light yellow color, standby servers are in a light grey.

The server on the left is the server (primary or standby) on which you are currently focused. The replication system boxes display the site name, HADR system status, synchronization mode, and synchronization state. The server boxes display the logical host name, host-name, and the port number on which the server is run.

A green line between the boxes indicates the systems are successfully replicated. A red line indicates that replication is stopped. A grey line indicates that replication is suspended.

The Service Component Status and the Replication Paths Status summarize the status of all components in the Service Component panel and in the Replication Paths table, respectively. The Service Component Status and the Replication Paths Status are shown as blue labels, and their text and icon are clickable. Clicking the Service Component Status label opens the Service Components panel on the bottom of the dashboard. Clicking the Replication Paths Status label opens the Replication Paths table.

Service Component Status

- A green arrow with an Active label indicates there are no warnings or errors in any service component.
- A yellow icon with an exclamation mark indicates that warnings exists in at least one of the service components, replication paths, or alerts.
- A red icon with an exclamation mark indicates that at lease one error exists in any of the service components.

The Service Components page shows the status of HADR Service components:

- RMA (local and remote)
- Fault Manager
- Replication Server

RMA is considered active if any local RMA or remote RMA is up. Otherwise it is considered inactive.

Fault Manager status can be:

- Unknown – After its initial start up, the Cockpit Server has not yet received any communication from the Fault Manager, so it is not known whether the Fault Manager is configured.
- Up – After receiving any message from the Fault Manager
- Down – After timing out the communication with the Fault Manager for not receiving any message from the Fault Manager
- Hibernate – After receiving a `FM_HIBERNATE` message from the Fault Manager

To the right of the Service Components page is the Fault Manager Messages table. It shows up to 100 messages, with the most recent message on top. There are two types of Fault Manager Messages: `fault` and `recovered`. All high severity messages are shown in red. `recovered` messages are shown in green. Lower severity messages are shown in black. Whenever a new Fault Manager is received, it automatically switches the screen to the Service Components screen to display the new Fault Manager message.

On top of the Fault Manager Message table is a Clear button that clears all messages in the table when selected.

Replication Paths Status

- ○ A green arrow with an Active label indicates there are no warnings or errors in any State, Log Records, Backlog, Rep Agent, or Latency columns.
  For the State column, an Inactive and Suspended message indicates a warning; Down, Incomplete and Unknown indicates an error; an Active message indicates the status is healthy.
  - ○ A yellow icon with an exclamation mark indicates that warnings exists in State, Log Records, Backlog, or Latency columns.
  - ○ A red icon with an exclamation mark indicates that at lease one error exists one of the columns.

Option	Description
Database	Name of the database that is replicated for disaster recovery
Path	Path to the replicated database.
State	State of the replication path.
Log Records	Indicates the percentage of free transaction log, and whether the server is writing messages to the log. Associated with the % of Free Transaction Log KPI. A green icon indicates the Log Records has not hit any alerts, yellow indicates the % of Free Transaction Log hit the low alert setting, and red indicates the KPI hit the high alert setting.

Option	Description
Backlog	Indicates whether the backlog of unwritten data is too high. Associated with the ASE Backlog, Primary RS Backlog, and Remote RS Backlog KPIs. A green icon indicates the Log Records has not hit any alerts, yellow indicates the % of Free Transaction Log hit the low alert setting, and red indicates the KPI hit the high alert setting.
Latency	Latency status.
Rep Agent	Indicates whether the Rep Agent Thread is running or not.

HADR Dashboard Bottom Panel

Select tabs on the on the bottom of the HADR dashboard to view the status of RMA, the Fault Manager, and Replication Server. You can also display log messages, view latency, and configure Rep Agent parameters.

Option	Description
Service Components	Provides status information about the RMA, the Fault Manager, and Replication Server. Select Clear to clear all Fault Manager messages. The Fault Manager Messages table displays a maximum of 100 messages, with the most recent message on the top. High severity messages are in red. Lower severity messages are in black. When a new fault manager message is received, the Dashboard switches the screen to this page. Clicking on a header tab allows you to resort the messages. Select the Clear button to clear all messages from the screen. The Fault Manager communication timeout value is saved in `$SYBASE/COCKPIT-4/plugins/ASEMAP/config.properties`. Use the `FM_PING` message to change the timeout value.
Log Records	Displays graphs for the % of Free Transaction Log, Log Records Scanned, and Log Records Processed KPIs for the replicated database.
Throughput	Includes graphs for the DSI Commands, DSI Transactions, EXEC Bytes, and RSI Bytes KPIs for the primary and standby servers.
Backlog	Displays the ASE log Backlog , Primary RS Backlog , Remote RS Backlog KPIs for the amount of the backlog processed, in megabytes, over time.
Latency	Shows the Overall Latency and Latency associated with the Total Latency, PDA_EXEC Latency, EXEC_DIST Latency, DIST_DSI Latency, and the DSI_RDB Latency KPIs for the replicated system, in milliseconds, over time

Option	Description
Rep Agent	Start and stop Rep Agent, or change Rep Agent configuration parameters. Clicking Current Context shows the current context of the Rep Agent. Only stream replication is shown for HADR. See Modify Replication Agent Configuration Parameters [page 304].

9 Manage SAP ASE

Performing system administration tasks using SAP ASE Cockpit.

SAP ASE Cockpit allows you to manage an SAP ASE server and helps you perform complex administration tasks without the need to remember the syntax of Transact-SQL commands or system stored procedures.

9.1 Searching for Objects in SAP ASE Cockpit

Search for a list of objects based on the resource, resource type, object type, and name.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. (Optional) In the left pane, click the Browse tab, expand *ASE Servers*, click the category for the object type for which you want to search, then select an object type.
3. Click the *Search* tab.
   If you selected the resource and object type from the Browse tab, your selection in listed in the Object type pull-down menu. The resource type is ASE Servers.
4. Enter the full or partial name of the object in the *Search string* text box.
   The text search is case insensitive.
5. (Optional) Click *Exact Match* to display only objects with names matching the exact search string.
6. Click *Search*.
7. (Optional) If the request cannot be displayed within the given threshold limits, a message row is displayed; providing status of the retrieval request. Depending on the type of processing issue involved, you can choose to cancel, expand, or retry the retrieval request. Hovering your mouse over the message row provides information specific to the type of processing issue.

9.1.1 Manage Message Rows for Search Requests

Processing of data retrieval from a search request can result in a message row being displayed.

Context

Processing of data retrieval may be slow due to various problems such as: a slow network connection or a heavy server load, the result set may be larger than the threshold display or time limit, or an error can occur and the request cannot be displayed.

Procedure

Use the Search tab to search for objects and display results in the right pane.

- Processing request - (Optional) Click the drop-down arrow on the message row and select *Cancel*.
  When the processing of data retrieval is slower than the set display time, a message row is displayed. By default, the time period after which a message row is displayed is seven seconds. Once the requested data is available, the actual result set is displayed, replacing the message row. Once Cancel is chosen the processing request is stopped and you see a new message row with an option to retry the request.
- Number of Rows - (Optional) Click the drop-down arrow on the message row and select *Expand*.
  When the requested result set size exceeds the threshold display limit, a message row is displayed. The default threshold display limit for rows is 500. Hovering your mouse over the message row provides the number of rows. Selecting Expand allows you to see the entire result set.
  When you select *Expand* an expanded message row is displayed below any remaining message rows once the processing is complete. If the processing takes a large amount of time, then you have the option of canceling the processing by selecting *Cancel* from the context menu of the expanded message row.

  > **i** Note
  >
  > If the number of rows are large (in the thousands), SAP recommends that you use the Search tab to narrow your results.

- Error - (Optional) Click the drop-down arrow on the message row and select *Retry*.
  If a result set cannot be returned, a message row is displayed indicating an error has occurred. Hovering your mouse over the message row provides the reason for the exception.

9.2 Replacing Compiled Object Definitions

Replace existing compiled objects with a new definition while preserving the original name, object ID, auditing options, and permissions.

A compiled object is any object that requires entries in the `sysprocedures` table.

Compiled objects include:

- Check constraints
- Defaults
- Rules
- Stored procedures
- Extended stored procedures
- Triggers
- Views
- Functions
- Computed columns
- Partition conditions

When granular permissions is enabled or disabled, you must be the object owner to replace a compiled object. You cannot impersonate a user through an alias or by using `setuser`. However, if you are the owner through `set proxy`, you can replace a compiled object.

Replacing compiled objects is achieved by either using the Replace option from an object's context menu, or adding an object and specifying a new definition for an existing object.

When adding an object to replace a complied object definition, you must specify the same compiled object name, owner, and database location in the Add wizard.

These objects are supported by the Replace option:

- Stored procedures
- SQLJ procedures
- Extended stored procedures
- Views
- Triggers
- Scalar user-defined functions
- SQLJ functions
- Rules
- Defaults

9.3 Executing SQL Statements

Execute SQL statements on one or more servers.

Context

You can use the Execute SQL view to run any valid SQL statement, including queries and stored procedures. Anyone can launch a query; no permissions are required. However, if you do not have authority to perform the actions in the query, SAP ASE Cockpit displays an error.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, click *ASE Servers*.
3. In the right pane, select the server, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Execute SQL*.
5. Enter the SQL statements.

   SQL history is persistently saved on a login basis. You can select previous added SQL statements or sort through a list of saved SQL statements by using the Previous SQL, SQL History, and Next SQL buttons.

   SQL history is saved when the history has been changed from previously saved history. You can clear the history by clicking *Clear SQL*.
6. Click *Execute*.

   The query runs on all the servers you selected, and results appear in the bottom portion of the view. The view includes a results tab for each server. On the tabs:
   - A green check indicates a successful query.
   - A red X indicates an error. A tab with a red X also displays an error message.

Related Information

Configuring SAP ASE to Use Precomputed Result Sets [page 382]

9.4 Tables and Indexes

Create or modify tables and table objects.

Tables consist of columns and rows that contain data on a database. SAP ASE uses the following types of tables:

- A system table stores information that allows the database to perform its services.
- A user table stores and provides access to user data.
- A proxy table accesses data on remote servers.

> **i** Note
>
> System table definitions are not usually updated.

To plan a table's design:

- Decide what columns you need in the table, and the datatype, length, precision, and scale, for each.
- Create any new user-defined datatypes before you define the table where they are to be used.

- Decide which column, if any, should be the IDENTITY column.
- Decide which columns should and which should not accept null values.
- Decide what integrity constraints or column defaults, if any, you need to add to the columns in the table.
- Decide whether you need defaults and rules, and if so, where and what kind.
- Consider the relationship between the NULL and NOT NULL status of a column and defaults and rules.
- Decide what kind of indexes you need and where.

9.4.1 Restoring Table Data

Restore table data from an archive or stand-by database.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables* > *User Tables*.
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Restore Data*.
5. On the Specify Database page, select the database from where the source table data is located.
6. On the Specify Table page, select the table to be used as a source for restoring data.
7. (Optional) Click *Preview* to verify your selection options.
8. Click *Copy Data* to start the restore process.

9.4.2 Checking Table Consistency

Check and repair the logical and physical consistency of a table.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of the following:
   - *User Tables*
   - *Proxy Tables*
   - *System Tables*

3. In the right pane, select a table, and do one of:
    - Click the arrow to the right of the name.
    - Click the *Actions* button.
4. Select *Check Consistency*.
5. On the Choose DBCC options page:
    a. Select *Check overall consistency*, then optionally click *Ignore non-clustered indexes*.
    Check overall consistency checks that:
        - Index and data pages are linked correctly.
        - Indexes are sorted properly.
        - Pointers are consistent.
        - All indexes and data partitions are correctly linked.
        - Data rows on each page have entries in the row-offset table.
        - Partition statistics for partitioned tables are correct.
    b. (Optional) Select *Check allocation*, then optionally click *Fix allocation errors*.
    Check allocation checks the table to ensure that:
        - All pages are correctly allocated.
        - Partition statistics on the allocation pages are correct.
        - No page is allocated that is not used.
        - All pages are correctly allocated to the partitions in the specified table and that allocated pages are used.
        - No unallocated page is used.
    c. (Optional) Select *Reindex*.
    This option allows the system administrator or table owner to check the integrity of indexes attached to a user table and to rebuild suspect indexes.
    a. (Optional; only for tables that contain text data) Select *Fix text*.
    Select this options if you are changing to a new multibyte character set from either a single-byte or a multibyte character set.
    b. Select the type of allocation report.
6. Click *Finish*.

9.4.3 Placing a Table on a Segment

Using a segment to put a table on a specific database device can improve performance and give increased control over placement, size, and space usage of database objects.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
    - *User Tables*
    - *Proxy Tables*

3. In the right pane, select a table, and do one of:
    - Click the arrow to the right of the name.
    - Click the *Actions* button.
4. Select *Properties*.
5. Click *Usage*.
6. Select the segment to on which to place the table.
7. Click *Apply*.

9.4.4 Setting the Table Locking Scheme

Choose or alter a locking scheme based on required performance.

Context

Conversions between allpages locking and data-only locking schemes can be expensive in time and I/O and require sufficient free space. Convert the locking scheme by creating copies of the tables and re-creating indexes. You must also dump the affected databases, and update statistics before changing between allpages locking and data-only locking schemes.

Conversions between data page and data row locking are quick and inexpensive, and implemented by updates to system tables. The data page and data row schemes are collectively called data-only locking.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
    - *User Tables*
    - *Proxy Tables*
3. In the right pane, select a table, and do one of:
    - Click the arrow to the right of the name.
    - Click the *Actions* button.
4. Select *Properties*.
5. Click *Lock Scheme*.
6. On the Lock Scheme page:
    a. Select the lock scheme.
    b. Set the maximum rows per page, to limit the number of rows on a data page.
    c. Set the rows size. This can increase the amount of storage required. If your tables have many rows that are shorter than the expected row size, setting this value and reorganizing the use of table space or changing the locking scheme increases the storage space required for the table.

d. Set the reserve page gap to leaves empty pages on extents that are allocated to the object when commands that perform extent allocation are executed. Setting the reserve page gap to a low value increases the number of empty pages and spreads the data across more extents, so the additional space required is greatest immediately after creating an index or reorganizing the use of table space.
e. Set the fill factor to allow space on the index pages to reduce page splits. Very small fillfactor values can cause the storage space required for a table or an index to be significantly greater.

7. (Optional) After converting from all pages locking and either of the data-only locking schemes, check table and database consistency. You must also perform a full database dump before you can back up the transaction log with a dump transaction.

9.4.5 Reorganize Tables and Table Objects

Reorganize tables, table partitions, indexes, and index partitions to improve performance by reclaiming unused page space, removing row forwarding, or rewriting all table rows to new pages, depending on the option used.

For additional information about reorganization, see *Using the reorg Command* in the *System Administration Guide: Volume 2*.

9.4.5.1 Reorganizing Tables at the Database Level

Reorganize a table at the database level to improve performance.

Prerequisites

You must be a system administrator, or have `reorg any table` permissions when granular permissions is enabled.

Context

You can reorganize only one database at a time.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Database* , then choose one of the following:
   - *User Databases*

- *System Databases*
- *Temporary Databases*
- *Proxy Databases*

3. In the right pane, select a database, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Reorganize Tables*.
5. On the Select tables page, choose all tables, exclude system tables, or search for a table.
   - To reorganize all tables in the database, click *Select all tables*.
   - To search for a table by name, click *Use search criteria*, select *Name contains*, enter the table name, and click *Search*. Select one or more tables from the list.
   - To search for a table by space utilization, click *Use search criteria*, select *Space utilization <=*, enter the value, and click *Search*. Select one or more tables from the list.
   - Choose whether to select *Exclude system tables*.
6. On the Commands page, select the type and level of reorganization.

Option	Description	Restrictions
Compact	Reclaim space and remove row forwarding.	Not supported with all-pages-locked tables.
Defragmentation	Reorganize data and allow concurrent reads or writes.	Not supported with: ○ Tables without an index (tables must have at least one index) ○ System tables ○ All-pages-locked tables
Forwarded rows	Remove row forwarding.	Not supported with all-pages-locked tables.
Rebuild	○ Remove row forwarding and reclaim unused page space. ○ Rewrite all rows to accord with a clustered index for a table, if it has one. ○ Write rows to data pages to accord with any changes made in space management settings through `sp_chgattribute`. ○ Drop and re-create all indexes belonging to the table.	Requires that the select into database option to be true. Not supported with system tables.
Reclaim space	Reclaim unused page space resulting from deletions and row-shortening updates.	Not supported with all-pages-locked tables.

7. On the Options page, select your reorganization options.

Option	Description	Restrictions
Compress	Compress the rows affected by the reorganization.	Available only when one of these reorganization types is selected:

Option	Description	Restrictions
		○ Compact ○ Forwarded rows ○ Reclaim space
Resume	Start reorganization at the point in a table where the previous reorganization left off.	Available only when one of these reorganization types is selected: ○ Compact ○ Forwarded rows ○ Reclaim space ○ Defragmentation, and resuming reorganization on a single table is feasible.
Time	Specify the length of time allowed for running reorganization.	Available only when one of these reorganization types is selected: ○ Compact ○ Forwarded rows ○ Reclaim space ○ Defragmentation
Skip compact extents	Specify the occupancy threshold of the extent. SAP ASE reorganizes only the extents for which compactness falls below the occupancy threshold; extents with a compactness higher than the threshold are not reorganized. The compactness of an extent is measured as the percentage range (1 – 100) occupancy in that extent (80 is the default). Compactness = (Total space occupied in an extent / Total space in an extent) x 100.	Available only when Defragmentation is selected.

8. Review the Summary page and click *Finish*.

Related Information

Enabling Granular Permissions [page 72]

9.4.5.2 Reorganizing Tables

Reorganize one or more tables to improve performance. By default, reorganization reorganizes all indexes within the selected table.

Prerequisites

You must be a system administrator, or have `reorg any table` permissions when granular permissions is enabled.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of the following:
   - *User Tables*
   - *Proxy Tables*
   - *System Tables*
   - *Temporary Databases*
   - *Proxy Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Reorganize*.
5. On the Analysis page, review space utilization to confirm that reorganization is needed.

   Space utilization uses the average row size and number of rows to compute the expected minimum number of data pages, and compares the expected minimum to the current number of pages. If space utilization is low, run reorganization.

   See *Performance and Tuning Series: Improving Performance with Statistical Analysis*.

   Space utilization is 0 when row count is equal to 0. For derived statistics on space utilization, the row count is based on the information from `systabstats`.

   If statistics have not been updated recently and the average row size has changed, or if the number of rows and pages are inaccurate, space utilization may report values greater than 1.0.
6. On the Commands page, select the type and level of reorganization.

Option	Description	Restrictions
Compact	Reclaim space and remove row forwarding.	Not supported with all-pages-locked tables.

Option	Description	Restrictions
Defragmentation	Reorganize data and allow concurrent reads or writes.	Not supported with: ○ Tables without an index (tables must have at least one index) ○ System tables ○ All-pages-locked tables
Forwarded rows	Remove row forwarding.	Not supported with all-pages-locked tables.
Rebuild	○ Remove row forwarding and reclaim unused page space. ○ Rewrite all rows to accord with a clustered index for a table, if it has one. ○ Write rows to data pages to accord with any changes made in space management settings through `sp_chgattribute`. ○ Drop and re-create all indexes belonging to the table.	Requires that the select into database option to be true. Not supported with system tables.
Reclaim space	Reclaim unused page space resulting from deletions and row-shortening updates.	Not supported with all-pages-locked tables.

7. On the Options page, select your reorganization options.

Option	Description	Restrictions
Compress	Compress the rows affected by the reorganization.	Available only when one of these reorganization types is selected: ○ Compact ○ Forwarded rows ○ Reclaim space
Resume	Start reorganization at the point in a table where the previous reorganization left off.	Available only when one of these reorganization types is selected: ○ Compact ○ Forwarded rows ○ Reclaim space ○ Defragmentation, and resuming reorganization on a single table is feasible.
Time	Specify the length of time allowed for running reorganization.	Available only when one of these reorganization types is selected: ○ Compact ○ Forwarded rows ○ Reclaim space ○ Defragmentation
Skip compact extents	Specify the occupancy threshold of the extent. SAP ASE reorganizes only the extents for which compactness falls below the occupancy threshold;	Available only when Defragmentation is selected.

Option	Description	Restrictions
	extents with a compactness higher than the threshold are not reorganized. The compactness of an extent is measured as the percentage range (1 – 100) occupancy in that extent (80 is the default). Compactness = (Total space occupied in an extent / Total space in an extent) x 100.	

8. Review the Summary page and click *Finish*.

Related Information

Enabling Granular Permissions [page 72]

9.4.5.3 Reorganizing Table Partitions

Reorganize a table partition to improve performance.

Prerequisites

You must be a system administrator, or have `reorg any table` permissions when granular permissions is enabled.

Context

Reorganization is not available for all-pages-locked tables.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of the following:
   - *User Tables*
   - *Proxy Tables*
   - *System Tables*

- *Temporary Databases*
- *Proxy Tables*

3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Partitions*.
6. Click the Name field of the partition, then click the drop-down arrow and select *Reorganize*.
7. On the commands screen, select the type and level of reorganization.

Option	Description	Restrictions
Compact	Reclaim space and remove row forwarding.	Not supported with all-pages-locked tables.
Defragmentation	Reorganize data and allow concurrent reads or writes.	Not supported with: ○ Tables without an index (tables must have at least one index) ○ System tables ○ All-pages-locked tables
Forwarded rows	Remove row forwarding.	Not supported with all-pages-locked tables.
Rebuild	—	Not supported with table partitions.
Reclaim space	Reclaim unused page space resulting from deletions and row-shortening updates.	Not supported with all-pages-locked tables.

8. On the Options screen, select your reorganization options.

Option	Description	Restrictions
Compress	Compress the rows affected by the reorganization.	Available only when one of the following is selected: ○ Compact ○ Forwarded rows ○ Reclaim space
Resume	Start reorganization at the point in a table where the previous reorganization left off.	Available only when one of the following is selected: ○ Compact ○ Forwarded rows ○ Reclaim space ○ Defragmentation, and resuming reorganization on a single table partition is feasible.
Time	Specify the length of time allowed for running reorganization.	
Skip compact extents	Specify the occupancy threshold of the extent. SAP ASE reorganizes only the extents for which compactness	Available only when Defragmentation is selected.

Option	Description	Restrictions
	falls below the occupancy threshold; extents with a compactness higher than the threshold are not reorganized. The compactness of an extent is measured as the percentage range (1 – 100) occupancy in that extent (80 is the default). Compactness = (Total space occupied in an extent / Total space in an extent) x 100.	

9. Review the Summary page and click *Finish*.

Related Information

Enabling Granular Permissions [page 72]

9.4.5.4 Reorganizing Indexes

Reorganize an index to improve performance.

Prerequisites

You must be a system administrator, or have `reorg any table` permissions when granular permissions is enabled.

Context

Reorganization is not available for all-pages-locked tables.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of the following:

- *User Tables*
- *System Tables*
- *Temporary Databases*
- *Proxy Tables*

3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Indexes*.
6. Click the Name field of the index, then click the drop-down arrow and select *Reorganize*.
7. On the Analysis page, review the space utilization information to confirm that reorganization is needed.

   If space utilization is low, run reorganization.

   See *Performance and Tuning Series: Improving Performance with Statistical Analysis*.

   Space utilization is 0 when row count is equal to 0. For derived statistics on space utilization, the row count is based on the information from `systabstats`.
8. On the Commands page, select the type and level of reorganization.

Option	Description	Restrictions
Compact	—	Not supported with indexes.
Defragmentation	—	Not supported with indexes.
Forwarded rows	—	Not supported with indexes.
Rebuild	○ Remove row forwarding and reclaim unused page space. ○ Rewrite all rows to accord with a clustered index for a table, if it has one. ○ Write rows to data pages to accord with any changes made in space management settings through `sp_chgattribute`. ○ Drop and re-create all indexes belonging to the table.	Requires that the select into database option is set to true. Not supported with system tables. Rebuilding an index on an all-pages-locked table is not supported.
Reclaim space	Reclaim unused page space resulting from deletions and row-shortening updates.	

9. If you selected *Reclaim space* in the previous screen, select your reorganization options:
   - *Compress* – compress the rows affected by the reorganization.
   - *Resume* – start reorganization at the point in a table where the previous reorganization left off.
   - *Time* – specify the length of time allowed for running reorganization.
10. Review the Summary page and click *Finish*.

Related Information

Enabling Granular Permissions [page 72]

9.4.5.5 Reorganizing Index Partitions

Reorganize an index partition to improve performance.

Prerequisites

You must be a system administrator, or have `reorg any table` permissions when granular permissions is enabled.

Context

Reorganization is not available for all-pages-locked tables.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of the following:
   - *User Tables*
   - *System Tables*
   - *Temporary Databases*
   - *Proxy Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Indexes*.
6. Click the Name field of the index, then click the drop-down arrow and select *Properties*.
7. In the left pane, click *Index Partitions*.
8. Click the Name field of the index partition, then click the drop-down arrow and select *Reorganize*.
9. On the Analysis page, review space utilization to confirm that reorganization is needed.

   If space utilization is low, run reorganization.

See *Performance and Tuning Series: Improving Performance with Statistical Analysis*.

Space utilization is 0 when row count is equal to 0. For derived statistics on space utilization, the row count is based on the information from `systabstats`.

10. On the Commands page, select the type and level of reorganization.

Option	Description	Restrictions
Compact	—	Not supported with index partitions.
Defragmentation	—	Not supported with index partitions.
Forwarded rows	—	Not supported with index partitions.
Rebuild	○ Remove row forwarding and reclaim unused page space. ○ Rewrite all rows to accord with a clustered index for a table, if it has one. ○ Write rows to data pages to accord with any changes made in space management settings through `sp_chgattribute`. ○ Drop and re-create all indexes belonging to the table.	Requires that the select into database option is set to true. Not supported with system tables. Rebuilding an index partition on an all-pages-locked table is not supported.
Reclaim space	—	Not supported with index partitions

11. Review the Summary page and click *Finish*.

Related Information

Enabling Granular Permissions [page 72]

9.4.5.6 Status Messages

Reorganizing large amounts of data may take a long time. During reorganization, you can view the status and possible errors.

Reorganization commands run asynchronously. The process bar displays the percentage of reorganization completed. You can also view the total commands, executed commands, and errors reported during your reorganization.

Cancel – cancels the unexecuted reorganization commands.

Close – closes the Reorganization Result window and continues to run the reorganization commands in the background.

Tables excluded from reorganization depend on the Reorganization option selected.

If you select Rebuild:

- Tables with the database option 'select into' set to off are excluded.
- System tables are excluded.

If you select Defragmentation:

- Tables without indexes are excluded.
- System tables are excluded.
- Tables using all pages locking scheme are excluded.

If Compact, Forwarded Rows, or Reclaim space is selected:

- Tables using all pages locking scheme are excluded.

9.4.6 Setting Table or Column Permissions

Grant or revoke permissions on tables or columns for users, groups, and roles.

You can grant and revoke permissions on a table based on the grantee type; users, groups, or roles, then select a specific grantee. You can grant or revoke permission for specific columns belonging to a table.

You can also grant permission with predicated privileges, which are privileges subject to conditions that are evaluated when data is accessed. Row-level access control can be granted on a given object based on conditions expressed through a general SQL `where` clause.

As an example of the `where` clause in a SQL statement, the following describes how to grant access to a group of engineers, allowing each member to see only his or her own salary and the salary of any direct reports.

```
grant select on emp (eng_salary)
  where eng_name = USER or
  engr = USER to eng_role
```

> **i** Note
>
> To grant or revoke predicated privileges, set the configuration parameter `enable predicate privileges` to 1.

9.4.6.1 Granting Table Permissions

Grant table access permission to users, groups, or roles.

Context

Table owners and database owners can grant database object permissions on a table.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
   - *User Tables*
   - *Proxy Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Permissions*.
6. In the right pane, click *Grant* to grant access permissions for the selected object.
7. On the Welcome page, select the type of grantee:
   - *Users*
   - *Groups*
   - *Roles*
8. On the Grantee page, select one or more grantees.
9. On the Columns and Options page, select the columns on which to set permissions.
10. On the Permission screen:
    a. Select the types of permissions allowed for the selected grantees.

Select	Look at information in a table or view.
Insert	Insert rows into a table or view.
Delete	Delete rows from a table or view.
Update	Update rows in a table or view. This may be granted on a set of columns in a table only.
References	Create indexes on a table, and to create foreign keys that reference a table.
Transfer	Incremental transfer.
Identity_insert	(Available when granular permissions is enabled) Explicitly insert a value into an IDENTITY table.
Identity_update	(Available when granular permissions is enabled) Explicitly update the value of the IDENTITY on a table.

    b. (Optional) Click *With grant option* to allow the specified users to grant object access permissions to other users.
    c. (Optional) Click *With predicated privileges*.
    d. Enter the `where` search conditions.

The search conditions act as a row filter, with the `where` clause specified on `select`, `update`, or `delete`. Search conditions can use all syntax allowed in a generic `where` clause.

e. (Optional) Enter a correlation name.
The correlation name is an alias for referencing columns in the selected table within the `where` clause.

f. (Optional) Enter a name for the predicate.

11. (Optional) Click *Summary* to review your selected options.

Related Information

Revoking Table Permissions [page 211]
Granting Column Permissions [page 212]
Revoking Column Permissions [page 214]

9.4.6.2 Revoking Table Permissions

Revoke table access permissions from users, groups, or roles.

Prerequisites

To grant or revoke predicated privileges, set the configuration parameter `enable predicate privileges` to 1.

Context

Table owners and database owners can revoke database object permissions from a table.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
   - *User Tables*
   - *Proxy Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.

- Click the *Actions* button.

4. Select *Properties*.
5. Select *Properties*.
6. In the left pane, click *Permissions*.
7. In the right pane, select the grantee and click *Revoke*.
   In the Revoke Permissions window, each type of permission is listed. Currently granted permissions are indicated by a check mark. Permissions with predicated privilege are indicated by the letter "p" under a check mark.
8. Choose one of:
   - Click *Revoke all permission* to revoke all permissions shown in the Revoke Permissions window.
   - Click individual cells to revoke the currently granted permissions. The cell changes to show an "x," indicating that the permission type is no longer granted.
   - Click *Revoke all permission with predicate* to revoke all permissions with a predicate shown in the Revoke Permissions window.

   Click *Predicate* to see details of the predicate search condition.
9. (Optional) Click *Preview* to see the SQL statements for your command.

Related Information

Granting Table Permissions [page 209]
Granting Column Permissions [page 212]
Revoking Column Permissions [page 214]

9.4.6.3 Granting Column Permissions

Grant column access permission to users, groups, or roles.

Prerequisites

To grant or revoke predicated privileges, set the configuration parameter `enable predicate privileges` to 1.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:

- *User Tables*
- *Proxy Tables*

3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Columns*.
6. Click the Name field of the column, then click the drop-down arrow and select *Properties*.
7. In the left pane, click *Permissions*.
8. In the right pane, click *Grant* to grant access permissions for the selected column.
   You see the Grant Permission wizard.
9. On the Welcome page, select the type of grantee:
   - *Users*
   - *Groups*
   - *Roles*
10. On the Grantee page, select one or more grantees.
11. On the Permission page:
    a. Select the types of permissions allowed for the selected grantees.

Option	Description
Select	Look at information in a table or view
Update	Update rows in a table or view. This may be granted on a set of columns in a table only
References	Create indexes on a table, and to create foreign keys that reference a table

    b. (Optional) Click *With grant option* to allow the specified users to grant object access permissions to other users.
    c. (Optional) Click *With predicated privileges*.
    d. Enter the `where` search conditions.
       The search conditions act as a row filter, with the `where` clause specified on `select`, `update`, or `delete`. Search conditions can use all syntax allowed in a generic `where` clause.
    e. (Optional) Enter a correlation name.
       The correlation name is an alias for referencing columns in the selected table within the `where` clause.
    f. (Optional) Enter a name for the predicate.
12. (Optional) Click *Preview* to see the SQL statements for your command.

Related Information

Granting Table Permissions [page 209]
Revoking Table Permissions [page 211]
Revoking Column Permissions [page 214]

9.4.6.4 Revoking Column Permissions

Revoke table access permissions from users, groups, or roles.

Prerequisites

To grant or revoke predicated privileges, set the configuration parameter `enable predicate privileges` to 1.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
   - *User Tables*
   - *Proxy Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Columns*.
6. Click the Name field of the column, then click the drop-down arrow and select *Properties*.
7. In the left pane, click *Permissions*.
8. In the right pane, select the grantee and click *Revoke*.
   In the Revoke Permissions window, each type of permission is listed. Currently granted permissions are indicated by a check mark. Permissions with predicated privilege are indicated by the letter "p" under a check mark.
9. Choose one of:
   - Click *Revoke all permission* to revoke all permissions shown in the Revoke Permissions window.
   - Click individual cells to revoke the currently granted permissions. The cell changes to show an "x," indicating that the permission type is no longer granted.
   - Click *Revoke all permission with predicate* to revoke all permissions with a predicate shown in the Revoke Permissions window.

   Click *Predicate* to see details of the predicate search condition.
10. (Optional) Click *Preview* to see the SQL statements for your command.

Related Information

Granting Table Permissions [page 209]

Revoking Table Permissions [page 211]
Granting Column Permissions [page 212]

9.4.7 Creating a User or Proxy Table

Create a user or proxy table to store and provide access to user data.

Context

A proxy table is a user table that allows you to access data in a remote table, view, remote procedure call, directory, or file. A proxy table has all the attributes of a user table, such as columns, indexes, and triggers, but it does not contain any data locally.

> **i** Note
>
> Only a database owner or a user with create table permission can create a table.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
   - *User Tables*
   - *Proxy Tables*
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.
5. On the Introduction page, select the server, database, and owner for the new table.
6. Enter a name for the table.
7. Enter the SQL statements for the new table and related table objects.

   For example, this SQL statement creates a table called `titles` in the pubs2 database:

```
create table titles
(title_id tid,
title varchar(80) not null,
type char(12),
pub_id char(4) null,
price money null,
advance money null,
royalty int null,
total_sales int null,
notes varchar(200) null,
pubdate datetime,
contract bit not null)
```

8. (Optional) Click *Summary* to review your selected options.
9. Click *Finish* to create the table.

9.4.8 Creating a Column

Add a column to an existing table.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
   - *User Tables*
   - *Proxy Tables*
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Columns*.
6. Select *New*.
7. On the Column Name page, enter the name of the column.
8. On the SQL Editor page, modify the SQL statement for the selected table to include the new column and related objects syntax.
9. (Optional) Click *Summary* to review your selected options.

9.4.9 Creating an Index

An index provides quick access to data in a table, based on the values in specified columns.

Context

An index is created on one or more table columns and points to the place where the column data is stored on disk. Indexes speed data retrieval and are useful for enforcing referential integrity. A table can have more than one index.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
   - *User Tables*
   - *Proxy Tables*
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Indexes*.
6. Select *New* > *Index*.
7. On the Name screen, enter a name for the index.
8. On the Columns page, select the columns to include in the index.
9. (Optional) Click *Add index column expression*.
   a. Select *Asc.* or *Desc.* as the order of the index expression.
   b. (Optional) Enter a name for the expression.
10. On the Database Segment page, select the database segment on which to place the index.
11. On the Database Cache page, select a data cache for the index.
12. (Optional) On the Key Type page, select either or both of:
    - *Make this index unique* – If the index is unique, you can ignore duplicate keys in the Duplicate Keys/Row window.
    - *Make this index clustered* – If the index is clustered, specify how you want the server to handle requests to insert duplicate rows in a table in the Duplicate Keys/Row window.
13. (Optional) On the Duplicate Key page:
    - Click *Ignore duplicate keys* to ignore duplicate keys rather than abort the transaction.
    - Choose whether to allow or ignore duplicate rows in a table.
14. (Optional) On the Space Management page:
    a. Specify the percentage amount to fill a page when the index is created.
    b. Specify the number of rows allowed on pages.
    c. Specifying a ratio of empty pages to filled pages.
15. (Optional) On the Index Compression page, specify whether or not to apply index compression.
16. (Optional) On the Cache Strategy page, specify the cache strategy when creating the index:
    - *Most recently used replacement* – reads new pages into the LRU end of the chain of buffers in cache. The pages are used and immediately flushed when a new page enters the MRU end. This strategy is advantageous when a page is needed only once for a query. It tends to keep such pages from flushing out other pages that can potentially be reused while still in cache.
    - *Large buffer prefetch* – if memory pools for large I/O are configured for the cache used by a table or an index, the optimizer can prefetch data or index pages by performing large I/Os of up to eight data pages at a time. This prefetch strategy can be used on the data pages of a table or on the leaf-level pages of a nonclustered index. By default, prefetching is enabled for all tables, indexes, and text or image objects. Setting the prefetch option to off disables prefetch for the specified object.

- *Data already sorted* – if data is already sorted, this option saves index creation time.
- *Online*– create indexes without blocking access to the data you are indexing.
  Restrictions:
  - User tables must include a unique index to use the `create clustered index ... online` command (creating nonclustered indexes does not have this restriction).
  - You can run `create index ... online` with a `pll sort` only on round robin partitioned tables
  - If you issue an `insert`, `delete`, `update`, or `select` command while `create index … online` or `reorg … online` are in the logical synchronization blocking phase:
    - The `insert`, `delete`, `update`, or `select` commands may wait and execute after `create index … online` or `reorg … online` are finished
    - SAP ASE may issue error message 8233.
  - You cannot:
    - Run `dbcc` commands and utility commands, such as `reog rebuild`, on the same table while you are simultaneously running `create index ... online`.
    - Run more than one iteration of `create index ... online` simultaneously.
    - Perform a `dump transaction` after running `create index ... online`. Instead, you can:
      - Run `create index ... online`, then dump the database, or
      - Run a blocking `create index`, then issue `dump transaction`.
    - Run `create index ... online` within a multistatement transaction.
    - Create a functional index using the `online` parameter

17. (Optional) On the Local Partition page, specify whether to create a local partitioned index.
18. (Optional) Click *Summary* to review your selected options.
19. Click *Finish* to create the index.

9.4.10 Deleting a Table

Delete tables.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables* and select the table type.
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Delete*.
5. Confirm the deletion.

   To zero out residual data, which may be visible to a user using the `dbcc` utility after you delete the table, select *Erase Residual Data*. You cannot use *Erase Residual Data* on tables that were created on a user database earlier than SAP ASE version 16.0.

6. Click *Finish*.

9.4.11 Deleting an Index

Delete indexes created on user tables.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables* > *User Tables*.
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Indexes*.
6. Click the Name field of the index, then click the drop-down arrow and select *Delete*.
7. Confirm the deletion.

   To zero out residual data, which may be visible to a user using the `dbcc` utility after you delete the index, select *Erase Residual Data*. You cannot use *Erase Residual Data* on indexes for tables that were created on a user database earlier than SAP ASE version 16.0.
8. Click *Finish*.

9.4.12 Table Properties

Display or modify device usage, compression, permissions, cache, and the locking scheme.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
   - *User Tables*
   - *Proxy Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.

4. Select *Properties*.
5. View or modify properties.

Pages	Properties

General	○ Name – specify a different table name.
	○ Using cache – select the cache to bind to the table.
	○ Identity gap – specify how ID numbers are allocated in memory. For example, a value of 10 indicates ID numbers are allocated in memory in blocks of 10.
	○ Data compression – specify the type of data compression.
	○ Index compression – specify whether to apply index compression.
	○ LOB compression – specify the level of compression.
	○ Enable incremental transfer – allows you to transfer data incrementally, and, if required, to a different product. The incremental transfer feature must be available on the selected server.
	○ Erase residual data – specify whether to remove residual data that is left over after some database operations. The options are:
	  ○ (Default) Off
	  ○ On
	  ○ Explicit off – allows you to override the "`erase residual data`" setting when it is turned on for a user table.

Usage	○ Usage – assigns space allocation for a table on a particular segment and segments to a device. Objects cannot grow beyond the space available in the segment's device. ○ Show – select the units of measurement. **i Note** The value displayed for *Spaced Reserved* on the Usage screen includes unused space and the spaced used by Object Allocation Map (OAM), data, and index. The value displayed for *Unused* on the Usage screen accounts for space used by Object Allocation Map (OAM). The value of the unused space can differ from a query for unused space that is preformed directly on the SAP ASE server through the administration console, which does not include OAM.
Permission	grant or remove table permissions and predicated privileges for users, groups, or roles. Decrypt permission is visible if `encrypted columns` is enabled in the server. Transfer permission is visible if `incremental transfer` is enabled on the table.

Pages	Properties
Lock Scheme	specify the locking scheme to set how much data is locked at one time. For more information about locking scheme, see Granularity of locks and locking schemes in *Performance and Tuning: Locking*.
Data	Displays the table data or table contents.
Referenced By	Displays the name, object type, and owner of objects that reference the specified table.
References	Displays the name, object type, and owner of objects of the specified reference.
Columns	Displays each column belonging to the table. Clicking the column name opens the properties window for the selected column.
Indexes	Displays each index belonging to the table. Clicking the index name opens the properties window for the selected index.
Triggers	Displays each trigger belonging to the table. Clicking the trigger name opens the properties window for the selected trigger.
Foreign Keys	Displays each foreign key belonging to the table. Clicking the foreign key name opens the foreign key window for the selected index.
Check Constraints	Displays each check constraint belonging to the table. Clicking the check constraint name opens the properties window for the selected check constraint.
Partitions	Displays each partition for the table. Clicking the partition name opens the properties window for the selected partition.

Related Information

Index Properties [page 223]
Trigger Properties [page 363]
Foreign Key Properties [page 374]
Check Constraint Properties [page 376]
Partition Properties [page 288]
Column Properties [page 222]

9.4.13 Column Properties

Use the Columns Properties window to change permissions, create check constraints, specify encryption keys, and bind rules and defaults to columns.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
   - *User Tables*
   - *Proxy Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Columns*.
6. In the right pane, click the Name field of the column, then click the drop-down arrow and select *Properties*.
7. View or modify properties.

Pages	Properties
General	○ Name – specify a different table name. ○ Datatype – change the datatype of the column, and depending on the datatype, the width and scale. ○ Primary key – constrains the values in the indicated column or columns so that no two rows have the same value, and so that the value cannot be NULL. ○ Allow nulls – specifies that SAP ASE assign a null value if a user does not provide a value. ○ Identity – indicates that the column has the IDENTITY property. Each table in a database can have one IDENTITY column with a datatype of either: exact numeric and a scale of 0, or of the integer datatypes, including signed or unsigned bigint, int, smallint, or tinyint. ○ Object storage specifier – specifies whether a Java-SQL column is stored separately from the row (off row) or in storage allocated directly in the row (in row). ○ Data compression – supported only on user tables.
Rules and Defaults	○ Default – specify a default value that appears in the column if no value is entered for an insertion or update. ○ Rule binding – bind rules to columns to provided criteria against which is SAP ASE checks data entered for an insertion or update.

Pages	Properties
Check Constraints	Creates filters that data must pass through before the data can be inserted into a table.
Permissions	You can grant and revoke permissions on a column or a table.
Encryption	You can specify an encryption key for column encryption and optionally a default value when you do not have decrypt permission. See the *Encrypted Columns Users Guide*.

Related Information

Index Properties [page 223]
Trigger Properties [page 363]
Foreign Key Properties [page 374]
Check Constraint Properties [page 376]
Partition Properties [page 288]
Table Properties [page 219]

9.4.14 Index Properties

Modify cache bindings, specify a device segment, or change index values.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
   - *User Tables*
   - *Proxy Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Indexes*.
6. In the right pane, click the Name field of the index, then click the drop-down arrow and select *Properties*.
7. View or modify properties.

Pages	Properties
General	○ Name – specify a different index name. ○ Unique – prohibits duplicate index values. ○ Clustered – physical order of rows on the current database device to be the same as the indexed order of the rows. ○ Suspect – indicates the integrity of the index is suspect. ○ Using cache – specifies the current cache binding. ○ Bind to – change the cache binding. ○ Index compression – specify whether to apply index compression.
Columns	Displays the columns used in the index.
Miscellaneous	○ Segment – change the segment on which the index is placed. ○ Duplicate keys – indicates if duplicate keys are allowed. ○ Duplicate rows – indicates if duplicate rows are allowed. ○ Data presorted – indicates the index data has been presorted. ○ Cache strategy – you can specify the strategy for determining where in cache to place data pages when reading in new data. You can also choose to prefetch index pages by performing large I/Os of up to eight data pages simultaneously. ○ Rows per page – limits the number of rows on data pages and the leaf-level pages of indexes. ○ Reserve page gap – specifies a ratio of filled pages to empty pages to be left during extent I/O allocation operations. ○ Fill factor – specifies how full each page is made when a new index is created on existing data.
Index Partitions	Displays the name, segment, and creation date.

Related Information

Trigger Properties [page 363]
Foreign Key Properties [page 374]
Check Constraint Properties [page 376]
Partition Properties [page 288]
Table Properties [page 219]
Column Properties [page 222]

9.5 Devices

Create, delete, and generate data definition language for database, device, and dump devices.

9.5.1 Displaying a Device Object

View database and in-memory device objects.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Devices*.
3. Select:
   - *Database Devices* to view a list of database devices
   - *In-Memory Devices* to view a list of in-memory devices

   Both lists display:
   - *Name* – name of the database device.
   - *Server* – name of the server in which the database resides.
   - *Size* – amount of space, in megabytes, used by the device.
   - *Unused size* – the amount of unallocated space, in megabytes, for the device.
   - *Physical name* – name of the physical device.

9.5.2 Creating a Database Device

Create new database devices.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Devices*.
3. Click *Database Devices*.
4. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.

5. Select *New*.
6. On the Device Name and Path page, enter:
   - Device name – the logical device name used in the `create database` and `alter database` commands.
   - Device path – the physical device name, usually in the form of a full path for the new file, or in UNIX, a raw device partition. If you do not specify a device path, this field is filled with the device name along with a `.dat` file extension.
7. On the Advanced Options page, specify:
   - The device size, in megabytes
   - The device number – a unique number that identifies this device on the server. A default device number is provided.
   - Starting address – the virtual starting address, or the offset, for the server to begin using the database device. Defines the starting address for this device, and is a virtual offset in 2KB blocks. The default is 0. See *Other optional parameters for* `disk init` in the *System Administration Guide* for information about `vstart`.
   - Skip initialization of device – select to speed up the resizing of the device.
8. Select a write option:
   - Data sync – ensures that writes to the database device occur on the physical storage medium. This allows the server to recover data from the device when a system failure occurs.
   - Direct IO – transfers the data directly to disk, bypassing the operating system's buffer cache.
   - Cached IO – turns off the data sync option, and any writes to the database device are buffered into the file system. During system failures, the server does not recover any data that has not been updated to the physical medium.
9. (Optional) On the Mirroring page, you can click *Mirror the database device* and specify the path for the duplicate device.

> **i** Note
>
> If the server is not configured to enable disk mirroring, the options for the Mirroring page are unavailable.

9.5.3 Modifying Device Sizes

Increase the size of devices.

Procedure

1. From the SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *Devices.*
3. In the right pane, select a device, and click the arrow to the right of the name.
4. Select *Resize*.
   The device resize dialog is displayed with the name of the selected device, allocated size, input field for increased size, unit of size, and an option that allows you to specify whether to initialize the device.

5. Enter the amount by which to increase the device size.
   The dialog box now displays the new device size that is calculated based on the input. If there is an error, it is indicated in the dialog box.
6. Click *OK*.
   For more information on devices, see the *System Administration Guide Volume 2*, .

9.5.4 Creating an In-Memory Device

Create an in-memory device, or a cache device, in a cache created for an in-memory database. This device resides on an in-memory storage cache, and allows you to create in-memory databases.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Devices*.
3. Click *In-Memory Devices*.
4. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *New*.
6. On the Device Name page, enter the logical device name, which the server uses in its `create database` and `alter database` commands.
7. The In-Memory Storage page displays a list of caches on which to create your in-memory device. On this screen, you can:
   - Add – displays the Specify Cache Device and Size wizard page, and lets you choose a cache to create the device in. The default size of an in-memory device is 6MB. If the in-memory storage is smaller than 6MB, the device size automatically matches the in-memory storage size.
   - Edit – allows the in-memory device to require more space from the in-memory storage. You cannot, however, increase the size of the storage itself.
   - Remove – removes the selected cache.

9.5.5 Creating a Dump Device

Create a dump device on a server. A dump device is a tape, partition, or file used for database or transaction dumps.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Devices*.
3. Click *Dump Devices*.
4. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *New*.
6. On the Introduction page, select the server on which to create the dump device.
7. On the Device Name and Path page, enter the name of the dump device and the physical device path.
8. On the Advanced Options page, specify the type of device to create the disk or tape dump device. If you select a tape device, enter its size, in megabytes.

9.5.6 Database Device Properties

Display or modify device's, as well as analyze its mirror status, databases that occupy the space on the device, and segments contained in the device.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Devices*.
3. Click *Database Devices*.
4. In the right pane, select a device, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Properties*.
6. View or modify properties.

Pages	Properties
General	○ Name and type of device ○ Physical name and path ○ Space allocated – you can change the value, which is in megabytes. ○ Default device – specify whether to set this device as the default device. ○ Write option – choose data sync, direct I/O, or cached I/O (data sync off) for this device.
Mirror	Displays whether disk mirroring is enabled. If it is, you can select: ○ Mirror device – turn on mirror device, choose whether the mirror is written after the primary is written or in parallel with parallel writes, and specify the mirror path in a file name relative to the server. ○ Disable mirror – select either the primary or secondary device to disable, and whether this disabling is temporary or permanent.
Databases	Displays a list of databases that occupy space on the device. Click *Properties* to see the database properties without going to the Database view.
Segments	Displays a list of segments contained in the device. Click *Properties* to view segment properties without going into the segment view.

9.5.7 In-Memory Device Properties

Display or modify in-memory devices, or analyze the list of databases and segments contained in the in-memory device.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Devices* .
3. Click *In-Memory Devices*.
4. In the right pane, select a device, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Properties*.
6. View or modify properties.

Pages	Properties
General	○ In-memory storage object name ○ Type information ○ Status ○ Current size – check the size of the in-memory device's storage by pages, kilobytes, megabytes, or gigabytes.
In-Memory Database	The in-memory database created on the in-memory device. Click *Properties* to see the database properties.
Segment	A list of segments contained in the in-memory device. Click *Properties* to see the segment properties without going into the Segment view.

9.5.8 Dump Device Properties

Display of modify a dump device.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Devices*.
3. Click *Dump Devices*.
4. In the right pane, select a device, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Properties*.
6. View or modify properties.
7.

Pages	Properties
General	○ Name – the name of of the dump device. ○ Type – the type of dump device, such as tape device. ○ Physical name – the full path of dump device. ○ Capacity (MB) – the storage capacity, in megabytes.

9.5.9 Generating DDL for a Device

Generate a DDL script for devices.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Devices*.
3. Select one of:
   - *Database Devices*
   - *In-Memory Devices*
   - *Dump Devices*
4. In the right pane, select a device, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Generate DDL*.
6. (Optional) Click *Save* to export and save the DDL statement.
   You can save the DDL in an external file on your local file system.

9.5.10 Deleting a Database, In-Memory, or Dump Device

Delete database, in-memory, or dump devices.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Devices*.
3. Select one of:
   - *Database Devices*
   - *In-Memory Devices*
   - *Dump Devices*
4. In the right pane, select a device, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Delete*.
6. Confirm the deletion.

7. Click *Finish*.

9.6 Databases

Create databases, modify their properties, and perform other administrative tasks.

9.6.1 Creating a User Database

Create a user database.

Prerequisites

Consider these database attributes:

- Size:
  - `sp_estspace` helps you estimate table and index space requirements based on the definition of a specific table.
  - Space for planned views, stored procedures, defaults, rules, and triggers.
  - Size of the transaction log.
  - Space for anticipated expansion.
- Database device location, and whether there is enough space on that device.
- Transaction log location – SAP recommends that you store the transaction log on a different device than the data.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Click *User Databases*.
4. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *New*.
6. On the Introduction page, select the server in which to create a database.
7. On the Database page, enter the name of the database you want to create.

8. (Optional) On the Devices page, enter the size of the new database. If you do not enter a size, the default size allocated is 3MB. You can specify separately the amount of space to allocate to the log and data segments.
9. (Optional) On the Options page, choose:
    - (Not recommended) *With override* to store the log and data on the same logical device.
    - *For load* to use the database for loading a database dump.

    If you created a database encryption key, you can select *Encrypt this database*, then specify the name of the database encryption key.
10. (Optional) On the Durability Level page, choose one of these levels to improve server performance by reducing the recoverability in case of a system failure:
    - NO_RECOVERY – there is no guarantee that, at runtime, committed transactions are written to the disk.
    - AT_SHUTDOWN – all committed transactions are written to disk during a normal server shutdown.
    - FULL – a complete recovery of committed transactions is possible after a system failure.
11. (Optional) On the Data Compression page, choose:
    - Data compression for the entire database – either page-level or row-level compression. If you choose neither option, then data is not compressed.
    - LOB compression – from levels 0 – 9, 100, or 101.
    - In-row LOB length – the length of the LOB column to be saved in-row. To disallow in-row LOB storage in the database, set the length to 0.
12. (Optional) Use the Guest User page, to create a guest user who can access the database with limited privileges.
13. (Optional) Click *Summary* to view your selected options.

Related Information

Creating a Temporary Database [page 235]
Creating a Proxy Database [page 234]
Creating an Archive Database [page 236]
Creating an In-Memory Database [page 238]
Creating an In-Memory Temporary Database [page 239]
Creating a Temporary Database Group [page 245]
Mounting a Database [page 253]
Database Properties [page 246]
Creating a Database Encryption Key [page 94]

9.6.2 Creating a Proxy Database

Create a proxy database.

Prerequisites

Consider these database attributes:

- Size:
  - `sp_estspace` helps you estimate table and index space requirements based on the definition of a specific table.
  - Space for planned views, stored procedures, defaults, rules, and triggers.
  - Size of the transaction log.
  - Space for anticipated expansion.
- Database device location, and whether there is enough space on that device.
- Transaction log location – SAP recommends that you store the transaction log on a different device than the data.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Click *Proxy Databases*.
4. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *New*.
6. On the Introduction page, select the server in which to create a database.
7. On the Database page, enter the name of the database you want to create.
8. (Optional) On the Devices page, enter the size of the new database. If you do not enter a size, the default size allocated is 3MB. You can specify separately the amount of space to allocate to the log and data segments.
9. (Optional) On the Default Location page, enter the name of the remote location where you want to store your proxy database. Select *For Proxy Update* to automatically get metadata from the remote location while creating proxy tables.
10. (Optional) Click *Summary* to view your selected options.

Related Information

Creating a User Database [page 232]

Creating a Temporary Database [page 235]
Creating an Archive Database [page 236]
Creating an In-Memory Database [page 238]
Creating an In-Memory Temporary Database [page 239]
Creating a Temporary Database Group [page 245]
Mounting a Database [page 253]
Database Properties [page 246]

9.6.3 Creating a Temporary Database

Create a temporary database.

Prerequisites

Consider these database attributes:

- Size:
  - `sp_estspace` helps you estimate table and index space requirements based on the definition of a specific table.
  - Space for planned views, stored procedures, defaults, rules, and triggers.
  - Size of the transaction log
  - Space for anticipated expansion.
- Database device location, and whether there is enough space on that device.
- Transaction log location – SAP recommends that you store the transaction log on a different device than the data.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Click *Temporary Databases*.
4. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *New*.
6. On the Introduction page, select the server in which to create a database.
7. On the Database page, enter the name of the database you want to create.
8. (Optional) On the Devices page, enter the size of the new database. If you do not enter a size, the default size allocated is 3MB. You can specify separately the amount of space to allocate to the log and data segments.

9. (Optional) On the Options page, choose:
    - (Not recommended) *With override* to store the log and data on the same logical device.
    - *For load* to use the database for loading a database dump.
    - Specify a template database that is copied over to create the in-memory database.
10. (Optional) On the Data Compression page, choose:
    - Data compression for the entire database – either page-level or row-level compression. If you choose neither option, then data is not compressed.
    - LOB compression – from levels 0 – 9, 100, or 101.
    - In-row LOB length – the length of the LOB column to be saved in-row. To disallow in-row LOB storage in the database, set the length to 0.

    If you created a database encryption key, you can select *Encrypt this database*, then specify the name of the database encryption key.
11. (Optional) On the Temporary Database Group page, select the database group that the temporary database belongs to.
12. (Optional) Click *Summary* to view your selected options.

Related Information

Creating a User Database [page 232]
Creating a Proxy Database [page 234]
Creating an Archive Database [page 236]
Creating an In-Memory Database [page 238]
Creating an In-Memory Temporary Database [page 239]
Creating a Temporary Database Group [page 245]
Mounting a Database [page 253]
Database Properties [page 246]
Creating a Database Encryption Key [page 94]

9.6.4 Creating an Archive Database

Create an archive database.

Prerequisites

Consider these database attributes:

- Size:
    - `sp_estspace` helps you estimate table and index space requirements based on the definition of a specific table.

- Space for planned views, stored procedures, defaults, rules, and triggers.
- Size of the transaction log.
- Space for anticipated expansion.

- Database device location, and whether there is enough space on that device.
- Transaction log location – SAP recommends that you store the transaction log on a different device than the data.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Click *Archive Databases*.
4. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *New*.
6. On the Introduction page, select the server in which to create a database.
7. On the Database page, enter the name of the database you want to create.

   To enter the name of an archive database, you must first select a scratch database. You can mark a database as a scratch database by selecting the Scratch Database option from the database property sheet.

   For information on scratch databases, see the *System Administration Guide: Volume 2*.
8. (Optional) On the Devices page, enter the size of the new database. If you do not enter a size, the default size allocated is 3MB. You can specify separately the amount of space to allocate to the log and data segments.
9. (Optional) On the Options screen, if you created a database encryption key, you can select *Encrypt this database*, then specify the name of the database encryption key.
10. (Optional) Click *Summary* to view your selected options.

Related Information

Creating a User Database [page 232]
Creating a Temporary Database [page 235]
Creating a Proxy Database [page 234]
Creating an In-Memory Database [page 238]
Creating an In-Memory Temporary Database [page 239]
Creating a Temporary Database Group [page 245]
Mounting a Database [page 253]
Database Properties [page 246]
Creating a Database Encryption Key [page 94]

9.6.5 Creating an In-Memory Database

Create an in-memory database.

Prerequisites

Consider these database attributes:

- Size:
  - `sp_estspace` helps you estimate table and index space requirements based on the definition of a specific table.
  - Space for planned views, stored procedures, defaults, rules, and triggers.
  - Size of the transaction log.
  - Space for anticipated expansion.
- Database device location, and whether there is enough space on that device.
- Transaction log location – SAP recommends that you store the transaction log on a different device than the data.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Click *In-Memory Databases*.
4. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *New*.
6. On the Introduction page, select the server in which to create a database.
7. On the Database page, enter the name of the database you want to create.
8. On the Devices page, enter the size of the new database. If you do not enter a size, the default size allocated is 3MB. You can specify separately the amount of space to allocate to the log and data segments.
9. (Optional) On the Options page, choose:
   - (Not recommended) *With override* to store the log and data on the same logical device.
   - *For load* to use the database for loading a database dump.
   - Specify a template database that is copied over to create the in-memory database.
10. (Optional) Use the Guest User page, to create a guest user who can access the database with limited privileges.
11. (Optional) Click *Summary* to view your selected options.

Related Information

Creating a User Database [page 232]
Creating a Temporary Database [page 235]
Creating a Proxy Database [page 234]
Creating an Archive Database [page 236]
Creating an In-Memory Temporary Database [page 239]
Creating a Temporary Database Group [page 245]
Mounting a Database [page 253]
Database Properties [page 246]

9.6.6 Creating an In-Memory Temporary Database

Create an in-memory temporary database.

Prerequisites

Consider these database attributes:

- Size:
  - `sp_estspace` helps you estimate table and index space requirements based on the definition of a specific table.
  - Space for planned views, stored procedures, defaults, rules, and triggers.
  - Size of the transaction log.
  - Space for anticipated expansion.
- Database device location, and whether there is enough space on that device.
- Transaction log location – SAP recommends that you store the transaction log on a different device than the data.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Click *In-Memory Temporary Databases*.
4. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *New*.

6. On the Introduction page, select the server in which to create a database.
7. On the Database page, enter the name of the database you want to create.
8. (Optional) On the Devices page, enter the size of the new database. If you do not enter a size, the default size allocated is 3MB. You can specify separately the amount of space to allocate to the log and data segments.
9. (Optional) On the Options page, choose:
    - (Not recommended) *With override* to store the log and data on the same logical device.
    - *For load* to use the database for loading a database dump.
    - Specify a template database that is copied over to create the in-memory database.
10. (Optional) On the Temporary Database Group page, select the database group that the temporary database belongs to.
11. (Optional) Click *Summary* to view your selected options.

Related Information

Creating a User Database [page 232]
Creating a Temporary Database [page 235]
Creating a Proxy Database [page 234]
Creating an Archive Database [page 236]
Creating an In-Memory Database [page 238]
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Mounting a Database [page 253]
Database Properties [page 246]

9.6.7 Creating an Encrypted Database

Manage the transparent encryption of databases.

Prerequisites

Before you can encrypt a database:

1. Create a master key. See Creating a Master Key [page 84].
2. Create a database encryption key. See Creating a Database Encryption Key [page 94].

Context

Full database encryption protects an entire database without affecting existing applications. Once you encrypt a database, all of its data, indexes, and transaction logs become encrypted. This encryption is transparent; so that you can perform operations on tables, indexes, and so on, as usual, without noticing any differences.

Data is encrypted at the page level. Once your database is set up as encrypted, the encryption and decryption process is automatic. Data becomes encrypted just before the page is written into disk, and decrypted as soon as the data page is loaded into memory.

Related Information

Manage Encryption Keys [page 79]

9.6.7.1 Encrypting an Existing Database

Use the Encrypt Database wizard to encrypt an existing unencrypted database.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Click *User Databases*.
4. In the right pane, select a database, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Encrypt*.
6. On the Options page:
   - Select *Encrypt* to encrypt the database.
   - Specify the database encryption key with which to encrypt the database.
   - Select *Specify the degree of parallelism* and enter a numeric value in the field.
7. (Optional) Click *Summary* to view your selected options.

Related Information

Manage Encryption Keys [page 79]

9.6.7.2 Suspending the Encryption Process

Use the Encrypt Database wizard to stop the encryption process of a database.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Click *User Databases*.
4. In the right pane, select a database, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Encrypt*.
6. On the Options page, if the database you chose is in the process of being encrypted, the only option you can choose is *Suspend encryption*.
7. (Optional) Click *Summary* to view your selected options.

Related Information

Manage Encryption Keys [page 79]

9.6.7.3 Resuming the Encryption Process

Manage the transparent encryption of databases.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Click *User Databases*.
4. In the right pane, select a database, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Encrypt*.
6. On the Options page, select *Resume encryption* to resume the encryption process.

If you have suspended the encryption process of the database, you can choose to either Resume encryption or Decrypt in the Options page.

7. Specify the degree of parallelism for the encryption.
8. (Optional) Click *Summary* to view your selected options.

Related Information

Manage Encryption Keys [page 79]

9.6.7.4 Decrypting an Encrypted Database

Use the Encrypt Database wizard to decrypt an encrypted database.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Click *User Databases*.
4. In the right pane, select a database, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Encrypt*.
6. On the Options page, if the database you chose is encrypted, the only option you can choose is *Decrypt*.
7. Specify the degree of parallelism for the decryption.
8. (Optional) Click *Summary* to view your selected options.

Related Information

Manage Encryption Keys [page 79]

9.6.7.4.1 Suspending the Decryption Process

Manage the transparent encryption of databases.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Click *User Databases*.
4. In the right pane, select a database, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Encrypt*.
6. On the Options page, if the database you chose is in the process of being decrypted, the only option you can choose is *Suspend decryption*.
7. (Optional) Click *Summary* to view your selected options.

Related Information

Manage Encryption Keys [page 79]

9.6.7.4.2 Resuming the Decryption Process

Manage the transparent encryption of databases.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Click *User Databases*.
4. In the right pane, select a database, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Encrypt*.
6. On the Options page, select *Resume decryption* to resume the encryption process.

If you have suspended the decryption process of the database, you can choose to either Resume decryption or Encrypt in the Options page.

7. Specify the degree of parallelism for the decryption.
8. (Optional) Click *Summary* to view your selected options.

Related Information

Manage Encryption Keys [page 79]

9.6.8 Creating a Temporary Database Group

Create a temporary database group.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Click *Temporary Database Groups*.
4. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *New*.
6. On the Introduction page, select the server in which to create a database group.
7. On the Group Name page, enter the name of the temporary database group.
8. On the Databases page, specify the temporary database to be added to the temporary database group.
9. On the Bindings page, select:
   - *Bind Application* to specify applications to be bound to the temporary database group.
   - *Bind Login* to specify logins to be bound to the temporary database group.

   > **i Note**
   >
   > If you change the binding of a login to a different group, the old binding is no longer valid.

10. (Optional) Click *Summary* to view your selected options.

Related Information

Creating a User Database [page 232]

Creating a Temporary Database [page 235]
Creating a Proxy Database [page 234]
Creating an Archive Database [page 236]
Creating an In-Memory Database [page 238]
Creating an In-Memory Temporary Database [page 239]
Mounting a Database [page 253]
Database Properties [page 246]

9.6.9 Database Properties

Display or modify database options, cache options and storage allocation, extend log buffers, and change the owner.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Select one of:
   - *User Databases*
   - *System Databases*
   - *Temporary Databases*
   - *Proxy Databases*
4. In the right pane, select a database, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Properties*.
6. View or modify the properties.

Pages	Properties

General	○ *Change Owner* – see Changing Ownership of a Database [page 256].
	○ Data cache – from the drop-down menu, select the cache to which you want to bind the database.
	○ Durability level – select one of:
	  ○ NO_RECOVERY – there is no guarantee that, at runtime, committed transactions are written to the disk.
	  ○ AT_SHUTDOWN – all committed transactions are written to disk during a normal server shutdown.
	  ○ FULL – a complete recovery of committed transactions is possible after a system failure.
	○ Default location – specify the default storage location for remote tables if no storage location is provided via `sp_addobjectdef`. See the section on `sysdatabases` in the *Reference Manual: Tables*.
	○ *DML logging* – enable DML logging.
	○ *Database guest user* – guest users are configured on the database.
	○ *Resynchronize proxy tables* – force resynchronization of proxy tables in the proxy databases. See the `alter database` command in the *Reference Manual: Commands* .

Devices	○ Database devices – you can add or remove devices associated with a selected database. See Modifying Database Storage Allocations [page 257]. ○ Transaction log – you can move the transaction log to a different location. See Modifying Database Storage Allocations [page 257].
Transaction Log	○ Transaction log buffer size – you can modify the I/O buffer size of the transaction log. See Modifying Transaction Log Buffer Size [page 258].
Options	○ Server configuration options – see Changing Database Options [page 259].
Usage	○ Details – displays a graph of the space used by the tables and indexes of your database. Use these values to determine if you have enough unreserved space to accommodate new database objects. ○ Largest user tables – shows the largest user tables based on space reserved, used space, and row count.

Related Information

Creating a User Database [page 232]
Creating a Temporary Database [page 235]
Creating a Proxy Database [page 234]
Creating an Archive Database [page 236]
Creating an In-Memory Database [page 238]
Creating an In-Memory Temporary Database [page 239]
Creating a Temporary Database Group [page 245]
Mounting a Database [page 253]
Changing Database Ownership [page 256]
Modifying Database Storage Allocations [page 257]
Modifying the Transaction Log Cache and the Log I/O Buffer Size [page 258]
Changing Database Options [page 259]

Viewing Database Statistics [page 170]

9.6.10 Database Administration

Perform database administrative task such as mount or unmount a database, modify the size of a database, shrink a database, check database consistency, or place a database in quiesce hold.

9.6.10.1 Shrinking a Database

Shrink databases, freeing unused space for reuse or deletion.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Select one of:
   - *User Databases*
   - *System Databases*
   - *Temporary Databases*
4. In the right pane, select a database, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Shrink*.
6. Select the device from which to release space, or select *Add* to add a device to the list.
7. On the Options page, specify the timeout period for this shrink operation.
8. On the Summary page, verify your selections.
9. Click *Finish* to perform the shrink operation.

9.6.10.2 Checking Database Consistency

Use the database consistency check to check the logical and physical consistency of a database.

Context

Regular database consistency checks detect, and often correct, index and page allocation errors resulting in corrupted tables.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Select one of:
   - *User Databases*
   - *System Databases*
   - *Temporary Databases*
   - *Proxy Databases*
   - *Archive Databases*
   - *In-Memory Databases*
   - *In-Memory Temporary Databases*
4. In the right pane, select a database, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Check Consistency*.
6. In the Database Consistency Checker wizard, choose from these options:

Option	Description
Check overall consistency	Run `dbcc checkdb`, which checks each table and index in the selected database. To skip checking nonclustered indexes on users tables, select *Ignore non-clustered indexes*; leave it unselected to check all indexes on all tables in the database. The generated report for each undamaged table shows the number of data pages and data rows.

Option	Description
Check allocation	Run `dbcc checkalloc`, which checks page allocation. To fix allocation errors, select *Fix allocation errors*. The database is automatically placed in single-user mode while executing `dbcc checkalloc`, then returned to multiuser mode when processing is complete. The generated report shows the amount of space allocated and used by each database table, including the system tables. For each table or index, the report shows the number of pages and extents (8-page blocks of allocated space) used.
Check system catalogs	Execute `dbcc checkcatalog` and check for consistency within and between the system tables found in a database. The generated report lists the segments used by the database.

7. Click *Finish* to start the consistency check.

Related Information

Checkpointing Databases [page 255]

9.6.10.3 Placing a Database in Quiesce-Hold

Use `Quiesce Hold` to block updates to a database during a copy operation.

Context

`Quiesce hold` allows you to block updates to one or more databases while you perform a disk unmirroring or external copy of each database device. Because no writes are performed during this time, the external, secondary copy of the database is identical to the primary image. While the database is in the quiescent state, read-only queries to operations on the database are allowed. You can load the external copy of the database onto a secondary server, ensuring that you have a transactionally consistent copy of your primary image.

Only database owners or system administrators can quiesce a database.

> **i** Note
>
> If there are distributed or multidatabase transactions in the database in prepared state, SAP ASE Cockpit waits for 5 seconds for those transactions to complete. If they do not complete in 5 seconds, the quiesce database hold operation fails.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Select one of:
   - *User Databases*
   - *System Databases*
   - *Temporary Databases*
   - *Proxy Databases*
4. In the right pane, select a database, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Quiesce Hold*.
6. In the Quiesce Database Hold wizard, choose from these options:

Option	Description
Tag Name	A tag name for the quiesce hold operation.
External Dump Option	Copy the database while updates to specified databases are suspended with the `Quiesce Hold` command. You must also specify: - Manifest File – specify the path for the manifest file. - Evaluate Dependencies – if you have not selected all the databases to be quiesced, allow the wizard to generate a list of databases that must be quiesced, along with your selected database, to ensure that the quiesce hold succeeds. The list of unselected databases that must be quiesced are indicated in the dependency matrix.

7. (Optional) Click *Summary* to verify your selected options.
8. Click *Finish* to start the quiesce-hold process.

Related Information

Placing a Database in Quiesce-Release [page 252]

9.6.10.4 Placing a Database in Quiesce-Release

Use quiesce release to resume database updates that were suspended by a quiesce hold command.

Context

Issue `quiesce release` only when the external copy operation has completed.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Select one of:
   - *User Databases*
   - *System Databases*
   - *Temporary Databases*
   - *Proxy Databases*
4. In the right pane, select a database, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Quiesce Release*.
6. Enter the tag information to release the database hold.

   > **i Note**
   >
   > If you have `mon_role` permissions, you can select a tag from the list. Otherwise, enter the tag name in the text input box.

7. Click *Finish* to start the quiesce-release process.

Related Information

Placing a Database in Quiesce-Hold [page 250]

9.6.10.5 Mounting a Database

Mount a user database on a server.

Context

The `mount` command attaches the database to the destination or secondary server. `mount` also decodes the information in the manifest file and makes a set of databases available online. The server also adds database devices, if necessary, and activates them, creates the catalog entries for the new databases, recovers them, and puts them online.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Click *User Databases*.
4. In the right pane, select a database, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Mount*.
6. Select the server to which to attach the database.
7. Specify the path of the manifest file, and select *With Verify* to verify the devices specified on the manifest.
8. Verify that the device paths listed in the Device Specification screen are correct. Click any row to change the device path of the corresponding device.
9. (Optional) Click *Summary* to view your selected options.

Related Information

Unmounting a Database [page 254]

9.6.10.6 Unmounting a Database

Unmount a database from a server.

Context

When you unmount a database, you remove the database and its devices from an server. The `unmount` command shuts down the database. All tasks using the database are terminated. The database and its pages are not altered and remain on the operating system devices.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Click *User Databases*.
4. In the right pane, select a database, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Unmount*.
6. Specify a location for the manifest file.
7. Select *Yes* on the Evaluate Dependencies screen to view any unselected databases that must be selected for the `unmount` command to succeed.

   > **i** Note
   >
   > The `unmount` command fails unless you select all the databases on a device.

8. Select the databases listed in the Dependency Matrix screen for `unmount` to succeed. If no databases are listed in the Unselected Databases column, there are no dependencies.
9. Override referential integrity checks by selecting *With override*.

   > **i** Note
   >
   > When the referencing database is dropped by the `unmount` command with an override, you cannot drop the referential constraints.

10. Enter a delay for distributed or multidatabase transactions in prepared state to complete before the `unmount` command is activated. If the transactions do not complete during the specified time period, the `unmount` command is not executed.
11. (Optional) Click *Summary* to view your selected options.

Related Information

Mounting a Database [page 253]

9.6.10.7 Checkpointing Databases

Issuing a checkpoint forces SAP ASE to write modified data pages from memory to disk.

Context

When you issue a checkpoint, SAP ASE freezes all current data-modifying transactions while writing to the disk. See the *Reference Manual: Commands*.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Select one of:
   - *User Databases*
   - *System Databases*
   - *Temporary Databases*
   - *Proxy Databases*
   - *Archive Databases*
   - *In-Memory Databases*
   - *In-Memory Temporary Databases*
4. In the right pane, select a database, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Checkpoint*.
6. Confirm that you want to run `checkpoint` on the current database.

Related Information

Checking Database Consistency [page 249]

9.6.10.8 Modifying Database Sizes

Increase the size of databases.

Procedure

1. From the SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *Databases*.
3. From the Databases table, select the database to configure.
4. Right-click the database name and select *Extend Database* from the context menu.
   You see the *Database Extend* wizard .
5. (Optional) Select a Device Name on which to extend the database.
6. (Optional) Specify the amount of space to allocate to the log and data segments.
7. Click *OK*.
   The dialog box closes if the operation succeeds, otherwise you see an error and the dialog box remains open.

9.6.10.9 Changing Database Ownership

Change the owner of a database.

Context

System administrators can change the ownership of a database to a user who is not a current user of the database and who does not have a current alias in the database.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Select one of:
   - *User Databases*
   - *System Databases*
   - *Temporary Databases*
   - *Proxy Databases*
   - *Archive Databases*

- *In-Memory Databases*
- *In-Memory Temporary Databases*

4. In the right pane, select a database, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Properties*.
6. On the General page, click *Change Owner*.
7. From the list, choose the login name for the new owner of the database. Additionally, you can choose to transfer all aliases and their permissions to the new owner.
8. Click *OK*.

Related Information

Modifying Database Storage Allocations [page 257]
Modifying the Transaction Log Cache and the Log I/O Buffer Size [page 258]
Changing Database Options [page 259]
Viewing Database Statistics [page 170]
Database Properties [page 246]

9.6.10.10 Modifying Database Storage Allocations

Add or modify space allocations for the database.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Select one of:
   - *User Databases*
   - *System Databases*
   - *Temporary Databases*
   - *Proxy Databases*
   - *Archive Databases*
   - *In-Memory Databases*
   - *In-Memory Temporary Databases*
4. In the right pane, select a database, and do one of:
   - Click the arrow to the right of the name.

- Click the *Actions* button.

5. Select *Properties*.
6. Click *Devices*.
   You see the list of devices to which the database is allocated.
7. (Optional) Modify storage allocation for your database:
   - Click *Add* to add space from a different device for your database. Specify whether the space is to be allocated for data or for the transaction log.
   - Click *Remove* to remove the space allocated to your database from a device. You can only remove devices that are added using the *Add* option.
   - Click *Move log* to move the transaction log of a database, with log and data on the same device, to a separate device. See `sp_logdevice` in the *Reference Manual*.
8. (Optional) Click *Create log or data fragment with override* to force SAP ASE to allocate the data and log devices as specified, even if data and log are specified on the same device.
9. (Optional) Click *Preview* to see the SQL statements for your command.
10. Click *Apply*.

Related Information

Changing Database Ownership [page 256]
Modifying the Transaction Log Cache and the Log I/O Buffer Size [page 258]
Changing Database Options [page 259]
Viewing Database Statistics [page 170]
Database Properties [page 246]

9.6.10.11 Modifying the Transaction Log Cache and the Log I/O Buffer Size

Modify the transaction log cache and the log I/O buffer size.

Context

Change the size of the transaction log cache and log I/O buffer by binding the log to a cache of different size. The log buffer size determines the number of I/O transactions that can be stored in the transaction log I/O cache.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Select one of:
   - *User Databases*
   - *System Databases*
   - *Temporary Databases*
   - *Proxy Databases*
4. In the right pane, select a database, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Properties*.
6. Click *Transaction Log*.
   You see the list of caches; the highlighted cache is the one currently configured for your database I/O buffer.
7. Select a different cache and click *Apply*.

Related Information

Changing Database Ownership [page 256]
Modifying Database Storage Allocations [page 257]
Changing Database Options [page 259]
Viewing Database Statistics [page 170]
Database Properties [page 246]

9.6.10.12 Changing Database Options

Change database options.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Select one of:
   - *User Databases*
   - *System Databases*

- *Temporary Databases*
- *Proxy Databases*

> **i Note**
>
> You cannot update any database options for the master database, or for archive databases.

4. In the right pane, select a database, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Properties*.
6. Click *Options* to see the list of options that you can set for this database.

   Database options that you can set include:

Option	Description
`abort tran on full log`	Determines how active transactions are treated when the database's log becomes critically low on space: ○ To cancel all user queries that need to write to the transaction log until space in the log has been freed, select this option. ○ To suspend transactions and awaken them when space has been freed, unset this option.
`allow nulls by default`	Affects the ability of columns in newly created database tables to accept NULL values: ○ If you select this option, columns in newly created tables allow null values unless the column definitions explicitly state "not null." ○ If you do not select this option, nulls are not allowed unless the column definitions explicitly permit them.
`allow wide dol row`	Allows wide, variable-length data-only-locked (DOL) rows in user databases.
`async log service`	Provides greater scalability and higher throughput in logging subsystems for high-end symmetric multiprocessor systems.
`auto identity`	Automatically adds a 10-digit IDENTITY column in a new table when a user creates the table without specifying a primary key, a unique index, or an IDENTITY column.
`dbo use only`	Restricts database access to the database owner.

Option	Description
`ddl in tran`	Allows users to include data definition language syntax within their transactions. Generally, avoid using DDL commands inside transactions. For more information about this option, see the *Reference Manual*.
`delayed commit`	When enabled, all local transactions use delayed commits so that control returns to the client without waiting for the I/O on log pages to complete, and I/O is not issued on the last log buffer for delayed commit transactions. `delayed commit` is supported by SAP ASE version 15.5 and later. **i Note** Delayed commit is not used if you enable both `delayed commit` and `async log service` for a database.
`enforce dump tran sequence`	When set to true, prevents operations that disallow a subsequent dump transaction.
`erase residual data`	Allows you to enable or disable the removal of residual data based on your needs. When you enable the option at a session level, all the page deallocations during that session have their residual data removed. This includes page deallocations of tables that have the `erase residual data` explicitly turned off.
`identity in nonunique indexes`	Automatically includes an IDENTITY column in a table's index keys, so that all indexes created on the table are unique.
`no chkpt on recovery`	Sets the database so that a checkpoint record is added to the database after it is recovered due to restarting the server. This checkpoint, which ensures that the recovery mechanism does not re-run unnecessarily, changes the sequence number on the database. If the sequence number on the secondary database has been changed, a subsequent dump of the transaction log from the primary database cannot be loaded into it. Select this option if you keep an up-to-date copy of a database. This prevents the secondary database from getting a checkpoint from the recovery process so that subsequent transaction log dumps from the primary database can be loaded into it.

Option	Description
`no free space acctg`	Determines whether the database enables free-space accounting and execution of threshold actions for non log segments. Suppressing free-space accounting speeds recovery time because the free-space counts are not recomputed for those segments. However, it disables updating the rows-per-page value stored for each table, so system procedures that estimate space usage may report inaccurate values. **i Note** Only system security officers can change the `no free space acctg` option.
`read only`	Prevents modification of any data in the database.
`scratch database`	The database that stores the `sysaltusages` table. See the *System Administration Guide: Volume 2*.
`select into/bulk copy/pllsort`	Allows users to perform nonlogged operations. Nonlogged operations include `select into` for permanent tables, the bulk-copy utility `bcp`, and the `writetext` utility. You need not select this option to allow `select into` for temporary tables or to run `bcp` on a table with indexes, because inserts are logged. Attempting to dump the transaction log in a database after unlogged changes have been made to the database with `select` only or bulk-copy produces an error message instructing you to use `dump database` instead.
`single user`	Allows only one user at a time to use the database.

Option	Description
`trunc log on chkpt`	Truncates the transaction log (removes committed transactions) every time the database is check pointed. If you select this option, you cannot dump the transaction log. You may want to select this option during development work, when backups of the transaction log are typically not needed. **i Note** If you select `trunc log on chkpt` for development purposes, clear it periodically and dump the transaction log. If you never dump the transaction log, it continues to grow, and eventually you run out of space in the database.
`unique auto_identity index`	If a database's `auto_identity` is turned on, newly created tables automatically get a column named SYB_IDENTITY_COL. This helps maintain data integrity, since unique IDs are commonly used.

Related Information

Changing Database Ownership [page 256]
Modifying Database Storage Allocations [page 257]
Modifying the Transaction Log Cache and the Log I/O Buffer Size [page 258]
Viewing Database Statistics [page 170]
Database Properties [page 246]

9.6.11 Deleting a Database

Delete database objects, or the database itself.

Context

i Note

Deleting a database deletes all the objects of a database.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Select one of:
   - *User Databases*
   - *System Databases*
   - *Temporary Databases*
   - *Proxy Databases*
4. In the right pane, select a database, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Delete*.
6. Confirm the deletion.

   To zero out residual data, which may be visible to a user using the `dbcc` utility after you delete the database, select *Erase Residual Data*.
7. Click *Finish*.

9.6.12 Generating DDL for a Database

Generate a DDL script for databases.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers*, then select *Databases* > *Schema Objects*.
3. Select the type of database.
4. In the right pane, select a database, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Generate DDL*.
6. (Optional) Click *Save* to export and save the DDL statement.

   You can save the DDL in an external file on your local file system.

9.7 Statistics

Understand the scope and freshness of server data in SAP ASE Cockpit.

Each server statistic presented has a scope:

- Delta – the number of occurrences since the last screen refresh. For example, the user log cache statistics on the Transactions screen are delta values.
- Rate – the number of occurrences over the given period of time. Device I/O is given as a rate.
- Percentage or ratio – an amount, number, or rate stated as a proportion to a whole. Percentage statistics include CPU utilization, space usage on devices and segments, and cache hit rates. Ratios include cache volatility.
- Count – a simple value; for example, the size of a database or cache in megabytes, or the number of partitions in a cache.
- Cumulative – the number of occurrences since the server started, or since the counter wrapped. On the Processes screen, you can set the Top 5 User Processes chart to display the five processes that use the most CPU, disk I/O, or network resources as rates or as cumulative values.

> **i Note**
>
> When a server has been running for a long time, its statistical counters might wrap, which means they restart from zero. This most often affects cumulative statistics. Information about when or how many times a counter has wrapped is not available.

Most server statistics not otherwise labeled are presented as deltas since the last screen refresh; rates, percentages, and cumulative numbers are labeled as such.

Statistics are displayed promptly. However, there are several factors that affect the freshness of the data on the screens:

- The screen refresh interval, which you can set on the Settings screen.
- The collection repeat interval, which you can set in the scheduler for each server collection
- Network latency.

For more information about interpreting server statistics, see:

- *Performance and Tuning Series: Improving Performance with Statistical Analysis*
- *Performance and Tuning Series: Monitoring Adaptive Server with sp_sysmon*
- *Performance and Tuning Series: Basics*

9.7.1 Updating Statistics on a Table

Update column-related statistics, such as histograms and densities.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, select *ASE Servers* > *Schema Objects* > *Tables* > *User Tables*.
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Update Statistics*.
5. On the Command Type page, select the `update statistics` command to run.
6. (Optional) On the Data Partitions page, select *Specify a data partition*, if applicable, and indicate any data partitions. `update statistics` runs on all partitions if you do not specify one.
7. On the Columns screen, indicate whether:
   - To run `update statistics` on specific columns.
   - Histograms on all columns (the default).
   - To updates statistics in ordered column grouping.
8. On the Indexes page (not available if you selected `update all statistics` on the Command Type tab, or specified any columns on the Columns tab), indicate any indexes on which to run `update statistics`. If you do not select any indexes, `update statistics` updates all indexes.
9. On the Index Partitions page (visible when you select an index on the Indexes screen), indicate the index partition to update.
10. On the Hashing page:

Option	Description
Choose the type of hashing	○ Partial hashing – for columns that have 65536 or fewer unique values. ○ With hashing – for columns that have greater than 65536 unique values. ○ No hashing.
A value for `max resource granularity`	max resource granularity indicates the maximum percentage of the system's resources a query can use.

11. On the Histogram Tuning page, set the `histogram tuning factor`. The size of the histogram is established by multiplying the number of steps with the value for `histogram tuning factor`.
12. On the Sampling page, specify whether to set sampling, and to what percentage.
13. On the Step Number page, indicate whether to set the number of histogram steps, and if so, how many.
14. On the Consumers page, set the number of consumer processes to be used in parallel processing. The controls are enabled if the value for `max parallel degree` is 3 or greater.

15. On the DataChange Threshold page, indicate whether to run `update statistics` when it reaches a data change threshold, and if so, the value of the threshold.
16. On the Summary screen, verify your selections.
17. Click *Finish*.

Related Information

Updating Statistics on an Index [page 268]
Updating Statistics for a Data Partition [page 269]

9.7.2 Updating Statistics on Specific Columns

Creating statistics on unindexed columns can improve the performance of many queries. Adding statistics for the minor columns of indexes and for unindexed columns that are frequently used in search arguments can greatly improve the optimizer's estimates.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, select *ASE Servers* > *Schema Objects* > *Tables* > *User Tables*.
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Columns*.
6. In the right pane, select a column, then click the drop-down arrow and select *Update Statistics*.
7. On the Hashing page:

Option	Description
Choose the type of hashing	○ Partial hashing – for columns that have 65536 or fewer unique values. ○ With hashing – for columns that have greater than 65536 unique values. ○ No hashing.
A value for `max resource granularity`	max resource granularity indicates the maximum percentage of the system's resources a query can use.

8. On the Histogram Tuning page, set the `histogram tuning factor`. The size of the histogram is established by multiplying the number of steps with the value for `histogram tuning factor`.
9. On the Sampling page, specify whether to set sampling, and to what percentage.
10. On the Step Number page, indicate whether to set the `number of histogram steps`. If applicable, enter the number.
11. On the Consumers page, set the number of consumer processes to be used in parallel processing. The controls are enabled if the value for `max parallel degree` is 3 or greater.
12. On the Datachange Threshold page, indicate whether to run update statistics when it reaches a data change threshold, and if so, the value of the threshold.
13. On the Summary page, verify your selections.
14. Click *Finish*.

9.7.3 Updating Statistics on an Index

Maintaining indexes statistics can improve the performance of many queries.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, select *ASE Servers* > *Schema Objects* > *Tables* > *User Tables*.
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Indexes*.
6. In the right pane, select an index, then click the drop-down arrow and select *Update Statistics*.
7. On the Command Type page, select the `update statistics` command to run.
8. (Optional) On the Index Partitions page, select the index partition to update.
9. On the Histogram Tuning page, set the `histogram tuning factor`. The size of the histogram is established by multiplying the number of steps with the value for `histogram tuning factor`.
10. On the Sampling page, specify whether to set sampling, and to what percentage.
11. On the Step Number page, indicate whether to set the number of histogram steps, and how many.
12. On the Consumers page, set the number of consumer processes to be used in parallel processing. The controls are enabled if the value for `max parallel degree` is 3 or greater.
13. On the DataChange Threshold page, indicate whether to run `update statistics` when it reaches a data change threshold, and if so, the value of the threshold.
14. On the Summary page, verify your selections.
15. Click *Finish*.

Related Information

Updating Statistics on a Table [page 266]
Updating Statistics for a Data Partition [page 269]

9.7.4 Updating Statistics for a Data Partition

Maintaining data partition statistics can improve the performance of many queries.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, select *ASE Servers* > *Schema Objects* > *Tables* > *User Tables*.
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Partitions*.
6. In the right pane, select a partition, then click the drop-down arrow and select *Update Statistics*.
7. On the Command Type page, select the `update statistics` command to run.
8. On the Hashing page:

Option	Description
Choose the type of hashing	○ Partial hashing – for columns that have 65536 or fewer unique values. ○ With hashing – for columns that have greater than 65536 unique values. ○ No hashing.
A value for `max resource granularity`	max resource granularity indicates the maximum percentage of the system's resources a query can use.

9. On the Histogram Tuning page, set the `histogram tuning factor`. The size of the histogram is established by multiplying the number of steps with the value for `histogram tuning factor`.
10. On the Sampling page, specify whether to set sampling, and to what percentage.
11. On the Step Number page, indicate whether to set the number of histogram steps, and how many.
12. On the Summary page, verify your selections.
13. Click *Finish*.

Related Information

Updating Statistics on a Table [page 266]
Updating Statistics on an Index [page 268]

9.7.5 Updating Statistics on an Index Partition

Maintaining index partition statistics can improve the performance of many queries.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, select *ASE Servers* > *Schema Objects* > *Tables* > *User Tables*.
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Indexes*.
6. In the right pane, select an index, then click the drop-down arrow and select *Properties*.
7. In the left pane, click *Index Partition*.
8. In the right pane, select an index partition, then click the drop-down arrow and select *Update Statistics*.
9. On the Command Type screen, select the `update statistics` command to run.
10. On the Hashing page:

Option	Description
Choose the type of hashing	○ Partial hashing – for columns that have 65536 or fewer unique values. ○ With hashing – for columns that have greater than 65536 unique values. ○ No hashing.
A value for `max resource granularity`	max resource granularity indicates the maximum percentage of the system's resources a query can use.

11. On the Histogram Tuning page, set the `histogram tuning factor`. The size of the histogram is established by multiplying the number of steps with the value for `histogram tuning factor`.
12. On the Sampling page, specify whether to set sampling, and to what percentage.
13. On the Step Number page, indicate whether to set the number of histogram steps, and how many.
14. On the Summary page, verify your selections.

15. Click *Finish*.

9.7.6 Deleting Statistics from a Table

Drop statistics for tables.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, select *ASE Servers* > *Schema Objects* > *Tables* > *User Tables*.
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Delete Statistics*.
5. (Optional) On the Data Partitions page, select *Specify a data partition*, if applicable, and indicate any data partitions. `update statistics` runs on all partitions if you do not specify one. Click *Next*.
6. On the columns page, click the columns from which to delete statistics.
7. Verify your selections on the Summary page.
8. Click *Finish*.

9.7.7 Deleting Statistics from a Column

Drop statistics for specific columns.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, select *ASE Servers* > *Schema Objects* > *Tables* > *User Tables*.
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Columns*.
6. Click the Name field of the column, then click the drop-down arrow and select *Delete Statistics*.
7. On the Data Partitions page, select *Specify a data partition*, if applicable, and indicate any data partitions. `update statistics` runs on all partitions if you do not specify one. Click *Next*.

8. Verify your selections on the Summary page.
9. Click *Finish*.

9.7.8 Deleting Statistics from a Data Partition

Drop statistics for data partitions.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, select *ASE Servers* > *Schema Objects* > *Tables* > *User Tables*.
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Partitions*.
6. Click the Name field of the partition, then click the drop-down arrow and select *Delete Statistics*.
7. On the Summary page, verify your selections.
8. Click *Finish*.

9.8 Compression

The compression advisor provides an estimate of the percentage of space you can save by compressing a user table or index.

Compression reduces database storage space and improves system performance, especially in I/O-bound systems. Queries against compressed data can be performed with fewer I/O operations, because each read from the disk retrieves more data.

Use the database usage properties to identify tables that might benefit from compression. The compression advisor then provides recommendations for which compression attributes to apply, and a compression estimation that is based on an analysis of sampled data. The estimate is then compared to the selected table in an uncompressed state and the table in its current state, which may or may not be compressed.

Compression advisor requires an ASE_COMPRESSION license and the system-wide configuration parameter `enable compression` to be set to 1.

9.8.1 Identifying Table Compression Candidates

Identify the largest user tables based on space reserved, used space, or row count.

Context

Before compressing a user table, identify the largest tables then generate a compression estimate to determine if the table will benefit from compression.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases* > *User Databases*.
3. In the right pane, select a database, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Usage*.
6. Click the *Largest user tables* tab.
7. (Optional) In the View field, click the arrow or enter a number to choose the number of tables to include and click *View* to update the display.
   You see a list of the largest tables based on the selected criteria.
8. Select the conditions by which the size of the tables is determined:
   - *Rowcount*
   - *Space reserved*
   - *Used space*
9. (Optional) Click *Compression Advisor* to invoke the Compression Advisor wizard.

9.8.2 Initiating a Compression Estimate

Apply compression attributes to a selected tables to reduce the size and improve performance for a database.

Prerequisites

- You must have an ASE_COMPRESSION license.
- Set the system-wide configuration parameter `enable compression` to 1.

- Use the database properties to identify the largest user tables, which are the most likely to benefit from compression.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables* > *User Tables*.
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Compression Advisor*.
5. On the Storage screen:
   a. Select a sampling size for the selected table and click *Apply*.
   The sampling information reflects a sampling size for the selected table. To estimate the compressed size of the selected table, the compression advisor creates a temporary table and loads into it sample data from the table to be compressed.

   For large tables, a sample size of 10% may provide good results. However, for smaller tables, a larger sample size may provide better results.
   b. Select a database to use for the sampling process.

   The temporary table is created once you click *Estimate*. It is deleted when you close the Compression Advisor Results dialog.
6. On the Table Attributes screen:
   a. Choose the level of data compression.
      - Row-level compression compresses individual rows in a table.
      - Page compression performs row-level compression first, then page-level compression.

      For uncompressed tables, data compression is, by default, set to page-level compression.
   a. If the table has one or more indexes, and the version is 16.0 or later, select the type of index compression.

   To compress large object (LOB) data, choose the compression level for FastLZ (100 –101) or ZLib (1–9).

   The LOB compression option is available for tables that use text, image, Unitext, or Java LOB datatypes.
7. (Optional) On the Columns Attributes screen, for LOB columns, click *Calculate* to calculate the best LOB length for each LOB column based on the sampling size.
   a. Click *Cancel* to cancel the calculation and restore the original values.
   b. Once the calculation is complete, click *Restore* to restore the original values.
8. (Optional) On the Columns Attributes screen, select individual column attributes to override the inherited table-level attributes. You can also choose to not compress individual columns.
   - You cannot change an in-row column to an off-row column.
   - You cannot reduce the in-row length.
   - You must set at least one column to be compressed.
9. (Optional; only available for tables with indexes) In the Indexes Attributes window, select either page compression or no compression for individual indexes. Selected compression values override the inherited index-level compression attributes.

10. Click *Summary* to see a comparison of the selected compression options for the table.
11. Click *Estimate* to start the compression estimate calculation.
    The Results window automatically appears.
12. Click *Preview* to show the compression attributes changes in SQL statements.
    Preview is available once the compression estimate has been initiated.

9.8.3 Applying Compression Settings

The compression advisor provides compression estimates and recommendations. Based on the results of these estimates, you can apply the attributes and compress the selected table.

Prerequisites

If granular permissions is enabled, you must have `reorg any table` privilege or be the table owner. If granular permissions is not enabled, you must be the table owner or have sa_role.

Apply compression attributes to the selected tables and apply changes to its existing data.

Context

See Initiating a Compression Estimate [page 273]. Once the compression estimate is initiated, you see the Compression Advisor Results window. The Results tab shows the compression ratio for the sample table, compared to the selected table in an uncompressed state.

Procedure

1. (Optional) On the Result screen:
   a. Click *Space usage of sampling table* to view the sampling table's space usage.
   b. (Optional) Click *Space usage of the real table* to view the current table's space usage.
2. (Optional) On the Compression Attributes screen:
   a. (Optional) Click on *Current compression attributes* to see a summary of the current table's compression attributes.
   b. (Optional) You can change attribute values and click *Apply* to apply the new values. Any value changes are applied to new data in the specified table.
   c. (Optional) To apply changes to existing data or on the entire table, click *Reorganize*.
3. (Optional) In the left pane, click *Messages* to show any server messages related to the compression estimate.
4. Click *Compress* to initiate compression of the selected table.
   You see the Compression Results window, including all messages regarding the execution of compression.

9.8.4 Manage Index Compression

Use the Create Table and Create Index wizards to set index compression. You can subsequently turn index compression on or off on the table, index, or local index property screens.

Set index compression on:

- Tables
- Indexes
- Local index partitions

Any table, index, or local index partition can be designated for index compression, except system catalogs and work tables.

The value of compression is page-level compression, which compresses redundant information on a page by storing repeated values in a single place and uses a symbol on the data page to refer to them.

9.8.4.1 Setting Index Compression on an Index

Use the Create Index wizard to specify index compression on an index.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables* and select the table type.
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, select *Indexes*.
6. In the right pane, select an index, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
7. Select *Properties*.
8. In the left pane, select *General*.
9. From the *Index Compression* drop-down field, select *Page* or *None*.

9.8.4.2 Setting Index Compression on a Local Index Partition

Use the Create Index wizard to specify index compression on a local index partition.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane , expand *ASE Servers* > *Schema Objects* > *Tables* and select the table type.
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left panel, select *Indexes*.
6. In the right pane, select an index, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
7. Select *Properties*.
8. In the left pane, select *Index Partitions*.
9. In the right pane, select an index partition, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
10. Select *Properties*.
11. In the left pane, select *General*.
12. From the *Index compression* drop-down field, select *Page* or *None*.
    The Index compression field is available when the index has been created with the `local index` parameter.

9.8.4.3 Setting Index Compression on a Table

Use the Create Index wizard to specify index compression on a table.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables* and select the table type.

3. In the right pane, select a table, and do one of:
    - Click the arrow to the right of the name.
    - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, select *General*.
6. From the *Index Compression* drop-down field, select *Page* or *None*.

9.9 Partitions

Use partitioning to divide large tables and indexes into smaller, more manageable pieces.

Partitions

Partitions are database objects that have unique IDs and can be managed independently. Each partition can reside on a separate segment.

Horizontal partitioning is supported, which means you can distribute a selection of table rows among storage devices. Assign individual table or index rows to a partition according to a partitioning strategy. By default, every table and index is created on a single, round-robin partition. You can also choose a semantics-based strategy that assigns rows to partitions.

Semantics-based partitioning is a separately licensed feature.

Hash Partitioning

With hash partitioning, a hash function is used to specify the partition assignment for each row. You select the partitioning key columns, but SAP ASE chooses the hash function that controls the partition assignment. Hash partitioning is a good choice for:

- Large tables with many partitions, particularly in decision-support environments
- Efficient equality searches on hash key columns
- Data that has no particular order, for example, alphanumeric product code keys

If you choose an appropriate partition key, hash partitioning distributes data evenly across all partitions. However, if you choose an inappropriate key, for example, a key that has the same value for many rows—the result may be skewed data, with an unbalanced distribution of rows among the partitions.

Range Partitioning

Rows in a range-partitioned table or index are distributed among partitions according to values in the partitioning key columns. The partitioning column values of each row are compared with a set of upper and lower bounds that determine the partition to which the row belongs.

Every partition has an inclusive upper bound and every partition except the first has a noninclusive lower bound.

Range partitioning is particularly useful for high-performance applications in both OLTP and decision-support environments. Select ranges carefully so that rows are assigned equally to all partitions—knowledge of the data distribution of the partition key columns is crucial to balancing the load evenly among the partitions. Range partitions are ordered; that is, each succeeding partition must have a higher bound than the previous partition.

List Partitioning

As with range partitioning, list partitioning distributes rows semantically; that is, according to the actual value in the partitioning key column. A list partition has only one key column. The value in the partitioning key column is compared with sets of user-supplied values to determine the partition to which each row belongs. The partition key must match exactly one of the values specified for a partition.

The value list for each partition must contain at least one value, and value lists must be unique across all partitions. You can specify as many as 250 values in each list partition. List partitions are not ordered.

Round-Robin Partitioning

In round-robin partitioning, partitioning criteria is not used. Round-robin-partitioned tables have no partition key. Rows are assigned in a round-robin manner to each partition so that each partition contains a more or less equal number of rows and load balancing is achieved. Because there is no partition key, rows are distributed randomly across all partitions.

9.9.1 Enabling Partition Locking

Partition locking improves concurrency and data availability.

Prerequisites

Partition locking requires system administrator or database owner permission.

Context

Enable or disable partition locking for user tables. By default, partition locking is disabled.

By enabling partition locking, you are locking a partition of interest and therefore allowing access to other partitions for concurrent DDL and DML access options. Concurrent access is allowed for tables during the merge, move, split, and drop partition operations.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables* > *User Tables*.
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Partitions*.
6. Click *Enable partition locking*, then click *Apply*.

9.9.2 Enabling Semantic-based Partitioning

Enable semantic-based partitions to use hash, list, or range partition strategies.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. Click the Name field of the server, then click the drop-down arrow and select *Configure*.
3. On the Server Configuration window, turn on `enable semantic partitioning`, then click *Save All*.

9.9.3 Using a Hash Partition

Create a new partition or change an existing partition using a strategy of a system-generated hashing function.

Context

> **i** Note
>
> To create hash, list, or range partitions, turn on the server configuration parameter `enable semantic partitioning`.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
   - *User Tables*
   - *Proxy Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Partitions*.
6. Click the drop-down arrow and select *New*, or choose to an existing partition from the right pane.
7. On the Select Partition Strategy page:
   a. Choose the partitioning strategy *Hash*.
   b. (Optionally) Specify the number of partitions.
8. On the Select Partition Key Columns page, use the arrow buttons to select partition key columns. Partition key columns are table columns that determine how the table is to be partitioned.
9. In the Partition Specification screen, specify the name of the partition and where the partition will reside.
10. (Optional) Click *Summary* to review your selected options.

9.9.4 Using a Range Partition

Create a new partition or change an existing partition according to whether one or more values in a row fall within a range of predefined values for the partition.

Context

> **Note**
>
> To create hash, list, or range partitions, turn on the server configuration parameter `enable semantic partitioning`.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
   - *User Tables*
   - *Proxy Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Partitions*.
6. Click the drop-down arrow and select *New*, or choose to an existing partition from the right pane.
7. On the Select Partition Strategy page, choose *Range*.
8. On the Select Partition Key Columns page, use the arrow buttons to select partition key columns. Partition key columns are table columns that determine how the table is to be partitioned.
9. On the Partition Specification page, specify the name of the partition, the range of values, and where the partition will reside.
10. (Optional) Click *Summary* to review your selected options.

9.9.5 Using a List Partition

Create a new partition or change an existing partition according to whether one value in the row matches one of a set of predefined values unique for each partition.

Context

> **i** Note
>
> To create hash, list, or range partitions, turn on the server configuration parameter `enable semantic partitioning`.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
   - *User Tables*
   - *Proxy Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Partitions*.
6. Click the drop-down arrow and select *New*, or choose to an existing partition from the right pane.
7. On the Select Partition Strategy page, choose *List*.
8. On the Select Partition Key Columns page, use the arrow buttons to select one partition key column. List partitions use only one key column. The value in the partitioning key column is compared with values supplied in the partition specification window to determine the partition to which each row belongs.
9. On the Partition Specification page, specify the name of the partition, specify a list of discrete values, and where the partition will reside.
10. (Optional) Click *Summary* to review your selected options.

9.9.6 Using a Round-Robin Partition

Create a new partition or change an existing partition using the round-robin strategy so that each partition contains an approximately equal number of rows.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
   - *User Tables*
   - *Proxy Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Partitions*.
6. Click the drop-down arrow and select *New*, or choose to an existing partition from the right pane.
7. On the Select Partition Strategy page:
   a. Choose the partitioning strategy *Round Robin*.
   b. (Optionally) Specify the number of partitions.
8. On the Partition Specification page, specify the name of the partition and where the partition will reside. This partitioning strategy is random as no partitioning criteria are used. Round-robin-partitioned tables have no partition keys.
9. (Optional) Click *Summary* to review your selected options.

9.9.7 Splitting a Partition

Splitting partitions can improve performance on partitions that include frequent queries and updates.

Context

- You must set the `select into/bulkcopy/pllsort` database option to true before you split a partition.
- You may split only list and range partitions.

See the *Transact-SQL Users Guide* for information about partitions.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
   - *User Tables*
   - *Proxy Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Partitions*.
6. Click the drop-down arrow and select *New*, or choose to an existing partition from the right pane.
7. Click the Name field of the partition, then select *Split*.
8. (Optional; only for user tables) Select *Enable 'online' mode*, which improves concurrency and data availability during the split partition operation
   Enable partition locking must also be enabled.
9. On the Partition Specification page, click *Add* and enter the.

Option	Description
Name	Partition name.
(Optional) Segment name	Segment name
(Optional) Column name.	The partition key is displayed, which is based on the table that has been partitioned. Enter a new value (or partition condition) for the split operation.
Value	Specify the inclusive upper bound of values for the partition.

10. Click *OK*.

9.9.8 Merging Partitions

Merging partitions consolidates data from partitions that are accessed infrequently into a single partition. You can merge only list and range partitions.

Context

You can merge any two list partitions, but only adjacent range partitions. The partitions selected to be merged must be on same segment.

> **Note**
>
> You must set the `select into/bulkcopy/pllsort` database option to true before you merge partitions.

See the *Transact-SQL Users Guide* for information about partitions.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
   - *User Tables*
   - *Proxy Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Partitions*.
6. Click the drop-down arrow and select *New*, or choose to an existing partition from the right pane.
7. Click the Name field of the partition, then select *Merge*.
8. On the Marge Partition page, enter the name of the destination partition.
9. (Optional; only for user tables) Select *Enable 'online' mode*, which improves concurrency and data availability during the merge partition operation
   Enable partition locking must also be enabled.
10. (Optional) Select *Preview* to view the new partition information.
11. Click *OK*.

9.9.9 Moving a Partition

Table owners, database owners, or system administrators can move partitions to another segment.

Context

> **Note**
>
> You must set the `select into/bulkcopy/pllsort` database option to true before you split a partition.

See the *Transact-SQL Users Guide* for information about partitions.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
   - *User Tables*
   - *Proxy Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Partitions*.
6. Click the drop-down arrow and select *New*, or choose to an existing partition from the right pane.
7. Click the Name field of the partition, then select *Move*.
8. On the Move Partition page, select the destination segment to which to move the partition.
9. (Optional; only for user tables) Select *Enable 'online' mode*, which improves concurrency and data availability during the move partition operation
   Enable partition locking must also be enabled.
10. (Optional) Select *Preview* to view the new partition information.
11. Click *OK*.

9.9.10 Deleting a Partition

Drop a user or proxy table partition.

Context

- You must set the `select into/bulkcopy/pllsort` database option to true before you can delete a partition.

See the *Transact-SQL Users Guide* for information about partitions.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
   - *User Tables*
   - *Proxy Tables*

3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Partitions*.
6. Click the Name field of the partition, then select *Delete*.
7. Click *OK*.

9.9.11 Partition Properties

Display or modify partition properties, such as the partition name, strategy, and type.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
   - *User Tables*
   - *Proxy Tables*
3. In the right pane, select a partition, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. View or modify the properties.

Page	Properties
General	Shows the partition properties including the name, strategy, and type of partition. You can change the segment on which the index is placed and the type of data compression.

Related Information

Index Properties [page 223]
Trigger Properties [page 363]
Foreign Key Properties [page 374]
Check Constraint Properties [page 376]
Table Properties [page 219]
Column Properties [page 222]

9.10 Remote Servers

Add, delete, or configure remote servers using SAP ASE Cockpit.

9.10.1 Configuring a Server for Remote Procedure Calls

Configure server installations to allow request for execution of stored procedures on a remote server from a local server. The result of this request is called a remote procedure call (RPC).

Your choice of RPC handling method affects SAP ASE configuration and login mapping for remote servers. To handle RPCs, you can use either a site handler, or Component Integration Services (CIS).

The default method for handling interaction between local and remote servers is through a site handler, which creates a physical connection between the local server and the remote server. It then creates a logical connection for each RPC to the remote server. SAP ASE creates a site handler for each remote server it connects to. A site handler is used only for connections between two server installations.

You can enable CIS for a server to request execution of stored procedures and access data on a remote server as if it were on the local server. CIS RPC handling is always used for connections involving proxy tables.

The principal difference between the two methods of handling RPCs is how the remote server views the RPC:

- If you use site handler, the remote server detects that the logical connection is made by another remote server and performs remote server verification through sysremotelogins.
- If you use CIS RPC handling, the remote server sees the RPC as an ordinary client connection. There is no verification using sysremotelogins. Therefore, connections must have a valid server login account established prior to the connection request. You cannot use trusted mode. Use of CIS RPC handling allows you to include RPCs in a transaction. Work done by an RPC can be committed or rolled back along with the other work performed in the transaction.

Related Information

Testing a Remote Server Connection [page 290]
Adding a Remote Server [page 290]

9.10.2 Adding a Remote Server

Add servers to your network.

Prerequisites

To add a remote server you must register and authenticate the agent for SAP ASE.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Networks* > *Remote Servers*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.
5. On the Remote Server Name page, specify the local name for the remote server.
6. On the Network and Server Class page, specify the server class of the remote server and enter a network name for the remote server.
   If Component Integration Services (CIS) is enabled, specify the server class of the remote server. If CIS is not enabled, accept the default server class: ASEnterprise.
7. (Optional) Click *Summary* to see the SQL statement and verify your selected options.

Related Information

Configuring a Server for Remote Procedure Calls [page 289]

9.10.3 Testing a Remote Server Connection

Verify that a connection can be established between the local server and the remote server.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.

2. In the left pane, expand *ASE Servers* > *Networks* > *Remote Servers*.
3. In the right pane, select a remote server, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the General window, select the network name and server class and click *Test Connection*.
   A dialog appears indicating whether the connection succeeded or failed.

Related Information

Configuring a Server for Remote Procedure Calls [page 289]

9.10.4 Setting Options for a Remote Server

View or change remote server options.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Networks* > *Remote Servers*.
3. In the right pane, select a remote server, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Options* and change the remote server options as required.

Option	Description
Server cost	(Component Integration Services only) Specifies the cost of a single exchange under the user's control, on a per-server basis.
CIS hafailover	(Component Integration Services only) When enabled, instructs Open Client to use automatic fail over when connections fail. In this case, CIS connection failures automatically failover to the server specified in directory services (such as the interface file and LDAP server) as the failover server.
Mutual authentication	Verifies the identity of the client and the server. The local server initiating the remote connection can request mutual authentication for all remote connection requests to target a server. This allows the client to verify the identity of the remote server.

Option	Description
Negotiated logins	(Component Integration Services only) This option is necessary if CIS connections to XP Server or Backup Server are required. When enabled, Omni connects to the specified server and establishes a callback handler that can respond appropriately to login challenges from XP Server and Backup Server.
Net password encryption	Specifies whether to initiate connections with a remote server with the client-side password encryption handshake or with the normal (unencrypted password) handshake sequence. The default is false, which means that no network encryption takes place.
Readonly	(Component Integration Services only) Specifies that access to the server named is read-only.
Relocated joins	Permits joins between local and remote tables to be on the remote server.
Security mechanism	External software that provides security services for a connection.
Server logins	(Component Integration Services only) To fully support remote logins, Client-Library provides connection properties that enable CIS to request a server connection. This connection is recognized at the receiving server as a server connection (as opposed to an ordinary client connection), allowing the remote server to validate the connection as if the connection were made by a site handler.
Timeouts	When unset (false), disables the normal timeout code used by the local server, so the site connection handler does not automatically drop the physical connection after one minute with no logical connection.
Use message confidentiality	Data is encrypted over the network to protect against unauthorized disclosure.
Use message integrity	Verifies that communications have not been modified during transport.

9.10.5 Managing Remote Server Login Mappings

Add, remove, and configure remote server login mappings.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Networks* > *Remote Servers*.
3. In the right pane, select a remote server, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Login Mapping*.
6. In the Login Mapping window, choose how logins from a remote server are mapped to a local server.

Option	Description
None	A particular remote login is mapped to a particular local login name. For example, user joe on the remote server might be mapped to joesmith.
Map to local logins with the same names	All logins from one remote server can use their remote names.
Map all to a single local login	All logins from one remote server can be mapped to one local name. For example, all users sending remote procedure calls from the MAIN server are be mapped to remusers.

> **i** Note
>
> Mapping more than one remote login to a single local login reduces individual accountability on the server. Audited actions can be traced only to the local server login, not to the individual logins on the remote server.

7. (Optional) To map a particular remote login to a specific local login name, click *Add*.
   a. Specify the remote login name, then select the local login name.
   b. (Optional) Click *Trusted Password* to indicate that the remote logins are trusted.
      Using the Trusted Password option reduces the security of your server, as the passwords are not verified.
8. (Optional) To remove a mapping of particular remote login from a specific local login name, select the login, then click *Remove*.

Related Information

Managing CIS Roles and Logins Mappings [page 293]

9.10.6 Managing CIS Roles and Logins Mappings

Add, remove, and configure remote server CIS roles and logins mappings.

Context

Logins and roles for CIS RPC handling are mapped on the local server level. By default, your local login is used as the remote login.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Networks* > *Remote Servers*.
3. In the right pane, select a remote server, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *CIS Mapping*.
6. On the CIS Mapping page, click *Add*.
   a. Select the local login or role, then specify the remote login name.
   b. Type in the remote password and confirm the password.
7. (Optional) To remove a CIS mapping, select the remote login name, then click *Remove*.

Related Information

Managing Remote Server Login Mappings [page 292]

9.10.7 Deleting a Remote Server

Delete a remote server from the SAP ASE system tables.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Networks* > *Remote Servers*.
3. In the right pane, select a remote server, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Delete*.
5. Click *OK* to confirm.

9.10.8 Remote Server Properties

Display or modify remote server properties, such change the server class, map local and remote logins, and change configuration options.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Networks* > *Remote Servers*.
3. In the right pane, select a remote server, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. View or modify the properties.

Pages	Properties
General	○ Remote server name ○ Type ○ Network name ○ Server class
Options	Provides options for configuring a remote server. Setting options is only available for a user-created remote server.
Login Mapping	Manage: ○ Default mapping for remote logins when called from a remote server. ○ Remote logins specifically mapped to local logins when called from a remote server.
CIS	Manage the mapping of local logins or roles to remote logins when access to the remote server is through Component Integration Services.

9.11 Always-On (HADR) Option

The always-on option includes the high availability disaster recovery (HADR) feature. Administering HADR includes a number of tasks.

9.11.1 Registering the Replication Management Agent (RMA)

The RMA requires a number of steps for registration.

Prerequisites

You must enable the `HADR mode` and `cis RPC handling` configuration parameters

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, click *ASE Servers*
3. In the right pane, select a server, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *HADR*.
   The SAP ASE Cockpit displays configuration information for the server on which you are currently logged in.
6. Under Replication Management Agent, specify the port number, user name, and password for the RMA.
7. Click *Authenticate* to verify your selections.
8. Click *OK* or *Apply*.

9.11.2 Unregistering the RMA

Unregistering the RMA requires a number of steps.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, click *ASE Servers*
3. In the right pane, select a server, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.

5. In the left pane, click *HADR*.
   The SAP ASE Cockpit displays configuration information for the server on which you are currently logged in.
6. Under Replication Management Agent, click *Clear Authentication*.

9.11.3 Displaying the HADR Properties

The SAP ASE Cockpit displays properties such as the server name, the HADR mode, and host name, and the name of the replication user.

Prerequisites

Viewing the HADR properties requires the sa_role.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, click *ASE Servers*
3. In the right pane, select a server, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *HADR*.
6. In the right pane, click:
   - *Properties* – To view the Replication Management Agent configuration. Sort the property values by entering search strings in the table headings. For example, entering "500" in the *Value* heading displays only the property values with ports numbers that include "500".
   - *System Status* – To view the health and status of the HADR system.
   - *Reset* – To reset the Fault Manager status to UNKNOWN, indicating that the Fault Manger is unconfigured. Fault Manager monitoring is available only after the Replication Management Agent is authenticated. Once the Fault Manger is configured and starts sending messages, its status changes to RUNNING. A configured, but not running, Fault Manager has a status of STOPPED.
   - *Clear Authentication* – To unregister the Agent

9.11.4 Displaying HADR States

HADR states can fluctuate over time.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *HADR*.

   The SAP ASE Cockpit displays the primary and standby machines graphically as boxes, with a red or green line connecting the boxes. A green line indicates the systems are successfully connected. A red line indicates a connection issue.

9.11.5 Displaying the Agent Properties

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, click *ASE Servers*
3. In the right pane, select a server, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Agent*.
   The SAP ASE Cockpit displays configuration information for the Replication Management Agent and the SAP ASE Agent plug-in.
6. Specify the port number.
7. (Optional) To register the companion's agent, select *Specify companion port number*, and enter the port number.
8. Enter the port number.
9. Click *Register*.
10. Click *Apply*.

9.11.6 Performing a Planned Failover

After a failover, the original primary server becomes the standby, and the original standby server becomes the new primary server.

Context

> **i** Note
>
> You can perform failover if:
>
> - The primary server is in an active state
> - The standby server is in an inactive state
> - All database replication to the standby server is active
> - All database replication to the primary server is suspended (without errors)

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, click *ASE Servers*
3. In the right pane, select a server, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Manage HADR*
5. (Optional) Select *Show Processes on* `<machine_name>` to check for currently running processes.
6. (Optional) Select *System Status* to view the health and latency of the HADR system. The *System Status* panel includes two tabs:
   - The *Overview* tab provides information about the primary and secondary companions and their external and internal states.
   - The *System Status* tab provides information about the primary and secondary hosts and replicated databases.
7. In the *What would you like to do?* section, click *Failover*.
8. Specify the *Timeout* period. This is the maximum amount of time the task waits to complete.
9. Choose the action the HADR system takes when failover reaches the specified timeout:
   - *Terminate failover* – Stops the failover action if the task does not complete.
   - *Force deactivation* – Forces the current primary into a deactivated state by removing transactions that do not complete within the specified timeout period.
   - *Force primary* – Forces the current standby to the primary role.
10. If the ASE Agent is registered, you can display the most recent progress messages for SAP ASE, Replication Server, and the Replication Management Agent. If the remote site's ASE Agent runs on the

same port and uses the same user name and password, the SAP ASE Cockpit also displays messages from the remote site's log. Select the *Progress Messages* drop-down list to view messages for:

- *RMA Messages* – Replication Management Agent
- *RS Messages* – Replication Server
- *ASE Messages* – SAP ASE

11. Enable or disable *Make primary host available as standby after failover*.
12. Click *Failover*.

9.11.7 Displaying Progress Messages

If the Replication Agent is registered, you can display the latest 500 log messages for SAP ASE, Replication Server, and the Replication Management Agent.

Context

If the remote site's Replication Agent runs on the same port and uses the same user name and password, messages from the remote site's log are also displayed.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, click *ASE Servers*
3. In the right pane, select a server, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Manage HADR*.
5. From the *Progress Messages* drop-down list (not displayed if the Replication Agent is not registered), select the progress message for:
   - *ADRP RMA Messages* – Replication Management Agent
   - *ADRP RS Messages* – Replication Server
   - *ADRP ASE Messages* – SAP ASE
   - *ADRS RMA Messages* – Replication Management Agent messages from Replication Server.
6. (Optional) .
   - To change the current line buffer size – double-click the text "*Last* `<number>` *lines*". Enter the number of lines you want displayed in the *Retrieve last* `<number>` *lines* drop down list, and click *OK*
   - To search for specific text – expand the messages panel, and enter the text in the search box. SAP ASE Cockpit displays only those messages that contain this text.

9.11.8 Suspend Replication

You can suspend replication to an individual database or to all databases

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, click *ASE Servers*
3. In the right pane, select a server, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Manage HADR*.
5. (Optional) Select *Show Processes on* `<machine_name>` to check for currently running processes.
6. (Optional) Select *System Status* to view the health and latency of the HADR system. The *System Status* panel includes two tabs:
   - The *Overview* tab provides information about the primary and secondary companions and their external and internal states.
   - The *System Status* tab provides information about the primary and secondary hosts and replicated databases.
7. In the *What would you like to do?* section, click *Suspend Replication*.
8. Indicate that you want to:
   - Suspend replication to a specific database – select *Suspend replication to database*, and select the database name from the list.
   - Suspend replication to all databases – select *Suspend all database replication*.
9. Click *Suspend Replication*.

9.11.9 Resume Replication

You can resume replication to an individual database or to all databases

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, click *ASE Servers*
3. In the right pane, select a server, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.

4. Select *Manage HADR*.
5. (Optional) Select *Show Processes on* `<machine_name>` to check for currently running processes.
6. (Optional) Select *System Status* to view the health and latency of the HADR system. The *System Status* panel includes two tabs:
   - The *Overview* tab provides information about the primary and secondary companions and their external and internal states.
   - The *System Status* tab provides information about the primary and secondary hosts and replicated databases.
7. In the *What would you like to do?* section, click *Resume Replication*.
8. Indicate that you want to:
   - Resume replication to a specific database – select *Resume replication to database*, and select the database name from the list.
   - Resume replication to all databases – select *Resume all database replication*.
9. Click *Resume Replication*.

9.11.10 Rematerialize Databases

You can rematerialize an individual database or all databases.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, click *ASE Servers*
3. In the right pane, select a server, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Manage HADR*.
5. (Optional) Select *Show Processes on* `<machine_name>` to check for currently running processes.
6. (Optional) Select *System Status* to view the health and latency of the HADR system. The *System Status* panel includes two tabs:
   - The *Overview* tab provides information about the primary and secondary companions and their external and internal states.
   - The *System Status* tab provides information about the primary and secondary hosts and replicated databases.
7. In the *What would you like to do?* section, click *Rematerialize*.
8. Select the database you want to rematerialize from the drop-down list.
9. Click *Rematerialize*.

9.11.11 Add an Existing Database to the HADR System

You can add existing databases to the HADR system.

Procedure

1. In the primary SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, click *ASE Servers*
3. In the right pane, select a server, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Manage HADR*.
5. Select *Manage Databases*.
6. Select the database you want to add from the *Add Databases* drop down list.
7. Click *Add Database.*.

9.11.12 Starting Or Stopping a Service Component

You can start and stop the SAP ASE, Replication Server, and RMA service components when ASEAP is available

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, click *ASE Servers*
3. In the right pane, select a server, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Manage HADR*.
5. In the *What would you like to do?* section, click *Start or stop a service component*.
6. To start or stop services on another host, select the host name from the *On host* drop-down list.
7. Click the button to start or stop the service.

9.11.13 Modify Replication Agent Configuration Parameters

Modify the configuration parameters for Rep Agent.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *HADR*.
3. Click on the *Rep Agent* tab on the bottom of the HADR dashboard.
4. Enter new values in the Configure Value column.
5. After entering a new value, you can choose Enter or click *Save All* to apply the changes.

   You must restart the Rep Agent thread after modifying a configuration parameter.

   These configuration parameters are excluded from modification:
   - `rs username`
   - `rs servername`
   - `connect dataserver`
   - `connect database`
   - `stream replication`
6. To revert your modification before applying the changes to the server, choose *Reset* on individual columns or choose *Reset All* to reset all modifications.

9.11.14 HADR KPIs

The HADR feature includes a number of KPIs.

KPI Name	Description	Unit	Alert	Alert Threshold
`KPI_ASE_FREE_XACT_LOG`	Amount of free transaction log space	Megabytes	No	N/A
`KPI_ASE_FREE_XACT_LOG_PERCENT`	Percentage of free transaction log space	Percentage	Yes	N:31-100 L:21-30 M:11-20 H:0-10
`KPI_RS_PATH_OVERALL_TICK_LATENCY`	Overall ticket latency	Milliseconds	Yes	N:0-10000 L:10001-20000 M:20001-30000 H:30001-217484648

KPI Name	Description	Unit	Alert	Alert Threshold
KPI_RS_PATH_PDB_EXEC_LATENCY	PDB to EXEC latency	Milliseconds	No	
KPI_RS_PATH_EXEC_DIST_LATENCY	EXEC to DIST latency	Milliseconds	No	
KPI_RS_PATH_DIST_DSI_LATENCY	DIST to DSI latency	Milliseconds	No	
KPI_RS_PATH_DSI_RDB_LATENCY	DSI to RDB latency	Milliseconds	No	
KPI_RS_PRIM_QUEUE_BACKLOG	Primary replication queue backlog	Megabytes	No	N:0-50 L:51-100 M:101-200 H:201-217484648
KPI_RS_REMO_QUEUE_BACKLOG	Remote replication queue backlog	Megabytes	Yes	N:0-50 L:51-100 M:101-200 H:201-217484648
KPI_RS_PRIM_XACT_LOG_BACKLOG	Primary SAP ASE transaction log backlog	Megabytes	Yes	N:0-50 L:51-100 M:101-200 H:201-217484648
KPI_RS_PRIM_DEVICE_USAGE_PERCENT	Percentage of device usage in primary Replication Server	Percentage	Yes	N:0-70 L:71-80 M:81-90 H:91-100
KPI_RS_REMO_DEVICE_USAGE_PERCENT	Percentage of device usage in remote Replication Server	Percentage	Yes	N:0-70 L:71-80 M:81-90 H:91-100
KPI_RS_PATH_DSI_CMDS	DSI commands	Counts per minute	No	
KPI_RS_PATH_DSI_XACT	DSI transactions	Counts per minute	No	
KPI_RS_PATH_EXEC_B	Bytes Received by EXEC thread	Kilobytes per minute	No	

KPI Name	Description	Unit	Alert	Alert Threshold
KPI_RS_PATH_RSI_B	Bytes written by RSI thread	Kilobytes per minute	No	
KPI_RS_REPLICATION_PATH_STATE	State of a replication path. The states are: • UNKNOWN(0) • STOPPED(1) • PENDING(2) • RUNNING(3) • WARNING(4) • ERROR(5)	Status	Yes	
KPI_FAULT_MANAGER_STATE	State of the fault monitor. The status is one of: • active • inactive • unknown	Status	Yes	N:active L:not active M:not active H:not active
KPI_RMA_STATE	State of RMA (for primary and remote site respectively). The status is one of: • active • inactive • unknown	Status	Yes	N:active L:not active M:not active H:not active
KPI_RS_PRIM_STATE	State of primary Replication Server. The status is one of: • active • inactive • unknown	Status	Yes	N:active L:not active M:not active H:not active
KPI_RS_REMO_STATE	State of remote Replication Server. The status is one of: • active • inactive • unknown	Status	Yes	N:active L:not active M:not active H:not active
KPI_RAT_LOG_RECORD_SCANNED	Log Records scanned by the Rep Agent	count / minute	No	
KPI_RAT_LOG_RECORD_PROCESSED	Log Records processed by the Rep Agent	count / minute	No	

9.12 Backup and Restore

Regular and frequent backups are your only protection against database damage that results from database-device failure.

9.12.1 Backing Up (Dumping) a Database

Back up a database and its transaction log.

Prerequisites

- Ensure that you can connect to the Backup Server from each server you administer.
- Decide on the backup media you will use, and create dump devices that identify the physical backup media to the server.
- Ensure that the login of the person starting the Backup Server has write permissions for the physical backup dump device, and that the dump device is available.

Context

Although SAP ASE has automatic recovery procedures to protect you during power outages and computer failures, your best protection against media failure is creating regular and frequent backups of system and user databases. See the *System Administration Guide* for details on backup and recovery.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. Select one of:
   - *User Databases*
   - *System Databases*
   - *Temporary Databases*
   - *Proxy Databases*
   - *In-Memory Databases*
   - *In-Memory Temporary Databases*
4. In the right pane, select a database, then do one of:

- Click the arrow to the right of the name.
- Click the *Actions* button.

5. Select *Back Up*.
6. On the Introduction page, choose whether to back up the database or transaction log using a dump configuration by selecting *Backup using configuration*.

   If you back up only the transaction log, you can:
   - Create either a new transaction log or a new transaction entry in the log
   - Delete the inactive part of the log
7. On the Dump Devices page, click *Add*, or specify the dump device.
8. (Optional) On the Options page, specify:

Option	Description
Compression level	Row-level, or page-level.
Block size	The block size for the dump operation, which overrides the default block size for the device. For optimal performance, specify the block size as a power of 2.
Retention time	The number of days for which the dump is preserved and cannot be overwritten. The default value is 0. Specify retention time to override the default value for all dump devices. The backup server does not automatically overwrite data unless it is older than the retention time.
Password	This password protects the backup from unauthorized access. If you specify a password here, you must use the same password while restoring the database.

9. (Optional) On the Dump Performance page, choose a setting to optimize the performance of the backup (see `sp_dumpoptimize` in *Reference Manual: Procedures* for more information about reserved threshold and allocation threshold settings):

Option	Description
Default	Dumps the database using default optimize options value. By default, the reserved threshold is 85 percent and the allocation threshold is set to 40 percent.
Maximum	Dumps the entire database without determining which pages are allocated. Using *Maximum* sets both reserved threshold and allocation threshold to 0 percent.
Minimum	Dumps only the allocated pages, which results in the smallest possible archive image. *Minimum* sets both reserved threshold and allocation threshold to 100 percent.
Advanced	Dumps the database with user-specified values for both reserved threshold and allocation threshold. You can also specify the threshold values for reserved pages and allocated pages.

10. (Optional) Click *Summary* to verify your selected options.
11. Click *Finish* to start the backup. SAP ASE Cockpit displays backup messages from the server.

Related Information

Restoring (Loading) a Database [page 333]
Creating a Dump Device [page 228]

9.12.1.1 Creating a Dump Configuration

System administrators can create a dump configuration.

Prerequisites

Agent authentication is required when the wizard must validate user input in the archive directory; otherwise, you can run this wizard without first authenticating the agent.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Backup/Recovery* > *Dump Configurations*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.
5. On the Dump Configuration Name page, enter the unique name of the dump configuration you want to create.
6. On the Options page, specify:

Option	Description
Archive directory	The name of the stripe directory that holds the dump files. By default, the stripe directory is the directory from which Backup Server is started.
External API	The name of the byte stream device to be used for the dump operation.
Number of stripe devices	The number of stripe devices to be used for the dump operation.
Retry times	The number of times the server tries to execute the dump operation for nonfatal errors. The range of values is 0 to 5.

Option	Description
Block size	The block size for the dump operation, which overrides the default block size for the device. For optimal performance, specify the block size as a power of 2.
Retain days	The number of days for which the dump is preserved and cannot be overwritten.
Compression level	The level of compression for compressed dumps. See *Backing Up and Restoring User Databases* in *System Administration Guide, Volume II* for more information on compression levels.
Dump verification	Specify whether Backup Server must perform a minimal page-header or full structural row check on the data pages as they are copied to archives. By default, this option is unselected. When selected, the default option is header.
Message destination	Specify whether the Backup Server must route messages to the client terminal that initiated the dump, or to the operator-console terminal where the Backup Server is running.
Backup Server name	Specify the remote Backup Server used for the dump operation.

7. (Optional) Click *Summary* to view your selected options.
8. (Optional) Click *Preview* to view the SQL syntax the wizard created, then click *Save* to save the SQL, or *Close* to close the preview.
9. Click *Finish* to create the dump configuration.

9.12.1.2 Backing Up a Database Using a Dump Configuration

Dump (back up) a database using a dump configuration.

Prerequisites

- Ensure that you can connect to the Backup Server from each server you administer.
- Decide on the backup media you will use, and create dump devices that identify the physical backup media to the server.
- Ensure that the login of the person starting the Backup Server has write permissions for the physical backup dump device, and that the dump device is available.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.

2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. In the right pane, select one of:
   - *User Databases*
   - *System Databases*
   - *Temporary Databases*
   - *Proxy Databases*
   - *In-Memory Databases*
   - *In-Memory Temporary Databases*
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Back Up*.
5. On the Introduction page, choose *Backup using configuration*.
6. On the Type of Backup page, choose whether to back up the entire database (including the transaction log), or only the transaction log.
7. (Optional) The selections in the Options screen are not part of the dump configuration, but are applied to the `dump database` and `dump transaction` commands. This means that some of these options take precedence over the configured parameter value stored in the dump configuration file for a particular dump operation. See *Reference Manual: Commands* for information on `dump database` and `dump transaction` options. To overwrite the options you previously selected for the dump configuration, select *Use modified options*.

Option	Description
Block size	The block size for the dump operation, which overrides the default block size for the device. For optimal performance, specify the block size as a power of 2. .
Compression level	Row-level, or page-level.
Dump password	A password, between 6 and 30 characters, protect the dump file from unauthorized users.
Retain days	The number of days that the dump is preserved and cannot be overwritten.
Dump verification	Specify whether Backup Server must perform a minimal page-header or full structural row check on the data pages as they are copied to archives.
Message destination	Specify whether the Backup Server must route messages to the client terminal that initiated the dump, or to the operator-console terminal where the Backup Server is running.

8. (Optional) Click *Summary* to view your selected options.
9. Click *Finish* to start the backup. SAP ASE Cockpit displays backup messages from the server.

Related Information

Dump Configuration Properties [page 312]

9.12.1.3 Viewing Dump Configurations and Dump Records

View available dump configurations, which define the options used to create a database dump, and dump records.

Prerequisites

Backup Server must be running and you must be the system administrator or database owner.

To view dump records, `enable dump history` must be on.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Backup/Recovery*.
3. In the left pane, click on:
   - *Dump Configurations*
   - *Dump Records*

9.12.1.4 Dump Configuration Properties

Display or modify dump configuration options.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Backup/Recovery*.
3. In the left pane, click *Dump Configurations*
4. In the right pane, select a dump configuration, then do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Properties*.
6. View or modify the properties.

Pages	Properties
General	View the name of the dump configuration.
Options	View and modify these dump configuration options: ○ Archive directory – name of the stripe directory that holds the dump files. By default, the stripe directory is the directory from which Backup Server is started. ○ External API – name of the byte stream device to be used for the dump operation. ○ Number of stripe devices – number of stripe devices to be used for the dump operation. The default is 1. ○ Retry times – number of times the server tries to execute the dump operation for nonfatal errors. The range of values is 0 to 5. The default value is 0. ○ Block size – block size for the dump operation, which overrides the default block size for the device. For optimal performance, specify the block size as a power of 2. The default value is 0. ○ Compression level – level of compression for compressed dumps. By default, this option is disabled and set to 0. ○ Retain days – number of days that the dump is preserved and cannot be overwritten. The default value is 0. ○ Volume reinitialization – whether the volume must be reinitialized. The default value is `noinit`. ○ Dump verification – specify whether Backup Server must perform a minimal page-header or full structural row check on the data pages as they are copied to archives. By default, this is unselected. When selected, the default option is header. ○ Message destination – specify whether the Backup Server must route messages to the client terminal that initiated the dump, or to the operator-console terminal where the Backup Server is running. By default, this is unselected. When selected, the default option is client. ○ Backup Server name – the remote Backup Server used for the dump operation. (Optional) Click *Preview* to view the SQL syntax generated by the settings from your options, then click *Save* to save the SQL, or *Close* to close the preview.

Related Information

Backing Up a Database or Transaction Log to Multiple Stripes [page 314]
Backing Up a Database Incrementally [page 317]
Backing Up a Database Incrementally Using a Dump Configuration [page 319]
Backing Up a Database Using a Dump Configuration [page 310]
Backing Up Server Configuration Files [page 324]

9.12.1.5 Deleting a Dump Configuration

Delete a dump configuration, database objects, or the database itself.

Prerequisites

You must have sa_role to delete a dump configuration.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Backup/Recovery*.
3. In the left pane, click *Dump Configurations*
4. In the right pane, select a dump configuration, then do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
5. Select *Delete*.
6. Verify that the dialog displays the dump configuration to delete, and click *OK*.
7. Click *Finish*.

9.12.1.6 Backing Up a Database or Transaction Log to Multiple Stripes

Dump (back up) a database or transaction log to multiple stripes.

Prerequisites

- Ensure that you can connect to the Backup Server from each server you administer.
- Decide on the backup media you will use, and create dump devices that identify the physical backup media to the server.
- Ensure that the login of the person starting the Backup Server has write permissions for the physical backup dump device, and that the dump device is available.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. In the right pane, select one of:
   - *User Databases*
   - *System Databases*
   - *Temporary Databases*
   - *Proxy Databases*
   - *In-Memory Databases*
   - *In-Memory Temporary Databases*
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Back Up*.
5. (Optional) On the Introduction page, choose the dump configuration by selecting *Backup using configuration*.
6. On the Type of Backup page, choose whether to back up the entire database (including the transaction log), or only the transaction log.
7. On the Dump Devices page, select the dump stripes. This option appears only if you chose a dump configuration selecting *Backup using configuration*. To add dump devices for the dump operation, click *Add*:
   - Named dump device – select the device.
   - Explicit dump device – specify a local dump device as either an absolute path name or a relative path name. When dumping across the network, specify an absolute path name.
     When dumping across the network, you can specify the Backup Server as your remote dump device.
8. (Optional) The Options page differs, depending on whether you are using a dump configuration.
   - If you are a using dump configuration, you can override the values in the dump configuration by selecting *Use modified options*. The parameters you can change are:

Option	Description
Block size	The block size for the dump stripes, which overrides the default block size for all dump stripes. The block size must be at least one database page, and be an exact multiple of the database page size.
Compression level	The level of compression for compressed dumps. By default, this option is disabled and set to 0.
Dump password	A password, between 6 and 30 characters long, to protect the dump file from unauthorized users. The default is null.
Retain days	The number of days for which the dump is preserved and cannot be overwritten. The default value is 0.

Option	Description
Dump verification	Choose whether to perform a minimal header or full structural row check on the data pages.
Message destination	Choose whether messages appear in the client or on the operator console.

Some of these options are part of the dump configuration, but if you change them at dump time, the new values take precedence over the dump configuration.

- If you are not using a dump configuration, the parameters you can specify are:

Options	Description
Compression level	The level of compression for compressed dumps. By default, this option is disabled and set to 0.
Block size	The block size for the dump stripes, which overrides the default block size for all dump stripes. The block size must be least one database page, and be an exact multiple of the database page size.
Retain days	The number of days that the dump is preserved and cannot be overwritten. The default value is 0.
Dump password	A password, between 6 and 30 characters long, to protect the dump file from unauthorized users. The default is null.

9. On the Dump performance page, specify the amount of data to be dumped. The performance depends on the amount of data and relative speed of the database and dump devices. See `sp_dumpoptimize` in *Reference Manual: Procedures* for details on these options:
   - Default – the default values.
   - Maximum – dumps the entire database without determining which pages are allocated.
   - Minimum – dumps only the allocated pages, which results in the smallest possible archive image.
   - Advanced – allows you to specify the value of the reserved threshold and the archive space.
10. (Optional) Click *Summary* to view your selected options.
11. (Optional) Click *Preview* to view the SQL statement you generated with your settings. To save a copy of the SQL statement, click *Save*.
12. Click *Finish* to start the backup. SAP ASE Cockpit displays backup messages from the server.

Related Information

Dump Configuration Properties [page 312]
Creating a Dump Configuration [page 309]

9.12.1.7 Backing Up a Database Incrementally

Perform a cumulative dump, which is a type of incremental dump (backup) in which only the changes since the last full database dump are backed up.

Prerequisites

- Ensure that you can connect to the Backup Server from each server you administer.
- Enable incremental dumps for the database you are dumping:

```
sp_dboption <dbname>, 'allow incremental dumps', true
```

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. In the right pane, select one of:
   - *User Databases*
   - *System Databases*
   - *In-Memory Databases*
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Back Up*.
5. On the Introduction page, choose the dump configuration by selecting *Backup using configuration*.
6. On the Type of Backup page, choose *Cumulative backup*. This creates a copy of all the changes in the database since the last time the entire database was backed up.

   To verify that you have enough space, click *Estimate Dump Size*.

   > **i** Note
   >
   > *Cumulative backup* is unavailable if you have not performed a full backup since enabling incremental dumps, and you see a message similar to:

7. On the Dump Devices page, specify the dump stripes from the list. To add dump devices for the dump operation, click No full database dump is available for cumulative dump.*Add*:
   - Named dump device – select the device.
   - No fullExplicit dump device – specify a local dump device as either an absolute path name or a relative path name. When dumping across the network, specify an absolute path name.
     When dumping across the network, you can specify the backup server as your remote dump device.
8. (Optional) The selections in the Options page are not part of the dump configuration, but are for the `dump database` and `dump transaction` commands. This means that some of the options take precedence

over the configured parameter value stored in the dump configuration file for a particular dump operation. See `dump database` and `dump transaction` in *Reference Manual: Commands* for more information on these options:

Option	Description
Block size	The block size for the dump stripes, which overrides the default block size for all dump stripes. The block size must be least one database page and be an exact multiple of the database page size.
Compression level	The level of compression for all dump stripes. By default, this option is disabled.
Dump password	A password, between 6 and 30 characters long, to protect the dump file from unauthorized users. The default is null.
Retain days	The number of days for which the dump is preserved and cannot be overwritten. The default value is 0.

9. On the Dump performance page, specify the amount of data to be dumped. The performance depends on the amount of data and relative speed of the database and dump devices. See `sp_dumpoptimize` in *Reference Manual: Procedures* for details on these options:
   - Default – use the default values.
   - Maximum – dumps the entire database without determining which pages are allocated.
   - Minimum – dumps only the allocated pages, which results in the smallest possible archive image.
   - Advanced – allows you to specify the value of the reserved threshold and the archive space.
10. (Optional) Click *Summary* to view your selected options.
11. (Optional) Click *Preview* to view the SQL statement you generated with your settings. To save a copy of the SQL statement, click *Save*.
12. Click *Finish* to start the backup.

Related Information

Dump Configuration Properties [page 312]
Creating a Dump Configuration [page 309]

9.12.1.8 Backing Up a Database Incrementally Using a Dump Configuration

Using a dump configuration file, perform a cumulative dump, which is a type of incremental dump (backup) in which only changes since the last full database dump are backed up.

Prerequisites

- Ensure that you can connect to the Backup Server from each server you administer.
- Enable incremental dumps for the database you are dumping:

```
sp_dboption <dbname>, 'allow incremental dumps', true
```

If you do not do this before performing the task, you cannot select the cumulative backup option.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. In the right pane, select one of:
   - *User Databases*
   - *System Databases*
   - *In-Memory Databases*
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Back up*.
5. On the Introduction page, select *Backup using configuration*, then select the configuration to use.
6. On the Type of Backup page, choose *Cumulative backup*. This creates a copy of all the changes in the database since the last time the entire database was backed up.

   To verify that you have enough space, click *Estimate Dump Size*.
7. (Optional) The selections in the Options page are disabled unless you click *Use modified options*. These options are not part of the dump configuration, but are for the `dump database` and `dump transaction` commands. This means that some of the options take precedence over the configured parameter value stored in the dump configuration file for a particular dump operation. See `dump database` and `dump transaction` in *Reference Manual: Commands* for more information on these options:

Option	Description
Block size	The block size for the dump stripes, which overrides the default block size for all dump stripes. The block size must be at least one database page, and be an exact multiple of the database page size.
Compression level	The level of compression for compressed dumps. By default, this option is disabled and set to 0.
Dump password	A password, between 6 and 30 characters long, to protect the dump file from unauthorized users. The default is null.
Retain days	The number of days for which the dump is preserved and cannot be overwritten. The default value is 0.
Dump verification	Specify whether Backup Server must perform a minimal page-header or full structural row check on the data pages as they are copied to archives. By default, this is unselected. When selected, the default option is header.
Message destination	Specify whether the Backup Server must route messages to the client terminal that initiated the dump, or to the operator-console terminal where the Backup Server is running. By default, this is unselected. When selected, the default option is client.

8. (Optional) Click *Summary* to view your selected options.
9. (Optional) Click *Preview* to view the SQL statement you generated with your settings. To save a copy of the SQL statement, click *Save*.
10. Click *Finish* to start the backup.

Related Information

Dump Configuration Properties [page 312]

9.12.1.9 Purging Dump Records from Dump History

Purge dump records from the dump history file.

Prerequisites

Backup Server must be running and you must have dump history enabled. To enable dump history, use:

```
sp_configure 'enable dump history', 1
```

See *Utility Guide* for details on `backupserver`.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Backup/Recovery* > *Dump Configurations*.
3. In the right pane, select a dump configuration, then do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Purge*.
5. On the Type page, select the type of dump record to be purged:
   - *ALL* – purges database objects, transaction dump objects, and server configuration objects.
   - *DB* – database objects created by `dump database`.
   - *XACT* – transaction dump objects created by `dump transaction`.
   - *CONFIG* – server configuration objects created by `dump configuration`
6. On the Time page, select a date and time; dump records before and including the selected time will be purged.
7. On the Status page, select whether successful or failed records are to be purged. The values allowed are Successful, Failed, and All.
8. (Optional) Click *Summary* to view your selected options.

9.12.1.10 Generating Database-Creation SQL for a Target Database

Generate SQL and load sequences to create target databases that differ from the source databases you back up, into which you can load database dumps.

Prerequisites

Backup Server must be running and you must have dump history enabled. To enable dump history, use:

```
sp_configure 'enable dump history', 1
```

See *Utility Guide* for details on `backupserver`.

Context

The Target Database DDL Generation wizard generates database-creation SQL using information from the dump history file. It extracts device and segment mapping information from dump images, then generates a sequence of `create database` and `alter database` commands. Use this wizard to generate a target database into which you can restore (load) a database you backed up

The wizard performs the `load database` command using the `listonly=create_sql` option.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. In the right pane, select one of:
   - *User Databases*
   - *System Databases*
   - *Temporary Databases*
   - *Proxy Databases*
   - *In-Memory Databases*
   - *In-Memory Temporary Databases*
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Generate Target Database DDL*.
5. On the Introduction page, specify the name of your target database.
6. On the Options page, generate the load sequence. By default, this option is unselected. To generate:

- Database-reation SQL only, do not select *Generate load sequence*. Select *Next* to go to the Summary screen.
- Both database-creation SQL and load sequence, select *Generate load sequence*. If you used a password to back up your database, enter it in the password field.

7. If you selected *Generate load sequence*, you see the Point in Time screen. Select a dump time. By default, the point in time is set to the most recent database dump.
8. (Optional) Click *Summary* to view your selected options.
9. (Optional) Click *Preview* to view the SQL statement you generated with your settings. To save a copy of the SQL statement, click *Save*.

9.12.1.11 Generating Database-Creation SQL from a Dump Image

Generate database-creation SQL for a target database from a dump image.

Prerequisites

Backup Server must be running and you must have dump history enabled. To enable dump history, use:

```
sp_configure 'enable dump history', 1
```

See *Utility Guide* for details on `backupserver`.

Context

The Generate DDL from Dump Image wizard generates database-creation SQL using information from the dump image. It extracts device and segment mapping information from dump images, then generates a sequence of `create database` and `alter database` commands, ensuring that you can create an exact copy of the same data and log segment layout for your target database.

.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. In the right pane, select one of:
   - *User Databases*
   - *System Databases*

- *Temporary Databases*
- *Proxy Databases*
- *In-Memory Databases*
- *In-Memory Temporary Databases*

- Click the arrow to the right of the name.
- Click the *Actions* button.

4. Select *Generate DDL from Dump Image*.
5. On the Introduction page, choose whether to:
   - Generate database DDL SQL.
   - Display dump header contents.
6. On the Image page, select a dump image from the list of available images from which to generate your database-creation SQL. By default, the wizard selects the most recent image.
7. On the Target Database page, specify the name of the target database for which to generate the database DDL. If you leave this blank, the wizard creates DDL for the database that the dump image came from.
8. (Optional) Click *Summary* to view your selected options.
9. (Optional) Click *Preview* to view the SQL statement you generated with your settings. To save a copy of the SQL statement, click *Save*.

9.12.1.12 Backing Up Server Configuration Files

Back up server configuration files.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the right pane, select a server, then do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
3. Select *Back Up Configuration Files*.
4. On the Introduction page, select the type of files to back up: server configuration and dump history configuration files.
5. On the Destination page, enter the path of the directory to which to copy the files.
6. (Optional) Click *Summary* to view your selected options.

Related Information

Dump Configuration Properties [page 312]

9.12.2 Scheduling a Database Backup

Database backups are an important part of system management and disaster recovery, and are typically performed by the database administrator or database owner.

Context

By using the features of Job Scheduler, a database administrator or owner can schedule predefined database backup jobs into a prearranged sequence that includes database backups, transaction backups, and cumulative backups, which can then be automatically executed at planned times.

9.12.2.1 Requirements and Permissions for Scheduling Backups

Before you schedule backups, install the Job Scheduler database, templates, and XML files.

Make sure:

- You install `sybmgmtdb`, the Job Scheduler database.
- Run the `installjsdb` Job Scheduler installation script.
- You install the JSTemplate procedures and XML files.
- The user has either js_user_role or js_admin_role permissions.
- Ensure that you can connect to the Backup Server from each SAP ASE server you administer.
- Ensure that the login of the person starting the Backup Server has write permissions for the physical backup dump device, and that the dump device is available.

9.12.2.2 Creating a Schedule for Backups

Create a new schedule into which you can add a backup job.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Task Management* > *Schedules*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.

5. On the Schedule Name page, enter:
   - A name for the schedule
   - (Optional) A description of the schedule
6. (Optional) Select *Allow others to use this schedule*.
7. On the Time Range page, select the start time for the schedule you are creating:
   - *At* – to schedule a specific time.
   - *Between* – to schedule a time range.
     When you click *Between*, the Recurrence page appears, where you can specify the repeat interval for the new schedule.
     Optionally, if you select *Restrict the schedule to certain* in the Recurrence page, the Recurrence Days page appears. Specify the days on which to activate the new schedule.
8. On the Date Range page, specify the start and end date for the schedule.
   For time-ranged schedules, you can specify a start and end date. For point-in-time schedules, an end date is not applicable.
9. (Optional) Click *Summary* to verify your settings:
10. Click *Preview* to view the SQL syntax for the options you selected for the schedule.

9.12.2.3 Schedule Properties

Display or modify schedule properties, such permissions, the schedule date and time, and recurrence.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Task Management* > *Schedules*.
3. In the right pane, select a schedule, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. View or modify the properties.

Pages	Properties
General	○ Name – change the name of the schedule. ○ ID – displays the ID of the schedule. ○ Owner – change the owner of the schedule. ○ Creation date – displays the date and time the schedule was created. ○ Allow others to use this schedule – to give permission to others to use the schedule. ○ Description – add a description about the schedule.

Pages	Properties

Time	○ Current time on server
	○ Current local time
	○ Start time – choose either:
	  ○ At – enter a time to start the schedule at a specific time.
	  ○ Between – enter a range within which the schedule can start.

Dates	○ Start date ○ End date

Recurrence	○ Repeat every – enter a numeric value, then select the increment, such as days or months.
	○ Trigger on the following days – choose either:
	  ○ *Days of the week* – select the days of the week.
	  ○ *Days of the month* – select the days of the month. You can also click *The last day of the month*.

9.12.2.4 Deleting a Schedule

Delete a schedule.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Task Management* > *Schedules*.
3. In the right pane, select a schedule, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Delete*.
5. Click *OK* to confirm.

9.12.2.5 Creating a Scheduled Backup Job

Create a new scheduled backup job.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Task Management* > *Scheduled Jobs*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.
5. On the Job Name page:
   - Enter a name for the scheduled job
   - (Optional) Enter a description for the job.
   - If you installed the Job Scheduler template in the server you selected, you see *Use a JS template to create this job*. Select this to use the template.
6. If you selected *Use a JS template to create this job*:
   a. Choose a backup template from the Backup Template screen.
   b. In the Target Server screen, select:
      - The local Job Scheduler target server, which is the same as the server you selected. You can then select a database from the local Job Schedule target server.
      - A remote Job Scheduler target server listed in the `sysservers` system table, after which, you specify a database on that remote target server.
7. If you left *Use a JS template to create this job* blank, you see the Job Command screen. Enter the SQL syntax for your backup job. In the target server page, select either the local target server or the remote target server on which the backup schedule job is to be executed.
8. On the Select Schedule page, choose one of:

Option	Description
Use existing schedule	Select a schedule from the table
Create new schedule	A field in which to enter a new name for the schedule field.

> **i Note**
>
> From this point in the wizard, click *Preview* at any point to view the SQL syntax for your selected options.

9. If you are using a backup template, you see the Backup Template Options screen:

Option	Description
Dump location	(Optional) Specify the location to which to dump the database. Job Scheduler uses the default location if you leave this field blank.
Server name	Use server name in dump filename.
Date format	Use date format in dump filename.
Number of stripe files	Specify how many dump stripe file will be generated.
Compression level	Data compression mode in dump operation.

10. On the Job Options page, select all that apply:

Option	Description
Allow multiple concurrent executions	Allows you to run your job concurrently, except for jobs that may interfere with another instance of itself, such as `dbcc reorg`.
Allow others to use this job	Gives permission to others to use the schedule and execute your job.
Always execute as the job owner	Specify this if you want all executions of this job to occur under your login.
Timeout	Specify a numeric value, in minutes. If the job does not complete in the amount specified, the job is terminated. **i Note** You can override this value for individual scheduled jobs.

11. On the Job Execution Option page, select all that apply:

Option	Description
Do not log output from job	By default, any output generated by a job is saved and can be viewed in the `Job Histories` folder. Select this option to suppress output from the job you are scheduling. By default, it is unselected.
Allow others to execute this scheduled job	Allow others to be able to execute this job. By default, this is unselected.
Disable on failure	Disable the job if its previous execution failed, and suspend all scheduled executions of the job until you manually re-enable it.
Delete on completion	Delete the scheduled job when it finishes executing. This is useful for jobs that do not recur. **i Note** Choosing this option does not delete the underlying job or schedule.

12. (Optional) Click *Summary* to verify your selected options.
13. Click Finish to schedule the job.

9.12.2.6 Properties of a Scheduled Backup Job

Display or modify properties of scheduled backup jobs.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Task Management* > *Scheduled Jobs*.
3. In the right pane, select a scheduled job, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. View or modify the properties.

Pages	Properties
General	○ Name – change the name of the schedule. ○ ID – displays the ID of the schedule. ○ Owner – change the owner of the schedule. ○ Creation date – displays the date and time the schedule was created. ○ Allow others to use this schedule – to give permission to others to use the schedule. ○ Description – add a description about the schedule.

Time	○ Current time on server
	○ Current local time
	○ Start time – choose either:
	  ○ At – enter a time to start the schedule at a specific time.
	  ○ Between – enter a range within which the schedule can start.

Dates	○ Start date ○ End date

Recurrence	○ Repeat every – enter a numeric value, then select the increment, such as days or months.
	○ Trigger on the following days – choose either:
	  ○ *Days of the week* – select the days of the week.
	  ○ *Days of the month* – select the days of the month. You can also click *The last day of the month*.

9.12.2.7 Manage a Scheduled Backup Job

Manually run an idle scheduled job from the job's context menu, or terminate, disable, or enable a running scheduled job.

Context

When you install Job Scheduler, the JS Agent creates its own log file in the same directory as the SAP ASE log file. If you encounter connection issues or failures, check the log file to view JS activity such as connection issues and task request.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Task Management* > *Scheduled Jobs*.
3. In the right pane, select a schedule, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Choose one of::

Option	Description
Enable	Activates the scheduled job.
Delete	Deletes the scheduled job.
Disable	Disables scheduled jobs that have been enabled. Current running jobs are unaffected.
Run	Runs the scheduled job immediately. You can select more than one job.
Reschedule	Allows you to choose a different schedule.
Terminate	Stops the backup job that is in progress.

9.12.2.8 Managing the Execution History of a Scheduled Backup Job

View the execution history log and properties for all scheduled backup jobs, or delete the record of a backup job's execution history

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Task Management* > *Job History*.
   The Job History page appears, and displays the execution history of all scheduled backup jobs.
3. In the right pane, select a job, then do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Choose:

Option	Description
Properties	Access and modify information on job histories.
View Log	View the contents of the execution history log.
Delete	Removes record of the backup job's execution history.

9.12.2.9 Job Scheduler Administration

Perform various backup schedule activities with the Job Scheduler Administration dialog.

Prerequisites

The Job Scheduler Administration dialog is available only if Job Scheduler is installed on the server and the user has js_admin_role permission.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Task Management*.
3. In the right pane, click the server you want to administer, and choose *Job Scheduler Administration*.

4. Manage these task in the Job Scheduler Administration dialog:

Option	Description
Start or Stop	Start or stop the Job Scheduler agent. The *Stop* button is unavailable if Job Scheduler is not performing a task (and the *Start* button is unavailable if the Job Scheduler is performing a task).
Terminate jobs	Terminates all running Job Scheduler jobs. Enter a numeric value to specify a number of seconds after which to perform the termination.
Enable Job Scheduler at boot	Specify whether to enable Job Scheduler when the server restarts.
Job Scheduler Interval	Enter a numeric value, in minutes, of how much time should elapse before the next Job Scheduler task begins.
Maximum number of concurrent jobs	Enter the maximum number of concurrent jobs.
Maximum size of job output	Enter a numeric value, in bytes, to set the maximum size of the job output.

9.12.3 Restoring (Loading) a Database

Restore a database backup and its transaction log.

Prerequisites

Decide to load the backup into a new database with the `for load` option, or into a preexisting database.

Context

You cannot load a database backup that was created on a different operating system, or with an earlier version of SAP ASE.

> **i** Note
>
> When loading an archive database, the block size and compression level are set to the system default value for each stripe.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. In the right pane, select one of:
   - *User Databases*
   - *System Databases*
   - *Archive Databases*
   - *In-Memory Databases*
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Restore*.
5. On the Introduction page, choose:
   - *Default* – loads a database or its transaction log from a single or multiple dump devices.
   - *Restore using script* – loads a database from an existing SQL script.
   - *Restore point-in-time* – loads a database from a specified time in the database dump sequence.
   - *Generate load sequence only* – generates database load sequence SQL from a specified time. You can save the load SQL for future use. The load sequence consists of a batch of load SQL, such as:

     ```
     load database testdb from...
     load transaction testdb from...
     ```

     You may restore the database directly from the saved SQL script, either using `Execute SQL` or script functionality in ASEMAP or by using `ISQL`.
6. On the Type of Restore page, choose to restore the entire database or only the transaction log. This option is available only when you select the *Default* restore option.
7. By default, the Dump Device page is initially empty. Click *Add* to identify the dump devices or dump stripes you want to load back into the database:
   - *Named dump device* – select the device from the menu.
   - *Explicit dump device* – specify a local dump device as either an absolute path name or relative path name. When dumping across the network, specify an absolute path name.
     You can specify the backup server as your remote dump device when using a default server. This option is not available when loading an archive database; use *Named dump device* instead.
     If you select a remote backup server, select its server name from the drop-down list.
8. (Optional) On the Options page, if you specified a password for backup, you must use the same password while restoring the database.

   Select *Bring the database online* to bring the database online after the restoration is complete. By default, this option is not selected.
9. (Optional) Click *Summary* to view your selected options.
10. (Optional) Click *Preview* to view the SQL statement you generated with your settings. To save a copy of the SQL statement, click *Save*.
11. Click *Finish* to start the restore process. Restore messages from the server are displayed.

Related Information

Backing Up (Dumping) a Database [page 307]

9.12.3.1 Generating a Database Load Sequence

Generate a load sequence from the dump history file. You can choose to generating a load sequence for a target database that is different from the database you backed up.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. In the right pane, select one of:
   - *User Databases*
   - *System Databases*
   - *Archive Databases*
   - *In-Memory Databases*
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Restore*.
5. On the Introduction page, select *Generate load sequence only* to generate database load sequence SQL from a specified time. You can save the load SQL for future use. The load sequence consists of a batch of load SQL, such as:

   ```
   load database testdb from...
   load transaction testdb from...
   ```

6. On the Point in Time page, select a dump time from the list of points in time in which the database was backed up. By default, the point in time is set to the last database dump time.
7. On the Options page:
   - If you used a password during the backup process, you must enter the same password to restore the database.
   - (Optional) Select *Restore to target database* to generate database creation SQL for a target database that is different from the database you backed up. This target database can reside on a different server. If you choose this option, enter the name of the target database.
8. (Optional) Click *Summary* to view your selected options.
9. (Optional) Click *Preview* to view the SQL statement you generated with your settings. To save a copy of the SQL statement, click *Save*.
10. (Optional) Click *Save* in the SQL Preview window to save the script to your local machine.

9.12.3.2 Restoring a Database from a Cumulative Dump

Restore a database backup and its transaction log from a cumulative backup, in which only the changes since the last full database dump are backed up.

Prerequisites

Decide whether to load the backup into a new database with the `for load` option, or into a preexisting database.

Context

You cannot load a database backup that was created on a different operating system, or with an earlier version of SAP ASE.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. In the right pane, select one of:
   - *User Databases*
   - *System Databases*
   - *In-Memory Databases*
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Restore*.
5. On the wizard's Introduction page, choose *Default*.
6. On the Type of Restore page, choose *Cumulative restore*.
7. On the Dump Devices page, specify the dump stripes from the list. To add dump devices for the dump operation, click *Add*:
   - Named dump device – select the device from the menu.
   - Explicit dump device – specify a local dump device as either an absolute path name or relative path name. When dumping across the network, specify an absolute path name.
     You can specify the backup server as your remote dump device when using a default server. This option is unavailable when you are loading an archive database.
8. (Optional) On the Options page, if you used a password during the backup process, enter this password.

   Click *Bring the database online* to bring the database online after the restoration is complete. By default, this option is not selected.

9. (Optional) Click *Summary* to verify your selected options.
10. (Optional) Click *Preview* to view the SQL statement you generated with your settings. To save a copy of the SQL statement, click *Save*.
11. Click *Finish* to start the restore process. Restore messages from the server are displayed.

9.12.3.3 Restoring a Database from a SQL Script

Restore a database backup from an existing SQL script.

Context

You cannot load a database backup that was created on a different operating system, or with an earlier version of SAP ASE.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. In the right pane, select one of:
   - *User Databases*
   - *System Databases*
   - *Archive Databases*
   - *In-Memory Databases*
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Restore*.
5. On the Introduction page, choose *Restore using script*.
6. On the Script page, you can:
   - Enter the syntax for your `restore` command in the text field.
   - Click *Select script file* to import an existing SQL file from a local machine that includes the `restore` command. The command from your SQL file then populates the text field.
7. (Optional) Choose Summary from the left pane to see the summary of your restore command, including:
   - Database name
   - Type of restoration
   - Script name
8. Click *Finish* to begin restoring the database.

9.12.3.4 Restoring a Database from a Point in Time

Restore a database backup from a specific point in time.

Context

You cannot load a database backup that was created on a different operating system, or with an earlier version of SAP ASE.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases*.
3. In the right pane, select one of:
   - *User Databases*
   - *System Databases*
   - *Archive Databases*
   - *In-Memory Databases*
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Restore*.
5. On the Introduction page, choose *Restore point-in-time*.
6. Click *Point In Time*, and:
   - Select a time range from the list. A time range represents a valid dump sequence that contains a database dump and a set of transaction dumps.
   - Select a range of time in the database dump sequence that spans from the time of the first dump to the time of the most recent dump.
7. (Optional) On the Options page, if you specified a password for backup, you must use the same password while restoring the database:

   Select *On-line database* to bring the database online after the restoration is complete. By default, this option is not selected.
8. (Optional) Click *Summary* to verify your selected options.
9. (Optional) Click *Preview* to view the SQL statement you generated with your settings. To save a copy of the SQL statement, click *Save*.
10. Click *Finish* to start the restore process. SAP ASE Cockpit displays restore messages from the server.

9.13 Execution Classes

Create, delete, and modify execution classes.

9.13.1 Creating Execution Classes

Create execution classes that can be bound to logins or tasks.

Prerequisites

The server is configured to run in threaded mode.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Performance*.
3. Click *Execution Classes*.
4. Select *New*.
5. On the Execution Class Name page, specify the name of execution class for which you want to create.
6. On the Priority page, select the priority: High, Medium, or Low. This priority determines the priority of the tasks that are bound to the execution class. It also determines the priority of the tasks run by the logins associated with the execution class.
7. On the Affinity page, specify the affinity of the execution class. This is the thread pool or engine group associated with the execution class. If the server is running in threaded mode, the tasks bound to the execution class can run only on the thread from the chosen thread pool.
8. (Optional) Click *Summary* to verify your selected options.

9.13.2 Execution Classes Properties

Display or modify an execution class, or change bindings.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Performance* > *Execution Classes*.
3. In the right pane, select an execution class, and do one of the following:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. View or modify the properties.

Pages	Properties
General	○ Priority – modify the priority of your execution class. ○ Properties – modify the thread pool properties.
Bindings	Change the process, login, or stored procedure that is bound to this execution class.

9.13.3 Modifying Bindings to Execution Classes

Change the scope and bindings of execution classes.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Performance* > *Execution Classes*.
3. In the right pane, select an execution class, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Bindings*.
6. In the right pane, click *Bind* to bind objects to an execution class.
   a. Select the scope of the execution class.
   b. Select the login to bind to the execution class.

7. (Optional) Select a login bound to the execution class and click *Unbind* to release the binding.

9.14 Engine

Manage SAP ASE engine groups.

9.14.1 Creating Engine Groups

Create groups of SAP ASE engines or processes that run in parallel.

Context

Engine groups are useful only in multiprocessor systems.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Performance* > *Engine Groups*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.
5. Specify the name of the engine group.
6. Select the engines in this engine group.
7. (Optional) Click *Summary* to verify your selected options.

9.14.2 Engine Groups Properties

Use the Engine Groups Properties window to view engine information and to add or remove an engine from an engine group.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Performance* > *Engine Groups*.
3. In the right pane, select an engine, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. View or modify properties.

Pages	Properties
General	○ Name and type ○ Properties – select an execution class and click *Properties* to view the properties of the execution class.
Engines	Select an engine from the list of engines, and click: ○ Add – to add the engine to your engine group. ○ Remove – to remove the engine from an engine group. **i Note** You cannot remove the last engine from the group.

9.14.3 Deleting an Engine Group

Delete an engine group.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Performance* > *Engine Groups*.
3. In the right pane, select an engine, and do one of:

- Click the arrow to the right of the name.
- Click the *Actions* button.

4. Select *Delete*.
5. Confirm the deletion.
6. Click *Finish*.

9.14.4 Generating DDL for an Engine Group

Generate a DDL script for engine groups.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Performance* > *Engine Groups*.
3. In the right pane, select an engine, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Generate DDL*.
5. (Optional) Click *Save* to export and save the DDL statement.

   You can save the DDL in an external file on your local file system.

9.15 Segments

Use segments to improve performance and provide the System Administrator or Database Owner increased control over the placement, size, and space usage of database objects.

9.15.1 Displaying Segments

Display a summary of available segments, which are labels that point to one or more database devices in your databases.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Segments*.
   You see a list of existing segments and their properties:

Property	Description
Name	The name of the database device.
Server	The name of the server in which the database device resides.
Database	The database in which the segment resides. This column includes both system-provided databases (such as `model`) and user-created databases.
Last Chance	Whether a last-chance stored procedure such as `sp_thresholdaction` is added to the segment. See *Managing Free Space with Thresholds* in the *System Administration Guide*.
Size	Displays the size of the database, in megabytes.
Used	Displays the amount of memory used by the database, in megabytes.
Free	Displays the amount of unused memory in the database.

9.15.2 Extend a Segment

Extend a segment on a specific device.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, select *Segments*.
3. In the right pane, select the segment to configure.
4. Right click and select *Extend Segment* menu item from the context menu.
5. Click the device name onto which to extend the segment.

> **Note**
>
> The device list is empty if the selected segment is using all the devices configured on the server. In this case, add a new device to the server to extend the segment.

6. Click *OK*.

9.15.3 Creating a Segment

Create a new segment, which is a label that points to one or more database devices in a database.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Segments*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.
5. On the Introduction page, select the database in which to create a segment.
6. On the Segment Name page, enter the name of the segment to create.
7. On the Device Selection page, select the database device to use for the segment.
8. (Optional) Click *Preview* to view the SQL statement that is created by this wizard.
9. Click *Finish*.

9.15.4 Segment Properties

Display or modify database devices, tables, and thresholds.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Segments*.
3. In the right pane, select a segment, and then do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.

4. Select *Properties*.
5. View or modify the properties.

Options	Properties
General	Displays the segment's summary information that appears in the segments list view, as well as the segment's hysteresis value. See *Managing Free Space with Thresholds* in the *System Administration Guide* for information about the hysteresis value. Specify how to show the current size: ○ Pages ○ Kilobytes ○ (Default) Megabytes ○ Gigabytes
Devices	Displays the database devices used by the segment, and their sizes, in megabytes. You can also: ○ Add a new database device to the segment. ○ Remove an existing database device that the segment uses. ○ View the properties of the database device – when you click Properties, you see the Database Device Properties wizard.
Contains	Displays: ○ Tables that use the segment – the list includes both the table name and its owner. ○ Indexes that use the segment – the list includes both the index name and the table the index uses.
Thresholds	Displays thresholds that are added to the segment in the form of system procedures and their owners. You can also add and remove thresholds.

Related Information

Adding a Database Device to a Segment [page 349]
Removing a Database Device from a Segment [page 348]
Adding a Threshold to a Segment [page 347]
Removing a Threshold from a Segment [page 347]

9.15.5 Removing a Threshold from a Segment

Remove a threshold associated with a segment.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Segments*.
3. In the right pane, select a segment, and then do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. Click *Thresholds*. Any existing threshold-related stored procedures for this segment appear in the table, listed by procedure name, owner, and the amount of free space, in megabytes.
6. Select the stored procedure to delete, and click *Remove*.
7. Click *Apply* after each stored procedure you delete, and *OK* when you are finished.

Related Information

Adding a Database Device to a Segment [page 349]
Removing a Database Device from a Segment [page 348]
Adding a Threshold to a Segment [page 347]
Segment Properties [page 345]

9.15.6 Adding a Threshold to a Segment

Create a threshold to monitor space on a database segment.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Segments*.
3. In the right pane, select a segment, and then do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.

4. Select *Properties*.
5. Click *Thresholds*. Any existing threshold-related stored procedures for this segment appear in the table, listed by procedure name, owner, and the amount of free space, in megabytes.
6. Click *Add* to view the Add New Threshold wizard page.
7. Choose a stored procedure, and specify its free-space threshold in pages, kilobytes, megabytes (the default), or gigabytes.
8. Click *Apply* after each new stored procedure you add, and *OK* when you are finished.

Related Information

Adding a Database Device to a Segment [page 349]
Removing a Database Device from a Segment [page 348]
Removing a Threshold from a Segment [page 347]
Segment Properties [page 345]

9.15.7 Removing a Database Device from a Segment

Remove a database device that is associated with a segment.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Segments*.
3. In the right pane, select a segment, and then do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. On the Devices page, click *Remove*.
6. Select the database device to remove.

Related Information

Adding a Database Device to a Segment [page 349]
Adding a Threshold to a Segment [page 347]
Removing a Threshold from a Segment [page 347]
Segment Properties [page 345]

9.15.8 Adding a Database Device to a Segment

Use the Segment Properties wizard to add an existing database device to a segment.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Segments*.
3. In the right pane, select a segment, and then do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. On the Devices page, click *Add*.
6. Choose an existing database device from the list to the add to the segment.

Related Information

Removing a Database Device from a Segment [page 348]
Adding a Threshold to a Segment [page 347]
Removing a Threshold from a Segment [page 347]
Segment Properties [page 345]

9.15.9 Deleting a Segment

Delete segments.

Context

> **i Note**
>
> You can delete only the segments you created; the *Delete* option is not available for segments created by other users.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Segments*.
3. In the right pane, select a segment, and then do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Delete*.
5. Confirm the deletion.
6. Click *Finish*.

9.15.10 Generating DDL for a Segment

Generate a DDL script for segments.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Segments*.
3. In the right pane, select a segment, and then do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Generate DDL*.
5. Click *Save* to export and save the DDL statement.
   You can save the DDL in an external file on your local file system.

9.16 Thread Pools

Use thread pools to group CPU resources and execute SAP ASE tasks associated with that thread pool.

9.16.1 Creating a Thread Pool

Group SAP ASE engines into thread pools.

Prerequisites

Set the kernel mode to threaded. You can change the kernel mode on the Server Configuration screen, or by executing this command at the server level from the Administration Console.

```
sp_configure "kernel mode", 0, threaded
```

You must restart SAP ASE for the change to take effect.

Context

Thread pools are groups of resources, such as engines, that execute user tasks, run specific jobs such as signal handling, and process requests from a work queue. Both system-defined and user-defined thread pools are supported.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Performance*, then select *Thread Pools*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.
5. On the Thread Pool Name page, specify the name of the thread pool you want to create.

   > **i Note**
   >
   > You cannot name thread pools starting with a `syb_` prefix since that is reserved for system thread pools.

6. On the Thread count page, specify the number of threads. The maximum number of threads you can configure cannot exceed the value of `max online engines`.
7. Specify the thread pool idle time out in microseconds.
8. (Optional) Provide a description for the thread pool.
9. (Optional) Click *Preview* to see the SQL statements for your command.
10. (Optional) Click *Summary* to verify your selected options.

9.16.2 Thread Pool Properties

View properties of thread pools in an SAP ASE.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Performance*, then select *Thread Pools*.
3. In the right pane, select a thread pool, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. View or modify the properties.

Option	Properties

General	○ Name and type – two types of threads are supported: Engine (or multiplexed) or Run to completion (RTC) threads. User created thread pools are always multiplexed.
	○ Thread count – you can increase the thread count up to a maximum value of `max online engines` configuration parameter.
	○ Idle Time Out – set to:
	  ○ 0 – threads change to sleep mode if no work is available.
	  ○ -1 – threads never change to sleep mode even if no work is available.
	○ Description – add a description for the thread pool.

Execution Classes	The execution classes that are associated with each user or system thread pool are displayed.

9.17 User-Defined Datatypes

Add, delete, or modify user-defined datatypes.

9.17.1 Adding a User-Defined Datatype

Name and design your own datatypes to supplement system datatypes.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *Server* > *Schema Objects* > *User Defined Datatypes*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.
5. On the Introduction page, select the database in which to create the datatype, and the datatype owner.
6. On the User-Defined Datatype Name page, enter the name of the datatype.
7. On the System Datatype page, select the system datatype that the user-defined datatype is based on, and whether the datatype allows null or identity values.

   Depending on the system datatype, specify the size for your user-defined datatype.
8. On the Options page, bind the datatype to a rule or default. Select *In Future Only* if you do not want existing columns to acquire the new rule or default.
9. (Optional) Click *Summary* to view your selected options.

9.17.2 User-Defined Datatypes Properties

Display or modify user-defined datatypes, including bound rules and defaults.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *Server* > *Schema Objects* > *User Defined Datatypes*.
3. In the right pane, select a user-defined datatype, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. View or modify the properties.

Options	Properties
General	View the name, type, database, and owner of the user-defined datatype.
Advanced Options	View or modify these options: ○ The system datatype that the user-defined datatype is based on ○ Whether the datatype allows null values ○ Whether the datatype allows identity values ○ Defaults and rules bound to the datatype
Referenced By	View the name, type, owner, and properties of objects referenced by this user-defined datatype.
References	View the name, type, owner, and properties of objects that this user-defined datatype references.

9.17.3 Deleting a User-Defined Datatype

Delete user-defined datatypes.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *Server* > *Schema Objects* > *User Defined Datatypes*.
3. In the right pane, select a user-defined datatype, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Delete*.
5. Confirm the deletion.
6. Click *Finish*.

9.18 Incrementally Transferring Data

Incremental data transfer lets you transfer data to SAP ASE or other products.

9.18.1 Enabling Incremental Transfer

You can designate incremental transfer eligibility on an existing table, or when you create a table.

Context

Enable incremental transfer on an existing table.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
   - *User Tables*
   - *Proxy Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. On the General screen, click *Enable incremental transfer*, then click *OK*.

9.18.2 Incrementally Transferring Data In

Use incremental transfer to read data files into SAP ASE.

Prerequisites

Enable incremental transfer. Enable Incremental Transfer [page 355]

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
   - *User Tables*
   - *Proxy Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Incremental Transfer In*.
5. On the Introduction page, specify the file name of data to be read into SAP ASE. You can optionally specify an absolute path.
   Only SAP ASE data file format is supported.
6. (Optional) Click *Summary* to review the file name and path.
7. Click *Finish*.

9.18.3 Incrementally Transferring Data Out

Transfer table data that has changed since a prior transmission from tables that are marked for incremental transfer.

Prerequisites

Enable incremental transfer. Enable Incremental Transfer [page 355]

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
   - *User Tables*
   - *Proxy Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Incremental Transfer Out*.
5. On the Introduction page, specify a destination file name. Optionally include an absolute path.

6. On the Data Formats page, specify the data format for the destination file.
7. On the Command Options page, specify the order in which the column data is to written.
8. On the Tracking and Sequence ID page:
   a. (Optional) Specify the tracking ID.
   b. (Optional) Specify whether to resend previously transferred data, then choose either to resend data using a sequence ID to determine the starting time stamp or resend the entire table.
9. (Optional) Click *Summary* to review your selected options.
10. Click *Finish*.

9.19 Bulk Copying Data

You can use bulk copy to copy data into or out of a table.

Bulk copying data in or out of a table provides a convenient, high-speed method for transferring data between a database table or view and an operating system file. When copying in from a file, bulk copy inserts data into an existing database table; when copying out to a file, bulk copy overwrites any previous contents of the file.

9.19.1 Bulk Copying Data Into or Out of Tables

Use bulk copy to insert data into an existing database table or to copy table data to an external file.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of:
   - *User Tables*
   - *Proxy Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select either *Bulk Copy In* or *Bulk Copy Out*.
   If you select one table, you can select a different data file for each partition. If you select multiple tables, you can only provide one data file for all partitions for the table.
5. On the Specify Data File page, enter the location for partitions.
6. On the Specify File Format page, select the format for copying data.
7. On the Specify Copy Format page, choose the field and row parameters for the file to be copied into the table.
8. Click *Finish*.

9.20 Views

Views are an alternative way of looking at the data in one or more tables.

A view is the results of a predefined SQL query. Use views to structure table data, restrict access to data, or combine data from various tables, which can be used to generate reports.

9.20.1 Creating a View

Create an SAP ASE view.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Views*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.
5. On the Introduction page, select a database and owner for the new view.
6. On the View Name page, enter the name of the view.
7. On the SQL Editor page, provide the SQL statement for the view.
8. (Optional) Click *Preview* to see the SQL statements for your command.
9. (Optional) Click *Summary* to verify your selected options.

Related Information

View Properties [page 359]

9.20.2 Replacing a View Definition

You can replace the SQL definition of an existing view.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Views*.
3. Choose one of the following:
   - Click the drop-down arrow on the view for which you want to replace the definition and select *Replace*.
   - From Views in the left pane, click the drop-down arrow and select *New*. Enter the name of the existing view for which you want to replace the definition.
     When selecting an existing view, the *Confirm Replace* dialog appears with an option to replace the object definition or cancel the replacement.
4. (Optional) On the SQL Editor page, enter the new view value.
5. (Optional) On the Summary page, verify the view name, database, owner, and the new expression.

9.20.3 View Properties

Display or modify column datatype and permissions, and on database objects that reference, and are referenced by, the view.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Views*.
3. In the right pane, select a view, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. View or modify properties.

Option	Properties
General	The name, type, database, owner, and creation date of the view.
SQL	The SQL statements for creating the view.

Option	Properties
Columns	The name and type of all columns in the view.
Data	The data for each row in the view.
Permissions	Grant and revoke permissions on a view to users, groups, or roles.
Referenced By	The name, type, owner, and properties of objects referenced by this view. .
References	The name, type, owner and properties of objects that this view references.

Related Information

Creating a View [page 358]

9.20.4 Granting Permissions on Views

Grant permission on views for users, groups, and roles.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Views*.
3. In the right pane, select a view, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Permissions*.
6. In the right pane, click *Grant* to grant access permissions for the selected object.
7. On the Welcome page, select the type of grantee:
   - *Users*
   - *Groups*
   - *Roles*
8. On the Grantee page, select one or more grantees.
9. Select the columns for the selected view.
10. Select the permission to be granted.

> **Note**
>
> If restricted decrypt permission is set, only a system security officer can grant decrypt permission.

11. Choose *with grant* to allow the grantee to further grant permissions to other users.
12. (Optional) Click *Summary* to verify your selected options.
13. Click *Finish*.

9.20.5 Revoking Permissions on Views

Revoke permission on views for users, groups, and roles.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Views*.
3. In the right pane, select a view, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Permissions*.
6. Select the grantee, then click *Revoke* to revoke access permissions to the object.
   In the Revoke Permissions wizard, each type of permission and the current granted permissions are shown in cells.
7. Choose one of:
   - *Revoke all permission.*
   - Individual cells to revoke the currently granted permissions. The cell changes to show an "x", indicating that the permission type is no longer granted.
8. Click *OK*.

9.20.6 Deleting a View

Delete views.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Views*.
3. In the right pane, select a view, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Delete*.
5. Confirm the deletion.
6. Click *Finish*.

9.21 Triggers

A trigger is a special type of procedure attached to a table column that goes into effect when a user changes the table. Triggers execute immediately after data modification statements are completed.

9.21.1 Creating a Trigger

Create a trigger on a table to enable checks whenever data is inserted, updated, or deleted.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of the following:
   - *User Tables*
   - *Proxy Tables*
   - *System Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.

4. Select *Properties*.
5. In the left pane, select *Triggers*.
6. Select *New*.
7. On the Name and Owner page, enter the name of the trigger and select an owner.
8. On the Trigger Type page:
   a. Select the events, that when executed, will call the trigger.
   b. Select *Update of columns*, then select the columns to be updated. If changes are made to any of the selected columns, the trigger executes.
9. On the SQL Editor page, enter the SQL statements for the new trigger and related table objects.
10. (Optional) Click *Summary* to review your selected options.

9.21.2 Trigger Properties

Display or modify options and objects referenced by the trigger.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of the following:
   - *User Tables*
   - *Proxy Tables*
   - *System Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, select *Triggers*.
6. In the right pane, select a trigger, click the arrow to the right of the name and select *Properties*.
7. View or modify the properties.

Pages	Properties
General	Shows the select trigger options.
Referenced by	Displays the name, type, and owner of the objects that are referenced by the specified trigger.

Related Information

Index Properties [page 223]

Foreign Key Properties [page 374]
Check Constraint Properties [page 376]
Partition Properties [page 288]
Table Properties [page 219]
Column Properties [page 222]

9.21.3 Replacing a Trigger Definition

You can replace the SQL definition of a trigger.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of the following:
   - *User Tables*
   - *Proxy Tables*
   - *System Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, select *Triggers*.
6. Choose one of the following:
   - Click the drop-down arrow on the trigger for which you want to replace the definition and select *Replace*.
   - From Triggers in the left pane, click the drop-down arrow and select *New*. Enter the name of the existing trigger for which you want to replace the definition.
     When selecting an existing trigger, the *Confirm Replace* dialog appears with an option to replace the object definition or cancel the replacement.
7. (Optional) On the SQL Editor page, enter the new trigger value.
8. (Optional) On the Summary page, verify the trigger name, and type.

9.22 Caches

Create, delete, and generate data definition language for caches.

9.22.1 Creating a Cache

Create new data caches.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Caches*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.
5. On the Cache Name page, specify a name for the cache.
6. On the Cache Size page, enter the size of the new cache, which must be at least 512KB, but can be no larger than the unconfigured amount remaining on the server.

   (Optional) To determine if the server can manage the cache size, enter the size and click *Calculate overhead*. The wizard calculates the overhead necessary for the specified cache size.
7. On the Type of Cache page, choose one of the following:
   - Data and log pages
   - Only log pages
   - In-memory database
8. Click *Summary* to see the cache options you selected.
9. (Optional) Click *Preview* to view the syntax used to create the cache.

Related Information

Generating DDL for a Cache [page 371]
Deleting a Cache [page 371]

9.22.2 Cache Properties

Display or modify default data cache sizes, buffer pool values, and cache bindings. Also view in-memory database and in-memory device information.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Caches*.
3. In the right pane, select a cache, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. View or modify the properties.

Option	Properties
General	Current size – select the display format: ○ Pages ○ KB ○ MB ○ GB
Configuration	○ Currently configured – you can change the size of the data cache. ○ Show in – allows you to specify the format in which to show cache size, including pages, kilobytes, megabytes, and gigabytes.
Buffer Pool	Current buffer pool values for regular caches – you can add, change, or remove buffer pools.
Cache Bindings	Shows object bindings for databases, tables, and indexes for regular caches – you can add, change, or remove cache bindings.
In-Memory Database	(Available only for in-memory databases) Displays the in-memory database that is created on this cache.
In Memory Device	(Available only for in-memory databases) Displays the in-memory device list that occupies this cache.

Related Information

Managing Cache Configurations [page 370]
Managing Binding Options [page 367]
Managing Buffer Pools [page 368]

9.22.3 Managing Binding Options

You can add and change object bindings for your data cache.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Caches*.
3. In the right pane, select a cache, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. Click *Cache Bindings*. You see a list of cached bindings for databases, tables, or indexes depending on what you select from the Show object bindings for.
6. Modify cache bindings for your data cache:
   - Add a binding – select the database, table, or index and click *Bind* to bind a new object to the cache within your selected scope. If you do not select a scope, the default is database.
   - Delete a cache binding – select the bound database, table, or index object and click *Unbind*.

   (Optional) Click *Properties* to see the detailed properties of the object you select.

Related Information

Managing Cache Configurations [page 370]
Managing Buffer Pools [page 368]
Cache Properties [page 366]

9.22.4 Adding Data Cache Buffer Pools

Change the configuration of your data cache buffer pools.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *Caches*.
3. In the right pane, select a cache, and do one of:

- Right-click a cache and select *Add Buffer Pool*.
- On the Pool Information tab, select *Add Buffer Pool*.

4. To configure the new buffer pool, enter the values:

Option	Description
I/O buffer size	The size of the I/O buffer, in kilobytes
Amount in pool	The size of the pool.
Wash size	The point in the cache at which the server writes dirty pages to disk for a memory pool and size format. The default is KB.
Local async prefetch limit	The percent of buffers in the pool that you can use to hold buffers that have been read into cache by asynchronous prefetch, but have yet to be used.
Affected pool	The amount of memory, in kilobytes, the new pool should take from the existing pool. The menu lists the existing buffer pool you added to the cache. Since there is only a 2KB page-sized pool in the cache, you can add a new buffer pool only by taking part of the size from the 2KB page-sized pool.

5. Click *Save*.

9.22.5 Managing Buffer Pools

You can add and change buffer pools for your data cache.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Caches*.
3. In the right pane, select a cache, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. Click *Buffer Pool* to see a list of existing buffer pool values.
6. To modify the buffer pool allocation for your data cache, do one of:
   - Click *Add* to add an additional memory pool to the existing data cache, and specify:

Option	Description
I/O buffer size	The size of the I/O buffer, in kilobytes

Option	Description
Amount in pool	The size of the pool.
Wash size	The point in the cache at which the server writes dirty pages to disk for a memory pool and size format. The default is KB.
Local async prefetch limit	The percent of buffers in the pool that you can use to hold buffers that have been read into cache by asynchronous prefetch, but have yet to be used.
Affected pool	The amount of memory, in kilobytes, the new pool should take from the existing pool. The menu lists the existing buffer pool you added to the cache. Since there is only a 2KB page-sized pool in the cache, you can add a new buffer pool only by taking part of the size from the 2KB page-sized pool.

- Select a buffer pool and click *Change* to change the memory pool settings. You see the same Add/Change Memory Pool dialog, with fewer options to modify:
  - Wash size
  - Local async prefetch limit
  - Affected limit – since you do not affect other pools when you change an existing pool, set this to null.
- Select the buffer pool to delete, and click *Remove* to remove any additional buffer pools you created. You cannot remove the default buffer pool.

Related Information

Managing Cache Configurations [page 370]
Managing Binding Options [page 367]
Cache Properties [page 366]

9.22.6 Modifying Data Cache Sizes

Modify the size of the data cache and specify the number of partitions in the data cache.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *Caches*.
3. In the right pane, right-click a cache and select *Resize*.
4. Enter the new size of the data cache.

An increase in the data cache size takes immediate effect; a decrease requires a server restart.

5. (Optional) Enter a new values for the partitions in the data cache.
6. (Optional) Use *Calculate Overhead* to calculate the amount of memory required to resize the data cache with the new input size.
7. Click *Save*.

9.22.7 Managing Cache Configurations

Change the size of your data cache.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Caches*.
3. In the right pane, select a cache, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Configuration* and adjust the cache size.
6. (Not available for in-memory storage caches) Choose whether the cache is stored as data and log pages, or only as log pages. You cannot change the type for default cache, which is configured for data and log pages.
7. (Not available for in-memory storage caches) In the Currently configured field, specify the size of the data cache.

   > **i Note**
   >
   > Current size indicates how much unused space remains in your specified data cache, while Available space shows the amount of additional memory available for all caches.

   Calculate Overhead allows you to see how much overhead you need to manage your data cache.

Related Information

Managing Binding Options [page 367]
Managing Buffer Pools [page 368]
Cache Properties [page 366]

9.22.8 Generating DDL for a Cache

Generate a DDL script for caches.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Caches*.
3. In the right pane, select a cache, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Generate DDL*.
5. (Optional) Click *Save* to export and save the DDL statement.
   You can save the DDL in an external file on your local file system.

Related Information

Creating a Cache [page 365]
Deleting a Cache [page 371]

9.22.9 Deleting a Cache

Delete a cache in SAP ASE.

Context

You cannot delete the default data cache.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management* > *Caches*.
3. In the right pane, select a cache, and do one of:

- Click the arrow to the right of the name.
- Click the *Actions* button.

4. Select *Delete*.
5. Confirm the deletion.
6. Click *Finish*.

Related Information

Creating a Cache [page 365]
Generating DDL for a Cache [page 371]

9.22.10 Setting the Statement Cache Size

Set the statement cache size.

Procedure

1. In SAP ASE Cockpit, click the *MONITOR* tab.
2. In the left pane, click *Server Configuration*.
3. In the right pane, set `statement cache size` to a nonzero value.

9.23 Constraints

Use constraints to specify rules for table data. Constraint prevent violations between the specified rule and the data action.

9.23.1 Creating a Foreign Key

Create a foreign key to constrain a column based on values in a reference table.

Context

A foreign key:

- is a column or combination of columns that have values that match the primary key,
- does not need to be unique.
- is often in a many to-one relationship to a primary key
- may be null; if any part of a composite foreign key is null, the entire foreign key must be null.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of the following:
   - *User Tables*
   - *Proxy Tables*
   - *System Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Foreign Keys*.
6. Click the drop-down arrow and select *New*.
7. On the Referenced Table page:
   a. Select the database that contains the table that the foreign key references.
   b. Select the referenced table of the foreign key,
   c. Provide a name for the foreign key.
8. On the Referenced Column page:
   a. Select the key to which the foreign key references.
   b. Select columns from the Foreign Key Column to match to columns in Primary Key Column.
   Foreign key values should be copies of the primary key values. No value in the foreign key should exist unless the same value exists in the primary key.
9. (Optional) Click *Summary* to review your selected options.
10. Click *Finish* .

Related Information

Creating a Check Constraint [page 375]
Creating a Unique Constraint or Primary Key [page 377]
Binding Defaults and Rules to a Column [page 378]

9.23.2 Foreign Key Properties

The Foreign Key Properties window shows current foreign key options and the matching primary keys.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of the following:
   - *User Tables*
   - *Proxy Tables*
   - *System Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Foreign Keys*.
6. View or modify properties.

Options	Description
General	Shows the selected foreign key options.
Columns	Shows the defined foreign keys and the primary keys to which the foreign keys applies.

Related Information

Index Properties [page 223]
Trigger Properties [page 363]
Check Constraint Properties [page 376]
Partition Properties [page 288]
Table Properties [page 219]
Column Properties [page 222]

9.23.3 Creating a Check Constraint

Creating a check constraint specifies a condition that any value must pass before it is inserted into the table.

Context

A check constraint specifies a condition that any value must pass before it is inserted into the table. You can create a check constraint at the table or column level. Column-level check constraints reference a single column. Table-level check constraints apply to the entire table.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of the following:
   - *User Tables*
   - *Proxy Tables*
   - *System Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Check Constraint*.
6. Click the drop-down arrow and select *New*.
7. On the Name page, enter a name for the check constraint.
8. On the Expression page, enter an expression that defines the constraint.
   For example, `salary > 0`. The comparable command line syntax using `alter table` is:

   ```
   alter table sample.dbo.employee
   add constraint test_const
   CHECK  (salary > 0)
   ```
9. (Optional) Click *Summary* to review the check constraint expression.
10. Click *Finish* .

Related Information

Creating a Unique Constraint or Primary Key [page 377]
Creating a Foreign Key [page 372]
Binding Defaults and Rules to a Column [page 378]

9.23.4 Check Constraint Properties

The Check Constraint Properties window shows the check constraint definitions.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of the following:
   - *User Tables*
   - *Proxy Tables*
   - *System Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Check Constraints*.
6. Click the Name field of the check constraint, then select *Properties*.
7. View or modify properties.

Page	Properties
General	○ Name, Owner, Creation date – shows the check constraint properties. ○ Check Constraint – shows the check constraint expression or condition that values must pass before being inserted into the table.

Related Information

Index Properties [page 223]
Trigger Properties [page 363]
Foreign Key Properties [page 374]
Partition Properties [page 288]
Table Properties [page 219]
Column Properties [page 222]

9.23.5 Creating a Unique Constraint or Primary Key

Creating a unique constraint or primary key constraint to ensure that no two rows in a table have the same values in the specified columns.

Context

A primary key is a column or combination of columns that uniquely identifies a row. It cannot be NULL and it must have a unique index. A table with a primary key is eligible for joins with foreign keys in other tables. Think of the primary key table as the master table in a master-detail relationship. There can be many such master-detail groups in a database.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of the following:
   - *User Tables*
   - *Proxy Tables*
   - *System Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Indexes*, then click the drop-down arrow and select *Unique Constraint*.
6. On the Name page:
   a. Specify a name for the unique constraint or primary key.
   b. Click *Unique Constraint* or *Primary key*.
   c. (Optionally) Click *Make supporting index clustered*.
7. On the Columns page, select the columns to include in the unique constraint or primary key.
8. On the Database Segment page, select a segment on which to place the unique constraint or primary key.
9. On the Space Management page:
   a. (Optional) Specify a fill factor percentage.
   b. (Optional) Specify the maximum number of rows per page for the index.
   c. (Optional) Specify the ratio of empty pages to filled pages to provide for expansion.
10. (Optional) Click *Summary* to review your selected options.
11. Click *Finish*.

Related Information

Creating a Check Constraint [page 375]
Creating a Foreign Key [page 372]
Binding Defaults and Rules to a Column [page 378]

9.23.6 Binding Defaults and Rules to a Column

Specify constraints on column data by binding defaults or rules to a column.

Context

Make sure that any default value bound to a column or user-defined datatype is compatible with the rule. A default that conflicts with the rule is not inserted.

You cannot bind a rule to a text, image, or timestamp column.

Rules bound to columns take precedence over rules bound to user-defined datatypes.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables*, then choose one of the following:
   - *User Tables*
   - *Proxy Tables*
   - *System Tables*
3. In the right pane, select a table, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Columns*.
6. Click the Name field of the column, then click the drop-down arrow and select *Properties*.
7. In the left pane, *Rules and Defaults*.
8. Choose one of:
   - *Default – None.*
   - *Default – Binding* to bind an existing default to the column.
   - *Default – Value* to bind a default user, defined value to the column.
   - *Rule Binding* to bind an existing rule to a column.

9. Click *Apply* to apply your rules or defaults.

Related Information

Creating a Check Constraint [page 375]
Creating a Unique Constraint or Primary Key [page 377]
Creating a Foreign Key [page 372]

9.24 Rules

Create or delete rules, or replace rule definitions.

9.24.1 Creating a Rule

Create a rule that specifies the domain of acceptable values for a particular column.

Context

Only a database owner, or a user or group with `create rule` permission can create a rule.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Rules*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.
5. On the Introduction page, select the database, and owner for the new rule.
6. On the Rule Name page, enter the name of the rule.
7. On the Rule Expression page, enter the expression that is used to evaluate the data. You can use any expression that is valid in a `where` clause.
8. (Optional) Click *Preview* to see the SQL statements for your command.

9. (Optional) Click *Summary* to verify your selected options.

Related Information

Rule Properties [page 380]

9.24.2 Replacing a Rule Definition

You can replace the rule expression of an existing rule.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Rules*.
3. Choose one of the following:
   - Click the drop-down arrow on the rule for which you want to replace the definition and select *Replace*.
   - From Rules in the left pane, click the drop-down arrow and select *New*. Enter the name of the existing rule for which you want to replace the definition.
     When selecting an existing rule, the *Confirm Replace* dialog appears with an option to replace the object definition or cancel the replacement.
4. (Optional) On the Rule Expression page, enter the new rule value.
5. (Optional) On the Summary page, verify the rule name, database, owner, and the new expression.

9.24.3 Rule Properties

Display or modify rules and objects that they reference.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Rules*.
3. In the right pane, select a rule, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.

4. Select *Properties*.
5. View or modify properties.

Pages	Properties
General	The name, type, database, owner, creation date, and rule expression.
SQL	The SQL statements for creating the rule.
Referenced By	The name, type, owner, and properties of objects that referenced by this rule.

Related Information

Creating a Rule [page 379]

9.24.4 Deleting a Rule

Delete rules.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Rules*.
3. In the right pane, select a rule, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Delete*.
5. Confirm the deletion.
6. Click *Finish*.

9.24.5 Generating DDL for a Rule

Generate a DDL script for rules.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Rules*.
3. In the right pane, select a rule, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Generate DDL*.
5. (Optional) Click *Save* to export and save the DDL statement.
   You can save the DDL in an external file on your local file system.

9.25 Precomputed Result Sets

Precomputed result sets (PRS) are views for which the result is computed, stored, and available for future use. SAP ASE precomputes queries and attempts to use the precomputed result during subsequent iterations.

9.25.1 Configuring SAP ASE to Use Precomputed Result Sets

You must configure SAP ASE to use precomputed result sets.

Procedure

Set these database `set` parameters:

- `set ansinull on`
- `set arithabort on`
- `set arithignore off`
- `set string_rtruncation on`

Related Information

Refreshing Precomputed Result Sets [page 385]
Creating a Precomputed Result Set [page 383]
Deleting a Precomputed Result Set [page 384]
Altering a Precomputed Result Set [page 385]
Executing SQL Statements [page 193]

9.25.2 Creating a Precomputed Result Set

Create precomputed result sets.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Precomputed Result Sets*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.
5. On the Introduction page, indicate the database and owner for the precomputed result set.
6. On the Name page, enter the name of the precomputed result set.
7. On the Options page, specify:
   - The refresh policy for the precomputed result set:
     - Immediate – the precomputed result set is updated with the same transaction that updates the base tables (requires a unique key).
     - Manual – the precomputed result set is updated with an explicit `refresh` command.
   - Whether the precomputed result set is populated with data when it is created.
   - The locking scheme.
   - Whether the precomputed result set is enabled when it is created.
   - Whether to include the precomputed result set for query rewrite during optimization, or whether to allow queries to use the precomputed result set with stale data.
8. On the Query Expression page, add the query to create the precomputed result set. For example:

   ```
   select <col1> <col2> from <tableName>
   ```

9. On the Summary page, view your choices. Select *Finish* to create the precomputed result set. Select *Back* to change a selection.

Related Information

Refreshing Precomputed Result Sets [page 385]
Configuring SAP ASE to Use Precomputed Result Sets [page 382]
Deleting a Precomputed Result Set [page 384]
Altering a Precomputed Result Set [page 385]

9.25.3 Deleting a Precomputed Result Set

Deleting a precomputed result set deletes its data, removes any system table entries, and deletes the precomputed result set.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Precomputed Result Sets*.
3. In the right pane, select a precomputed result set, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Delete*.
5. Confirm the deletion.

Related Information

Refreshing Precomputed Result Sets [page 385]
Configuring SAP ASE to Use Precomputed Result Sets [page 382]
Creating a Precomputed Result Set [page 383]
Altering a Precomputed Result Set [page 385]

9.25.4 Altering a Precomputed Result Set

Altering a precomputed result set changes its policies or properties.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Precomputed Result Sets*.
3. In the right pane, select a precomputed result set, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. In the left pane, click *General*.
5. Select new options for these precomputed result set policies:
   - Refresh policy
   - Locking scheme
   - Enable the precomputed result set
   - Enable query rewriting
6. Select *Preview* to verify your changes.
7. Click *Save* to confirm the changes.

Related Information

Refreshing Precomputed Result Sets [page 385]
Configuring SAP ASE to Use Precomputed Result Sets [page 382]
Creating a Precomputed Result Set [page 383]
Deleting a Precomputed Result Set [page 384]

9.25.5 Refreshing Precomputed Result Sets

Refresh precomputed result sets to prevent their data from getting stale.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Precomputed Result Sets*.

3. In the right pane, select a precomputed result set, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Refresh*.
5. Confirm the refresh.

Related Information

Configuring SAP ASE to Use Precomputed Result Sets [page 382]
Creating a Precomputed Result Set [page 383]
Deleting a Precomputed Result Set [page 384]
Altering a Precomputed Result Set [page 385]

9.25.6 Truncating a Precomputed Result Set

Truncating a precomputed result set removes the data but retains the definition of the precomputed result set in the system table.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Precomputed Result Sets*.
3. In the right pane, select a precomputed result set, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Truncate*.
5. Confirm that you want to truncate the data in the precomputed result set.

9.25.7 Granting Permissions on Precomputed Result Sets

Grant permission on precomputed result sets for users, groups, and roles.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Precomputed Result Sets*.
3. In the right pane, select a precomputed result set, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Permissions*.
6. Click *Grant*
7. On the Welcome page, select whether you are granting permissions for a user, group, or role.
8. On the Grantee page, indicate the user to whom you are granting permissions.
9. On the Columns and Options page, select the columns for which to grant permissions.
10. The Permissions page shows which actions you can perform. Select the actions for which to grant permissions:
    - If you select all the columns, the Permissions page shows all actions.
    - If you select a subset of columns, the Permissions page shows only the actions permissible for these columns.
11. On the Summary page, review your choices.
12. Select *Finish* to grant these permissions.

Related Information

Granting Precomputed Result Set Permissions to a Specific User [page 388]
Revoking Precomputed Result Set Permissions from a Specific User [page 389]
Revoking Permissions on Precomputed Result Sets [page 388]

9.25.8 Revoking Permissions on Precomputed Result Sets

Revoke permissions on precomputed result sets for users, groups, and roles.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Precomputed Result Sets*.
3. In the right pane, select a precomputed result set, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Permissions*.
6. Select the object from which to revoke permissions.
7. Click *Revoke*.
8. Select *Revoke all permissions*.
9. Confirm the refresh.

Related Information

Granting Precomputed Result Set Permissions to a Specific User [page 388]
Revoking Precomputed Result Set Permissions from a Specific User [page 389]
Granting Permissions on Precomputed Result Sets [page 387]

9.25.9 Granting Precomputed Result Set Permissions to a Specific User

Grant permission for precomputed result sets to specific users.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Users*.
3. Click the user for whom to change permissions and select *Properties*.
4. In the left pane, click *Object Permissions*.

5. From the pull down menu, select *Views*.
6. Click *Grant*.
7. In the Welcome page, click *Precomputed Result Set*.
8. On the *Objects and Options* page, select the objects for which to grant permissions.
9. On the *Permissions* page, select the permissions to grant.
10. On the *Summary* page, view your choices. Select:
    - *Preview* – to view the SQL text.
    - *Back* – to change a selection.
    - *Finish* – to change the change the permissions to the choices you have selected.
    - *Cancel* – to cancel the truncate.

Related Information

Revoking Precomputed Result Set Permissions from a Specific User [page 389]
Granting Permissions on Precomputed Result Sets [page 387]
Revoking Permissions on Precomputed Result Sets [page 388]

9.25.10 Revoking Precomputed Result Set Permissions from a Specific User

Revoke precomputed result set permission from a specific user.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Security* > *Users*.
3. Click the Name field of user for whom to change permissions, then click the drop-down arrow and select *Properties*.
4. In the left pane, click *Object Permissions*.
5. From the pull-down menu, select *Views*.
6. Select the object from which you want to revoke permissions.
7. Click *Revoke* to start the Revoke Permissions wizard.
8. Click the object's row in the Select column to revoke individual permissions. An "X" indicates the object's permissions are being revoked.
9. Select *Preview* to view the SQL text.
10. Click *OK*.

Related Information

Granting Precomputed Result Set Permissions to a Specific User [page 388]
Granting Permissions on Precomputed Result Sets [page 387]
Revoking Permissions on Precomputed Result Sets [page 388]

9.25.11 Precomputed Result Set Properties

Display information (such as column IDs, user names, partition names, and so on) associated with precomputed result sets.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Precomputed Result Sets*.
3. In the right pane, select a precomputed result set, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. View or modify the properties.

Option	Description
SQL	SQL used to create the precomputed result set.
Columns	Column names and character sets
Data	Data the precomputed result set contains.
Permissions	Permissions granted on the precomputed result sets.
References	The name, object type, and owner of all objects the precomputed result set references.
Partitions	The name of the partitions, the segment on which they reside, and the date they were created.

Option	Description
Indexes	The following are displayed: ○ Name of the index ○ Any constraints ○ Whether the index is clustered ○ Whether the index is unique ○ Which columns include indexes

9.25.12 Generating DDL for a Precomputed Result Set

Generate object definitions for existing precomputed result sets.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Precomputed Result Sets*.
3. In the right pane, select a precomputed result set, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Generate DDL*.
5. (Optional) Click *Save* to export and save the DDL statement.
   You can save the DDL in an external file on your local file system.

9.26 Defaults

Specify a default value that can be referenced by an object if no value is explicitly supplied.

9.26.1 Creating a Default

Specify a value to insert in a column if no value is explicitly supplied at insert time.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Defaults*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.
5. On the Introduction page, select the database, and owner of the new default.
6. Enter the name of the default.
7. Enter the expression to define the value of the default. Expressions must be constants, mathematical expressions, or built-in functions.
8. (Optional) Click *Summary* to verify your selected options.

9.26.2 Defaults Properties

Display or modify defaults.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Defaults*.
3. In the right pane, select a default, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. View or modify properties.

Pages	Properties
General	○ Name ○ Type ○ Database

Pages	Properties
	○ Owner ○ Creation date ○ Expression
SQL	View the SQL statements for creating the default.
Referenced By	○ Name ○ Type ○ Owner ○ Properties of objects referenced by this default

9.26.3 Replacing a Default Definition

You can replace an existing default expression with a new definition.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Defaults*.
3. Choose one of the following:
   - Click the drop-down arrow on the default for which you want to replace the definition and select *Replace*.
   - From Defaults in the left pane, click the drop-down arrow and select *New*. Enter the name of the existing default for which you want to replace the definition.
     When selecting an existing default, the *Confirm Replace* dialog appears with an option to replace the object definition or cancel the replacement.

   The Replace Default wizard appears.
4. (Optional) On the Default Expression screen, enter the new default value.
5. (Optional) On the Summary screen, verify the default name, database name, and the new expression for the default.

9.26.4 Deleting a Default

Delete a default.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Defaults*.
3. In the right pane, select a default, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Delete*.
5. Confirm the deletion.
6. Click *Finish*.

9.27 Stored Procedures

Manage stored and SQLJ procedures.

9.27.1 Manage Stored Procedures

Create, delete, or modify stored procedures.

Stored procedures are named collections of SQL statements and flow control statements. A stored procedure that performs a `select`, `execute`, or data modification command must have the same owner as the object acted upon.

A system administrator, a database owner, or a user or group with `create procedure` permission can create a stored procedure.

Related Information

Extended Stored Procedures Properties [page 405]
Creating an Extended Stored Procedure [page 404]

9.27.1.1 Creating a Stored Procedure

A stored procedure is a collection of SQL statements and optional control-of-flow statements stored under a name.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Procedures* > *Stored Procedures*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.
5. On the Introduction page, select the database, and owner of the new procedure.
6. On the Stored Procedure Name page, enter the name of the procedure.
7. (Optional) On the Compilation Option page, you have the option to recompiled your procedure every time it is executed. This is useful if you expect parameter values to change frequently. If you do not select this option, the procedure is compiled only the first time it is executed.
8. (Optional) On the Stored Procedure Group page, you can specify a group number to which to add the stored procedure. Grouping together all stored procedures that belong to a certain application lets you drop all procedures with a single command.
9. (Optional) On the Execution Behavior page, select how the procedure will be executed. This feature is not controlled by the `enable granular permissions` configuration option.
10. On the SQL Editor page, provide the SQL statements for the procedure. Ensure that all objects referenced by the procedure exist in the database.
11. (Optional) Click *Preview* to see the SQL statements for your command.
12. (Optional) Click *Summary* to verify your selected options.

Related Information

Creating a SQLJ Procedure [page 400]
Extended Stored Procedures [page 403]
Stored Procedure Properties [page 396]
Enabling Granular Permissions [page 72]

9.27.1.2 Replacing a Stored Procedure Definition

You can replace the SQL definition of a stored procedure and change whether the procedure is recompiled each time it is executed.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Procedures* > *Stored Procedures*.
3. Choose one of the following:
   - Click the drop-down arrow on the stored procedure for which you want to replace the definition and select *Replace*.
   - From Stored Procedures in the left pane, click the drop-down arrow and select *New*. Enter the name of the existing stored procedure for which you want to replace the definition.
     When selecting an existing stored procedure, the *Confirm Replace* dialog appears with an option to replace the object definition or cancel the replacement.

   The Replace Stored Procedure wizard appears.
4. (Optional) On the Compilation Option page, change the recompiling setting for the procedure.
5. (Optional) On the Execution Behavior page, change the procedure execution behavior.
6. (Optional) On the SQL Editor page, enter any changes to the SQL description.
7. (Optional) On the Summary page, verify the stored procedure name, group, compilation option, database, and owner.

9.27.1.3 Stored Procedure Properties

Display or modify stored procedures.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Procedures* > *Stored Procedures*.
3. In the right pane, select a stored procedure, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. View or modify properties.

Pages	Properties
General	○ View the name, type, database, owner, creation date, and group number of the procedure.
SQL	○ View the SQL statements for creating the procedure.
Parameters	○ View the name, type, mode, and order of all the procedure parameters. The mode value indicates whether it is an input or an output parameter. The order is a numeric value that indicates the place of the parameter in the list of parameters. ○ To change the parameters, change the definition of the stored procedure by dropping and re-creating the procedure.
Permissions	○ Grant and revoke permissions on a procedure to users, groups, or roles. Choose the *Grant* option to allow the grantee to further grant permissions to other users.
Referenced By	○ View the name, type, owner, and properties of objects that this procedure references.
References	○ View the name, type, owner, and properties of objects that this procedure references.

Related Information

Extended Stored Procedures [page 403]
Creating a SQLJ Procedure [page 400]
Creating a Stored Procedure [page 395]

9.27.1.4 Granting Execute Permission on a Stored Procedure

Grant execute permission on stored procedures.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Procedures* > *Stored Procedures*.
3. In the right pane, select a stored procedure, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Permissions*.
6. In the right pane, click *Grant* to grant access permissions for the selected object.
7. On the Welcome page, select the type of grantee:
   - *Users*
   - *Groups*
   - *Roles*

8. On the Grantee page, select one or more grantees.
9. Select *Execute*.
10. Choose *With grant option* to allow the grantee to further grant permissions to other users.
11. (Optional) Click *Summary* to verify your selected options.

9.27.1.5 Revoking Execute Permission on a Stored Procedure

Revoke execute permission on stored procedures.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Procedures* > *Stored Procedures*.
3. In the right pane, select a stored procedure, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Permissions*.
6. Select the grantee, then click *Revoke* to revoke access permissions to the object.
   In the Revoke Permissions wizard, each type of permission and the current granted permissions are shown in cells.
7. Choose one of:
   - *Revoke all permission.*
   - Individual cells to revoke the currently granted permissions. The cell changes to show an "x", indicating that the permission type is no longer granted.
8. Click *OK*.

9.27.1.6 Deleting a Stored Procedure

Delete stored procedures.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Procedures* > *Stored Procedures*.

3. In the right pane, select a stored procedure, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Delete*.
5. Confirm the deletion.
6. Click *Finish*.

9.27.1.7 Generating DDL for a Stored Procedure

Generate a DDL script for stored procedures.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Procedures* > *Stored Procedures*.
3. In the right pane, select a stored procedure, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Generate DDL*.
5. (Optional) Click *Save* to export and save the DDL statement.
   You can save the DDL in an external file on your local file system.

9.27.2 Manage SQLJ Procedures

Create, delete, modify , and administer SQLJ procedures.

SQLJ procedures are named collections of SQLJ statements and flow control statements. A stored procedure that performs a `select`, `execute`, or data modification command must have the same owner as the object acted upon.

A system administrator, a database owner, or a user or group with `create procedure` permission can create a stored procedure.

Related Information

SQLJ Functions [page 413]

9.27.2.1 Creating a SQLJ Procedure

Create a SQLJ procedure by adding a SQL wrapper to a Java static method..

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Procedures* > *SQLJ Procedures*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.
5. On the Introduction page, select the database, and owner of the new procedure.
6. On the SQLJ Procedure Name page, enter the name of the procedure.
7. On the External Name page, specify the external name, which identifies the Java method, class, and an optional package name.
8. On the SQL Properties page, select:
   - Modifies SQL data – indicate that the Java method invokes SQL operations and modifies SQL data in the database.
   - Dynamic result set – set the number of rows returned. The default number of returned rows is 1.
   - Deterministic option – include the keywords deterministic or not deterministic for compatibility with the SQLJ standard. However, SAP ASE does not make use of this option.
9. On the SQL Editor page, provide the SQL statements for the procedure. Ensure that all objects referenced by the procedure exist in the database.
10. (Optional) Click *Preview* to see the SQL statements for your command.
11. (Optional) Click *Summary* to verify your selected options.

Related Information

Creating a Stored Procedure [page 395]
Extended Stored Procedures [page 403]
Stored Procedure Properties [page 396]
Creating a SQLJ Function [page 413]
SQLJ Function Properties [page 415]
SQLJ Procedure Properties [page 401]

9.27.2.2 Replacing a SQLJ Procedure Definition

You can replace the SQL definition of a SQLJ procedure.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Procedures* > *SQLJ Procedures*.
3. Choose one of the following:
   - Click the drop-down arrow on the SQLJ procedure for which you want to replace the definition and select *Replace*.
   - From SQLJ Procedures in the left pane, click the drop-down arrow and select *New*. Enter the name of the existing SQLJ procedure for which you want to replace the definition.
     When selecting an existing SQLJ procedure, the *Confirm Replace* dialog appears with an option to replace the object definition or cancel the replacement.

   The Replace SQLJ Procedure wizard appears.
4. (Optional) On the External Name page, enter a new Java class name.
5. (Optional) On the SQL Properties page, modify the SQL data such as setting the dynamic result sets option, and the deterministic option.
6. (Optional) On the SQL Editor page, enter any changes to the SQL description.
7. (Optional) On the Summary page, verify the procedure name, database, and owner.

9.27.2.3 SQLJ Procedure Properties

Display or modify SQLJ procedures.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Procedures* > *SQLJ Procedures*.
3. In the right pane, select an SQLJ procedure, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. View or modify properties.

Pages	Properties
General	○ Name ○ Type ○ Database ○ Owner ○ Creation date ○ Group number
SQL	SQL statements for creating the procedure
Parameters	○ Name ○ Type ○ Mode – indicates whether it is an input or an output parameter ○ Order of all the procedure parameters – a numeric value that indicates the place of the parameter in the list of parameters To change the parameters, change the definition of the stored procedure by dropping and re-creating the procedure.
Permissions	Grant and revoke permissions on a procedure to users, groups, or roles. Choose the Grant option to allow the grantee to further grant permissions to other users.
Referenced By	○ Name ○ Type ○ Owner ○ Properties of objects
References	○ Name ○ Type ○ Owner ○ Properties of objects that the procedure references

Related Information

SQLJ Function Properties [page 415]
Creating a SQLJ Function [page 413]
Creating a SQLJ Procedure [page 400]

9.27.2.4 Deleting a SQLJ Procedure

Delete SQLJ procedures.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Procedures* > *SQLJ Procedures*.
3. In the right pane, select an SQLJ procedure, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Delete*.
5. Confirm the deletion.
6. Click *Finish*.

9.27.2.5 Generating DDL for a SQLJ Procedure

Generate a DDL script for SQLJ procedures.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Procedures* > *SQLJ Procedures*.
3. In the right pane, select an SQLJ procedure, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Generate DDL*.
5. (Optional) Click *Save* to export and save the DDL statement.
   You can save the DDL in an external file on your local file system.

9.28 Extended Stored Procedures

Create, delete, modify, and administer extended stored procedures.

9.28.1 Creating an Extended Stored Procedure

Create an extended stored procedure.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Extended Stored Procedures*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.
5. On the Introduction page, select a database and owner for the new extended stored procedure.
6. On the ESP page, enter the name of the extended stored procedure.
7. On the Library Name page, enter the name of the dynamic link library or shared library that is executed when an application invokes the extended stored procedure.
8. (Optional) Click *Preview* to see the SQL statements for your command.
9. (Optional) Click *Summary* to verify your selected options.

Related Information

Manage Stored Procedures [page 394]
Extended Stored Procedures Properties [page 405]

9.28.2 Replacing an Extended Stored Procedure Definition

You can replace the SQL definition of a extended procedure or change whether the procedure is recompiled each time it is executed.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Extended Stored Procedures*.
3. Choose one of the following:
   - Click the drop-down arrow on the extended stored procedure for which you want to replace the definition and select *Replace*.

- From Extended Stored Procedures in the left pane, click the drop-down arrow and select *New*. Enter the name of the existing extended stored procedure for which you want to replace the definition. When selecting an existing extended stored procedure, the *Confirm Replace* dialog appears with an option to replace the object definition or cancel the replacement.

The Replace Extended Stored Procedure wizard appears.

4. (Optional) On the Library Name page, enter a new library name.
5. (Optional) On the Summary page, verify the procedure name, database, and owner.

9.28.3 Extended Stored Procedures Properties

Display or modify extended stored procedures.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Extended Stored Procedures*.
3. In the right pane, select an extended stored procedure, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. View or modify properties.

Pages	Properties
General	View the name, type, database, owner, creation date, and dynamic link library (DLL) path of the stored procedure. The DLL need not exist when you create the extended stored procedure, but it must exist when you execute the extended stored procedure.
Permissions	Grant and revoke permissions on an extended stored procedure to users, groups, or roles. Choose the *Grant* option to allow the grantee to further grant permissions to other users. Select an object in the table of permissions, and click *Properties* to view the object properties.
Referenced By	View the name, type, owner, and properties of objects that are referenced by this extended stored procedure.

Related Information

Manage Stored Procedures [page 394]

Creating an Extended Stored Procedure [page 404]

9.28.4 Granting Execute Permission on an Extended Stored Procedure

Grant execute permission on extended stored procedures.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Extended Stored Procedures*.
3. In the right pane, select an extended stored procedure, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Permissions*.
6. In the right pane, click *Grant* to grant access permissions for the selected object.
7. On the Welcome page, select the type of grantee:
   - *Users*
   - *Groups*
   - *Roles*
8. On the Grantee page, select one or more grantees.
9. Select *Execute*.
10. Choose *With grant option* to allow the grantee to further grant permissions to other users.
11. (Optional) Click *Summary* to verify your selected options.

9.28.5 Revoking Execute Permission on an Extended Stored Procedure

Revoke execute permission on extended stored procedures.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Extended Stored Procedures*.

3. In the right pane, select an extended stored procedure, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Permissions*.
6. Select the grantee, then click *Revoke* to revoke access permissions to the object.
   In the Revoke Permissions wizard, each type of permission and the current granted permissions are shown in cells.
7. Choose one of:
   - *Revoke all permission.*
   - Individual cells to revoke the currently granted permissions. The cell changes to show an "x", indicating that the permission type is no longer granted.
8. Click *OK*.

9.28.6 Deleting an Extended Stored Procedure

Delete extended stored procedures.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Extended Stored Procedures*.
3. In the right pane, select an extended stored procedure, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Delete*.
5. Confirm the deletion.
6. Click *Finish*.

9.28.7 Generating DDL for an Extended Stored Procedure

Generate a DDL script for extended stored procedures.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Extended Stored Procedures*.
3. In the right pane, select an extended stored procedure, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Generate DDL*.
5. (Optional) Click *Save* to export and save the DDL statement.
   You can save the DDL in an external file on your local file system.

9.29 Functions

Manage scalar and SQLJ functions.

9.29.1 Scalar Functions

Create, delete, modify, and administer scalar functions.

9.29.1.1 Creating a Scalar Function

A scalar function takes a list of scalar arguments and return a single scalar value.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Functions*, *Scalar Functions*.
3. In the left pane, do one of:

- Click the arrow to the right of the name.
- Click the *Actions* button.

4. Select *New*.
5. On the Introduction page, select the database, and owner for the new function.
6. On the Function Name page, enter the name of the function.
7. On the Return Type page, select the datatype of the value returned by the function.
8. On the Compilation Option page, you can elect to have your function recompiled every time it is executed. This is useful if you expect parameter values to change frequently. If you do not select this option, the function is compiled only the first time it is executed.
9. On the SQL Editor page, provide the SQL statements for the scalar function. Ensure that all objects referenced by the function exist in the database.
10. (Optional) Click *Preview* to see the SQL statements for your command.
11. (Optional) Click *Summary* to verify your selected options.

Related Information

Creating a SQLJ Function [page 413]
Scalar Function Properties [page 410]

9.29.1.2 Replacing a Scalar User Defined Function Definition

You can replace the SQL definition, the return type, and change whether the function is recompiled each time it is executed.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Functions* > *Scalar Functions*.
3. Choose one of the following:
   - Click the drop-down arrow on the scalar function for which you want to replace the definition and select *Replace*.
   - From Scalar Functions in the left pane, click the drop-down arrow and select *New*. Enter the name of the existing scalar function for which you want to replace the definition.
     When selecting an existing scalar function, the *Confirm Replace* dialog appears with an option to replace the object definition or cancel the replacement.

   The Replace Scalar Function wizard appears.
4. (Optional) On the Return Type page, enter any changes to the return type.
5. (Optional) On the Compilation Option page, change the recompile behavior for compiling the function.

6. (Optional) On the SQL Editor page, enter any changes to the SQL description.
7. (Optional) On the Summary page, verify the function name, database, the return type, and recompile option.

9.29.1.3 Scalar Function Properties

Display or modify scalar function properties.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Functions* > *Scalar Functions*.
3. In the right pane, select a scalar function, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. View or modify properties.

Pages	Properties
General	○ Name ○ Type ○ Database ○ Owner ○ Creation date ○ Group number
SQL	The SQL statements for creating the function.
Parameters	○ Name ○ Type ○ Mode – indicates whether it is an input or an output parameter ○ Order – a numeric value that indicates the place of the parameter in the list of parameters To change the parameters, change the definition of the function by dropping and re-creating the function.
Permissions	Grant and revoke execute permission on a scalar function to users, groups, or roles.

Related Information

Creating a Scalar Function [page 408]

Creating a SQLJ Function [page 413]

9.29.1.4 Granting Execute Permission on a Scalar Function

Grant execute permission on scalar functions.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Functions* > *Scalar Functions*.
3. In the right pane, select a scalar function, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, click *Permissions*.
6. In the right pane, click *Grant* to grant access permissions for the selected object.
7. On the Welcome page, select the type of grantee:
   - *Users*
   - *Groups*
   - *Roles*
8. On the Grantee page, select one or more grantees.
9. Select *Execute*.
10. Choose *With grant option* to allow the grantee to further grant permissions to other users.
11. (Optional) Click *Summary* to verify your selected options.

9.29.1.5 Revoking Execute Permission on a Scalar Function

Revoke execute permission on scalar functions.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Functions* > *Scalar Functions*.
3. In the right pane, select a scalar function, and do one of:
   - Click the arrow to the right of the name.

- Click the *Actions* button.

4. Select *Properties*.
5. In the left pane, click *Permissions*.
6. Select the grantee, then click *Revoke* to revoke access permissions to the object.
   In the Revoke Permissions wizard, each type of permission and the current granted permissions are shown in cells.
7. Choose one of:
   - *Revoke all permission.*
   - Individual cells to revoke the currently granted permissions. The cell changes to show an "x", indicating that the permission type is no longer granted.
8. Click *OK*.

9.29.1.6 Deleting a Scalar Function

Delete scalar functions.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Functions* > *Scalar Functions*.
3. In the right pane, select a scalar function, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Delete*.
5. Confirm the deletion.
6. Click *Finish*.

9.29.1.7 Generating DDL for a Scalar Function

Generate a DDL script for scalar functions.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Functions* > *Scalar Functions*.

3. In the right pane, select a scalar function, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Generate DDL*.
5. (Optional) Click *Save* to export and save the DDL statement.
   You can save the DDL in an external file on your local file system.

9.29.2 SQLJ Functions

Create, delete, modify , and administer SQLJ functions.

Related Information

Manage SQLJ Procedures [page 399]

9.29.2.1 Creating a SQLJ Function

Create a user-defined function by adding a SQL wrapper to a Java static method.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Functions* > *SQLJ Functions*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.
5. On the Introduction page, select the database, and owner for the new function.
6. On the Function Name page, enter the name of the function.
7. On the External Name page, specify the external name, which identifies the Java method, class, and an optional package name.
8. On the Return Type page, select the datatype of the value returned by the function.
9. On the SQL Properties page, select:
   - Null input – select to either return null if input is null, or to execute the function with null input.
   - Modifies SQL data – indicate that the Java method invokes SQL operations and modifies SQL data in the database.

- Exportable – specify if this function may be run on a remote server using the SAP ASE OmniConnect™ feature. Both the procedure and the method it is built on must exist on the remote server.
- Deterministic option – include the keywords deterministic or not deterministic for compatibility with the SQLJ standard. However, SAP ASE does not make use of this option.

10. On the SQL Editor page, provide the SQLJ statements for the function. Ensure that all objects referenced by the function exist in the database.
11. (Optional) Click *Preview* to see the SQL statements for your command.
12. (Optional) Click *Summary* to verify your selected options.

Related Information

Creating a Scalar Function [page 408]
Scalar Function Properties [page 410]
Creating a SQLJ Procedure [page 400]
SQLJ Function Properties [page 415]
SQLJ Procedure Properties [page 401]

9.29.2.2 Replacing a SQLJ Function Definition

You can replace the SQL definition, the return type, and change whether the function is recompiled each time it is executed.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Functions* > *SQLJ Functions*.
3. Choose one of the following:
   - Click the drop-down arrow on the SQLJ function for which you want to replace the definition and select *Replace*.
   - From SQLJ Functions in the left pane, click the drop-down arrow and select *New*. Enter the name of the existing SQLJ function for which you want to replace the definition.
     When selecting an existing SQLJ function, the *Confirm Replace* dialog appears with an option to replace the object definition or cancel the replacement.

   The Replace SQLJ Function wizard appears.
4. (Optional) On the External Name page, enter a new Java class name.
5. (Optional) On the Return Type page, specify the datatype of the value returned by the function.
6. (Optional) On the SQL Properties page, modify the SQL data such as setting the dynamic result sets option, and the deterministic option.

7. (Optional) On the SQL Editor page, enter any changes to the SQL description.
8. (Optional) On the Summary page, verify the function name, database, and owner.

9.29.2.3 SQLJ Function Properties

Display or modify SQLJ functions.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Functions* > *SQLJ Functions*.
3. In the right pane, select an SQLJ function, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. View or modify properties.

Pages	Properties
General	○ Name ○ Type ○ Database ○ Owner ○ Creation date ○ Group number
SQL	The SQL statements for creating the function.
Parameters	○ Name ○ Type ○ Mode – indicates whether it is an input or an output parameter ○ Order – numeric value that indicates the place of the parameter in the list of parameters To change the parameters, change the definition of the function by dropping and re-creating the function.

Related Information

SQLJ Procedure Properties [page 401]
Creating a SQLJ Function [page 413]
Creating a SQLJ Procedure [page 400]

9.29.2.4 Deleting a SQLJ Function

Delete SQLJ functions.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Functions* > *SQLJ Functions*.
3. In the right pane, select an SQLJ function, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Delete*.
5. Confirm the deletion.
6. Click *Finish*.

9.29.2.5 Generating DDL for a SQLJ Function

Generate a DDL script for SQLJ functions.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Compiled Objects* > *Functions* > *SQLJ Functions*.
3. In the right pane, select an SQLJ function, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Generate DDL*.
5. (Optional) Click *Save* to export and save the DDL statement.
   You can save the DDL in an external file on your local file system.

9.30 Data Store Access Management (DSAM)

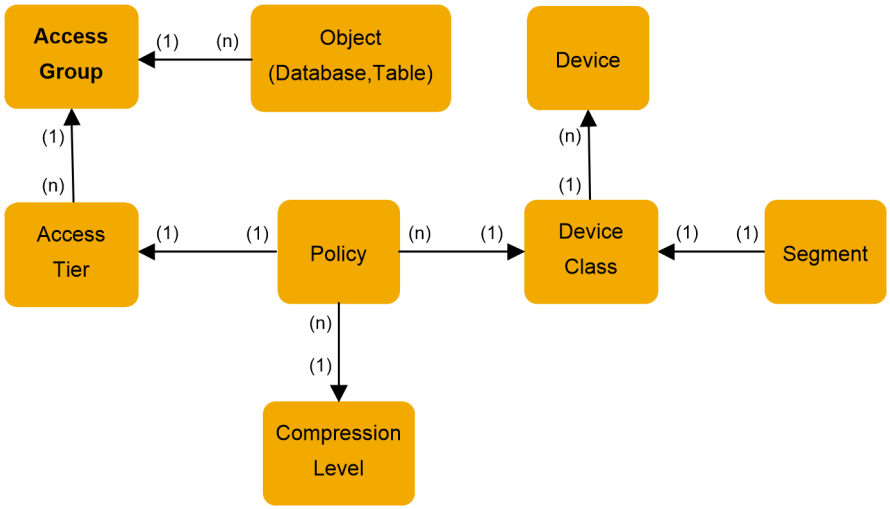
Data store access management (DSAM) tracks access patterns for devices, segments, and data partitions, providing detailed insights on how data is accessed in an SAP ASE database. DSAM allows you to define data storage policies that compress and move data to appropriate storage based on the activity level of data.

Benefits for using DSAM include:

- Being able to monitor data usage
- Moving data to faster devices or to archive devices based on data access activity.
- Enhancing performance by keeping active data on high performance storage.
- Enabling a more cost-effective use of storage assets.

9.30.1 Relationship Workflow Between DSAM Elements

A graphical workflow illustrating DSAM elements and how they interact with each other.



- Object (Tables or Databases) – are associated with access groups for the purpose of display and control.
- Access Group – is composed of a collection of access tiers, any of which may have a policy associated with it.
- Access Tier – access frequency descriptions that describe the data's access patterns for reporting purposes.
- Policy – may describe a compression level and a device class to be applied to data whose access pattern matches the associated access tier.
- Device Class – A customer-supplied code describing a storage device, which may be applied to storage devices as a means of characterizing those devices. For example, HI - Hi Performance device.
- Segment – partition assigned to a region of storage, which controls the data's physical placement on its storage devices. Device - each device may permit storage for several segments, or for only one.
- Compression Level – row or page level compression.

9.30.2 Requirements and DSAM Database Installation

There are minimum requirements for installing and using DSAM.

To use DSAM, you need `sybdsamdb`, a database in which DSAM stores its information. Although you may run the `installsybdsamdb` script to install the default `sybdsamdb` database, this database may be too small for your needs, in which case you should plan for and create one instead. By default, the `sybdsamdb` database is built on the `sybdsamdbdev` device, which needs at least 10,240 pages. If the `sybdsamdbdev` device is unavailable, the script uses the default device.

Activity	Requirement
Compressing partitions	Enable configuration parameter `enable compression`. Using this feature requires the license ASE_COMPRESSION.
Using operations that call DSAM procedures	When granular permissions are: • Enabled – the user needs `manage any database` permission. • Not enabled – the user needs `sa_role`.
Scheduling	• SAP ASE Job Scheduler must be running to schedule the background access collection job, policy evaluation job, and partitions' movement job. • To schedule background access collection for the monitored databases users need these roles, in the following order: 1. `sa_role` 2. `mon_role` 3. `js_admin_role` or `js_user_role` • When granular permissions are enabled, users must have `sa_role` or `manage server` permissions, and Job Scheduler must be installed, enabled, and running.

9.30.2.1 Determining the Size of sybdsamdb

DSAM stores information in the `sybdsamdb` historical database. Plan for your needs and create the `sybdsamdb` database before using the `installsybdsamdb` installation script. The script creates the `sybdsamdb` database if it does not exist, but the default size may be too small for your needs.

Context

The `sybdsamdb` space requirement is principally defined by the `DSAMAccessData` table, which holds historical data access information. New rows are added to table `DSAMAccessData` on a user-defined schedule (the default is every six hours) for every user partition in every tracked database. Those records are thinned out after a user-defined period (the default is after six months) and eventually discarded (the default is after one year). This uses the most space in the database, so this is the basis used to determine the database size. Knowing the maximum size of this table lets you determine the maximum required size of `sybdsamdb`.

Procedure

1. Determine which database or databases to track through DSAM. You cannot use `master`, `model`, `temporary`, or `in-memory` databases.
2. Count the number of user partitions in those databases. A user partition has a partition ID greater than 255.
3. Determine how many rows each partition should store in `DSAMAccessData`. Each partition stores one row per aggregation interval up to the "compression period", and one row per compression interval through the "purge period". Using the system-supplied defaults:
   - Aggregation frequency is six hours (that is, four collections per day).
   - Compression period is six months, or 183 days.
   - Compression interval is seven days.
   - Purge period is one year, or 365 days.

   Using these defaults, each partition stores 4 rows/day * 183 days = 732 rows, plus 1 row/week * 182 days = 26 rows, for a total of 758 rows per partition.
4. Multiply rows per partition times the number of partitions to get total rows. For example, if you have 10,000 partitions, you will store 758 * 10,000 = 7,580,000 rows.
5. Determine how many pages that data occupies. The number of rows per page depends on your installation's logical page size:

Option	Description
2 KB page	34 rows/page (there are 512 pages per megabyte)
4 KB page	69 rows/page (there are 256 pages per megabyte)
8 KB page	140 rows/page (there are 128 pages per megabyte)
16 KB page	281 rows/page (there are 64 pages per megabyte)

   In the example below, if you use a 16 KB page, you need 7,580,000 / 281 = 26,975.09 pages. SAP ASE cannot allocate a fraction of a page, so you round up to 26,976 pages.
6. Determine how many megabytes that data will occupies: Divide the total pages by the number of pages/MB given above. In our example, this is 26,976 / 64 = 421.5 MB.
7. Add approximately 25 percent for the table's index and 25 percent for estimated log space. So: 421.5 * 1.25 = 526.875 MB for data, and 421.5 * 0.25 = 105.375 MB for log, for a total of 632.25 MB.
8. Minor additional data space may be required for smaller tables. This will not be larger than the size of the `model` database:

   ```
   select sum(size) / {pages per megabyte}
   from master.dbo.sysusages
   where dbid = db_id('model')
   ```

   Using a default installation with a 16 KB logical page, that size is 24 MB. 526.875 + 24 = 550.875 MB for data.
9. SAP ASE can only create databases in even numbers of megabytes, and its "block" size varies by logical page size. For 2 KB and 4 KB pages, the block is 1 MB; for 8 KB pages, 2 MB; and for 16 KB pages, 4 MB. Round the sizes up to a multiple of your block size. In the example below, with a 16 KB page, 550.875 rounds to 552 MB and 105.375 MB rounds to 108 MB; or, if creating a mixed-use database, (550.875 + 105.375) = 656.25 rounds to 660 Mb.

> **Note**
>
> Create a database with separate log and data sections.

> **Note**
>
> The size of the database you should create is:
>
> ```
> create database sybdsamdb
> on data_device = '552M'    -- recommended: create separate data
> log on log_device = '108M' -- and log sections.
> ```
>
> or
>
> ```
> create database sybdsamdb
> on mixed_device = '660M'   -- not recommended: mix log and data.
> ```

9.30.2.1.1 Estimating the sybdsamdb Size Example

An example procedure that estimates the required `sybdsamdb` database size.

The input parameter is the number of partitions you expect to collect data for. It represents the total number of user data partitions in all databases for which DSAM is enabled. You may count this or estimate it. To count it, see the example for counting user partitions in all trackable databases.

For each database to be managed through DSAM, use the following:

```
select count(1) from (this database).dbo.syspartitions where id > 255
```

The total of those counts is the input `@ptn_total`:

```
create or replace procedure dsam_database_size @ptn_total int = 10000
as
declare @agg_freq   numeric(2,0)
      , @agg_days   numeric(4,0)
      , @data_mb    numeric(12,2)
      , @index_mb   numeric(12,2)
      , @log_mb     numeric(12,2)
      , @mb_data    int
      , @mb_log     int
      , @page_k     int
      , @pg_per_mb  numeric(3,0)
      , @rows       numeric(15,0)
      , @rows_page  numeric(5,0)
      , @store_freq numeric(2,0)
      , @store_days numeric(4,0)
set nocount on
```

These numbers are the default DSAM configuration:

- Aggregate every six hours (four times per day)
- Store all data for sx months
- Thin out data to one row per seven days
- Store thinned-out data for six months

```
select @agg_freq   =   4.0   -- Aggregate 4 times per day.
```

```
     , @agg_days   = 183.0   -- Aggregate for 6 months (1 month = 30.5 days)
     , @store_freq =   7.0   -- Compression period stores 1 record per 7 days
     , @store_days = 183.0   -- Compression period lasts 6 months
```

This is the total number of rows to store in `DSAMAccessData`:

```
select @rows = ceiling( @ptn_total * (@agg_days * @agg_freq) + @ptn_total *
(@store_days / @store_freq))
```

Discover how many rows fit on one page at the current page size:

```
select @page_k = @@maxpagesize / 1024
select @pg_per_mb = 1024 / @page_k
select @rows_page = case when @page_k = 2 then 34
                         when @page_k = 4 then 69
                         when @page_k = 8 then 140
                         else 281
                    end
```

Divide rows by rows/page to get pages. Divide pages by pages/MB to get MB. From that number, estimate index space and log space:

```
select @data_mb  = ceiling( @rows / @rows_page / @pg_per_mb )
select @index_mb = ceiling( @data_mb / 4.0 )
select @log_mb   = ceiling( (@data_mb + @index_mb) / 4.0 )
```

Display the calculations results:

```
print 'Number of rows by default for %1! partitions: %2!, @ %3! rows/page',
@ptn_total, @rows, @rows_page
print 'Estimated size:'
select @data_mb as 'Data size in Mb'
     , @index_mb as 'Index size in Mb'
     , @data_mb + @index_mb as 'Total non-log Mb'
     , @log_mb as 'Log Mb'
```

Additionally, estimate the system table size plus additional spare space. The following estimate includes the total size of the `model` database:

```
select @data_mb = @data_mb + (sum(size) / @pg_per_mb)
from master.dbo.sysusages
where dbid = db_id('model')
```

From those results, develop a suggested `create database` statement:

```
select @mb_data = convert(int, @data_mb + @index_mb)
select @mb_log  = convert(int, @log_mb)
if @page_k > 2
begin
```

Round the suggested sizes to sizes that can succeed `create database` with this page size:

```
select @page_k = @page_k / 2
  if (@mb_data & (@page_k - 1)) != 0
    select @mb_data = @mb_data + @page_k - (@mb_data & (@page_k - 1))
  if (@mb_log & (@page_k - 1)) != 0
    select @mb_log = @mb_log + @page_k - (@mb_log & (@page_k - 1))
end
print ''
print 'Suggested sizes for sybdsamdb:'
print 'create database sybdsamdb on [data device] = ''%1!M'' log on [log device]
= ''%2!M''', @mb_data, @mb_log
```

9.30.2.1.2 Example of Counting User Partitions in All Trackable Databases

This example demonstrates how to obtain the total partition count of user tables in all databases that are eligible to have DSAM statistics collected.

Any database is permitted except for `master`, `model`, `temporary`, and `in-memory` databases.

This example includes databases you typically need not monitor, such as `sybsystemprocs` and `sybsystemdb`, which contain very few user tables.

```
set nocount on
declare @ptn_ct  int
      , @ptn_now int
      , @db_name varchar(30)
      , @cmd     varchar(300)
select @ptn_ct = 0
select @db_name = min(name) from master.dbo.sysdatabases
where dbid > 3
  and status3 & -536870656 = 0
  and status4 & 4096 = 0
while @db_name is not null
begin
  select @cmd = 'select @ptn_now = count(1) from '
              + @db_name + '.dbo.syspartitions where id > 255'
  exec (@cmd)
  select @ptn_ct = @ptn_ct + @ptn_now
  if @ptn_now != 0
    print '%1! partitions in database %2!', @ptn_now, @db_name
  select @db_name = min(name) from master.dbo.sysdatabases
  where dbid > 3
    and status3 & -536870656 = 0
    and status4 & 4096 = 0
    and name > @db_name
end
print ''
select @ptn_ct as 'Partition count'
```

9.30.2.2 Installing the sybdsamdb Database

Run the `installsybdsamdb` script to install the `sybdsamdb` database.

Prerequisites

To run `installsybdsamdb`:

- Enable the `enable monitoring` configuration parameter.
- Enable the `per object statistics active` configuration parameter.

- Have `sa_role` or `mon_role`, or the `manage server` granular permission.

Procedure

1. Start SAP ASE.
2. Go to the scripts directory at:

Option	Description
UNIX	`$SYBASE/$SYBASE_ASE/scripts`
Windows	`%SYBASE%\%SYBASE_ASE%\scripts`

3. Use `isql` to log in to the SAP ASE server and run the following script, where `<server_name>` is the destination server for the database:

Option	Description
UNIX	`isql -Usa -Ppassword -S<server_name>` `  -i$SYBASE/$SYBASE_ASE/scripts/installsybdsamdb`
Windows	`isql -Usa -P***** -S<server_name>` `-i %SYBASE%\%SYBASE_ASE%\scripts\installsybdsamdb`

9.30.3 DSAM Configuration

Use the DSAM Guidance Wizard the first time you configure DSAM. Changes can be made after this initial setup using DSAM Configure.

9.30.3.1 Configuring DSAM for the First Time

Use the DSAM Guidance Wizard to configure DSAM for the first time.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management*.
3. In the right pane, select *Data Store Access Management* and do one of:
   - Click the arrow to the right of the name.

- Click the *Actions* button.

4. Select *Guidance Wizard*.
5. Click *Next* in the Introduction page.
6. Select the databases to use activity monitoring, which tracks the database's tables' active partitions and physical access counts and click *Next*.
7. Associate a device class for each device.

Option	Description
`High Performance (HI)`	Fast access data storage
`General Purpose (GP)`	General purpose data storage
`Online Archive (OA)`	Rarely accessed data storage

You can associate devices (except log only devices) with the device classes according to the device's speed, cost and usage. The two-character designator ('HI', 'GP', 'OA') shown with each class is the "class tag", which is stored as part of the device description and used to associate a device with a class.

8. Click *Next*.
9. The Access Tiers and Policy page displays the default access group and the associated policies. The `Default` access group has three access tiers:

Option	Description
`Active`	Data accessed 1000000 times per hour or more over the past 7 days
`Less Active`	Data accessed less than 999999 times per hour over the past 7 days
`Historical`	Data accessed 100 times or less within 30 days.

10. Click *Edit* to change the access tier information, including access counts, time period, policy association or if you want to change the default color.
11. Click *Next*.
12. In the Customization page, specify:
    - The time interval to add a DSAM record in the `DSAMAccessData` table.
    - When data is accessed less frequently to perform `DSAMAccessData` table size reduction and compress rows to a larger aggregation interval.
    - When to delete DSAM data.

9.30.3.2 Defining the DSAM Collection Frequency

After you perform initial DSAM setup using the DSAM Guidance Wizard, you can use DSAM Configure to change your collection frequency settings.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management*.
3. In the right pane, select *Data Store Access Management* and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Configure*.
5. Click the Collection Frequency page and specify the following:
   - The time interval to add a DSAM record in the `DSAMAccessData` table.
   - When data is accessed less frequently to perform `DSAMAccessData` table size reduction and compress rows to a larger aggregation interval.
   - When to delete DSAM data.

9.30.3.3 Enabling Database Monitoring

When you enable database monitoring, all of its active partition activities (physical I/O) are recorded.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management*.
3. In the right pane, select *Data Store Access Management* and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Configure*.
5. Click the Database monitoring page and select the databases to monitor.
6. To view or change any of the database properties listed, select a database and click *Properties*.

9.30.3.4 Device Classes

Add, edit, or delete device classes.

9.30.3.4.1 Adding a Device Class

Add, edit, or delete a device class.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management*.
3. In the right pane, select *Data Store Access Management* and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Configure*.
5. Click the Device Classes page.

   The top panel lists all default and user-defined device classes. The bottom panel lists all devices and their device class.
6. Click *Add*.
7. Enter a device class name, a tag (two unique characters for customization), and a comment.
8. (Optional) select the devices to associate to the new device class.
9. Click *Properties* to view or modify device's device class from its properties page and click *OK* when you are done making your changes.

9.30.3.4.2 Editing or Deleting a Device Class

Edit or delete a device class from the SAP ASE Cockpit.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management*.
3. In the right pane, select *Data Store Access Management* and do one of:
   - Click the arrow to the right of the name.

- Click the *Actions* button.

4. Select *Configure*.
5. Click the Device Classes page.

   The top panel lists all default and user-defined device classes. The bottom panel lists all devices and their device class.
6. Select the device class and click:

Option	Description
Edit	To edit the device class: 1. Edit the user name of the device class. 2. (Optional) Edit the comments about the device class. 3. (Optional) add or remove devices associated with the device class. 4. Select *Properties* view or modify a device's device class from its properties page.
Remove	To delete the device class. A warning displays all devices associate with the deleted device class. The associated device classes is set to NULL.

7. Click *OK* when you are done making your changes.

9.30.3.5 Policies

A policy controls what to do with data that fits that access pattern.

9.30.3.5.1 Creating a Policy

Create a policy through the SAP ASE Cockpit.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management*.
3. In the right pane, select *Data Store Access Management* and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Configure*.
5. Click the Policies page.
6. Click *Add*:
   a. Enter a policy class name.
   b. Specify the compression type.
   c. Specify the device class associated with your new policy. Click *Properties* to view its properties.

d. Add any comments about your new policy.
e. Click *Preview* to view the syntax data associated with your request, then click *Save*.

9.30.3.5.2 Editing and Deleting a Policy

Edit and delete a policy through the SAP ASE Cockpit.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management*.
3. In the right pane, select *Data Store Access Management* and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Configure*.
5. Click the Policies page.
6. Select a policy and click:

Option	Description
Edit	To edit the policy. Click *Preview* to view the policy syntax.
Remove	To delete the policy.

7. Click *OK* to confirm.

9.30.3.6 Access Groups

An access group manages a partition by reporting and managing the storage for that partition.

9.30.3.6.1 Creating an Access Group

The Access Group Wizard walks you through the creation of an access group.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.

2. In the left pane, expand *ASE Servers* > *Space Management*.
3. In the right pane, select *Data Store Access Management* and select *Configure* from the drop-down menu.
4. Click the Access Groups page.
5. Click *Add*.
6. Click *Next* in the Introduction page of the Access Group Wizard.
7. Specify the name of the access group, add any comments, then click *Next*.
8. Specify the input for the necessary tiers in the Questionnaire page.
9. Answer the questions in the Questionnaire page to help you define your access tiers, then click *Next*.
10. Click *Edit* to change the tier information, such as changing policy associations, default colors, or access counts.
11. Click *Next*.
12. View the access tiers and their definitions. Click *Edit* to modify the tier information, then click *OK* when you are done..
13. Click *Next*, then click *Finish*.

9.30.3.6.2 Editing or Deleting an Access Group

Edit or delete an access group and its tiers.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management*.
3. In the right pane, select *Data Store Access Management* and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Configure*.
5. Click the Access Groups page.
6. Select an access group, and click:

Option	Description
Edit	To edit the access group.
Remove	To delete the access group. 1. In the confirmation dialog, click *Preview* to view the syntax. 2. Select *With Force* to remove all access tiers.

7. Click *OK* when you are finished.

9.30.3.6.3 Adding Access Tiers to an Access Group

Add existing access tiers in an access group.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management*.
3. In the right pane, select *Data Store Access Management* and select *Configure* from the drop-down menu.
4. Click the Access Groups page.
5. Select the access group name from the list and click the *Tiers of Access Group* tab.
6. Click *Add* and specify the following:
   - The name of the new access tier and the color code to associate with it.
   - The access count and the time evaluation period.
   - (Optional) assign a policy to the new tier.
7. Click *OK*.

9.30.3.6.4 Editing or Deleting Access Tiers

You can either remove an access tier from an access group, or modify existing access tiers, such assigning a different policy to an access group.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management*.
3. In the right pane, select *Data Store Access Management* and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Configure*.
5. Click the Access Groups page.
6. Select the access group name from the list and click the *Tiers of Access Group* tab. Click:
7. Select an access tier and click:

Option	Description
Edit	To edit the access tier.

Option	Description
Remove	To delete an access tier.

9.30.3.6.5 Binding or Unbinding an Access Group Object

Bind or unbind an object (database or table) to an access group.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management*.
3. In the right pane, select *Data Store Access Management* and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Configure*.
5. Click the Access Groups page.
6. Select the access group name from the list and click the *Associated Objects of Access Group* tab.

   > **i** Note
   >
   > Only monitored databases appear in the list.

7. To edit the object's properties, select the object and click Properties.

   When you are done making your edits, click *OK*.
8. Select the objects that you want to bind, or deselect the ones to unbind, and click *OK*.

9.30.3.6.6 Viewing or Editing an Access Group from a Database

View or modify a database's access group from its properties page.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Databases* > *User Databases*.
3. In the right pane, do one of:

- Click the arrow to the right of the name.
- Click the *Actions* button.

4. Select *Properties*.
5. From the General page, select *Associate Access Group* and choose a group from the drop-down menu.

9.30.3.6.7 Viewing or Editing an Access Group from a Table

View or modify a table's access group from its properties page.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Schema Objects* > *Tables* > *User Tables*.
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. From the General page, select *Associate Access Group* and choose a group from the drop-down menu.

9.30.4 Selecting the Table for DSAM to Display

Display DSAM data for a selected table.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management*.
3. In the right pane, select *Data Store Access Management* and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Launch*.
5. Click the Tables page and select the database.
6. To search:

Option	Description
For a table	From the Table Information tab type any portion of the name, the number of views to display by Row count, Space reserved or Used space, and click *Search*.
By access groups	From the Search by Access Group tab, select the access groups that are used in the database, and click *Search*.

7. Select a table and click *Access Map*.

   A chart displays. The X axis is the access tier based on the access group which the table is assigned. Y axis is the total size of partitions which falls in the same access tier.
8. Click a column to view its partitions.

9.30.5 Managing Partitions Based on Access Tiers

View a list of partitions based on access tiers, and manage their storage and compression.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management*.
3. In the right pane, select *Data Store Access Management* and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Launch*.
5. From the Tables tab, select the database.
6. To search for:

Option	Description
A table	From the Table Information tab, type any portion of the name, the number of views to display by row count, space reserved, or used space,
By Access Groups	From the Search by Access Group tab, select the access groups that are used in the database.

7. Click *Search*.
8. Select a table and click *Access Map*.

   A chart displays. The X axis is the access tier based on the access group which the table is assigned. Y axis is the total size of partitions which falls in the same access tier.
9. Click a column to view its partitions.
10. To move a partition to a specified segment and compress it, select the partition and click *Manage*.

> **i Note**
>
> To alter the table, enable the `select into` database option from Database Properties.

If the partition's allocated access tier has assigned a policy, the compression and segment are already chosen. The device class is known and displayed only if the segment's devices are all of the same device class. The list only displays segments that have enough space to move a partition to.

11. Select the destination to compress the data.
12. Select the destination segment.
13. Select *Enable online mode* to allow access to the table during the move.

    If the partition is "list" or "range" and the policy involves a segment change, then enable *Enable partition locking* from the Partitions page in Table Properties (the table must have more than two partitions). Otherwise, the table must have a unique index to use this feature. You can create a unique index from Table Properties.

9.30.6 Editing the Policy Evaluation Time

You can view and edit the policy evaluation time.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management*.
3. In the right pane, select *Data Store Access Management* and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Click the Policy Tracking page.
5. Click *Schedule Partitions Evaluation*.

   Enable Job Scheduler to enable this button.
6. Use the Schedule Partitions Evaluation Wizard if you have not specified a previous schedule:
   a. Click *Next* in the Introduction page.
   b. View when the policy is evaluated and enter the time you want this schedule to start, or a time range for repeated schedules and click *Next*.
   c. Select a date for the schedule and click *Next*.
7. Click *Finish*.
8. If a previous schedule is detected, the scheduled job properties displays. Make your changes and click *OK*.

9.30.7 Viewing Partitions That Do Not Meet Policy Conditions

View partitions that do not comply with the policy of their qualified access tier.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management*.
3. In the right pane, select *Data Store Access Management* and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Launch*.
5. Click the Policy Tracking page.
6. Click a category in the pie chart to display a list of partitions and the number of times a partition has been recommended for policy evaluation.

   A table lists the partition name, table, database, size, current and recommended compression, current and recommended device class, and whether the execution is scheduled. Use the search fields at the top of the table to narrow the scope of the results listed in the columns.
7. To move a partition to a specified segment and compress it, select the partition and click *Manage*.
8. Select the destination to compress the data.
9. Select the destination segment.

   > **i** Note
   >
   > If a policy's conditions are not met, partition movement is not allowed.
10. Select *Enable online mode* to allow access to the table during the move.

9.30.8 Manually Execute Policy Evaluation

You can immediately execute a policy for a partition or schedule a time to do so with Job Scheduler.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management*.
3. In the right pane, select *Data Store Access Management* and do one of:

- Click the arrow to the right of the name.
- Click the *Actions* button.

4. Select *Launch*.
5. Click the Policy Tracking page.
6. Click *Reevaluate Partitions Now*.

9.30.9 Execute Policy Movement with Job Scheduler

You can use Job Scheduler to set a date and time to evaluate partitions.

Prerequisites

Make sure Job Scheduler is enabled on SAP ASE.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management*.
3. In the right pane, select *Data Store Access Management* and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Launch*.
5. Click the Policy Tracking page.
6. Click a category in the pie chart to display a list of partitions.
7. To schedule a partition to a specified segment and compress it, select the partition and click *Schedule*.
8. Enter the schedule start time and click *Next*.
9. View policy recommendation for movement and compression, and click *Next*.
10. Select a date to start the schedule and click *Next*.
11. View summary information and click *Finish*.
    The selected partition is now listed as *Scheduled*.

9.30.10 Batch Execute Policy Movement

You can batch apply policy updates sequentially to selected partitions.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Space Management*.
3. In the right pane, select *Data Store Access Management* and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Launch*.
5. Click the Policy Tracking page.
6. Click a category in the pie chart to display a list of partitions and the number of times the partition has been recommended for policy evaluation.
7. Select the partitions in the list and click *Manage*.

   > **i** Note
   >
   > If a policy's conditions are not met, partition movement is not allowed.

8. Click *Yes* to batch-apply policy updates sequentially to the selected partitions.

   The partitions are executed sequentially without user interruption and status is displayed as Completed or Error.
9. Select a partition from the list to view the executed SQL or the status message.

10 Capturing, Analyzing, and Replaying Workloads

The SAP ASE workload analyzer option allows you to capture, analyze, and replay a production workload nondisruptively. You can then utilize the captured workload to diagnose problems, and understand and manage configuration changes proactively.

SAP ASE workload analyzer also allows you to run replays of captured workloads to measure and analyze application performance under different conditions.

Use the SAP ASE workload analyzer option to:

- Identify problematic queries, such as queries with a long response time due to missing indexes.
- Identify client activity patterns, such as the number of requests per IP address.
- Measure the performance of captured workloads in different server configurations.
- Compare query and overall workload performance between different server configurations.
- Evaluate database upgrades and understand benefits from new options.
- Diagnose product problems by replaying functionality in a controlled environment.

> **i** Note
>
> Whenever you use this option, make sure to start both SAP ASE and SAP ASE Cockpit using the same operating system login. SAP ASE Cockpit must be able to read the PCAP files that SAP ASE generates. SAP ASE Cockpit creates the output directories for the PCAP files and SAP ASE must be able to write to those directories. Because permission to access to the directories and files are controlled by the operating system login that creates them, SAP ASE Cockpit cannot perform a workload analysis unless it is running under the same operating system login as the SAP ASE server.

10.1 Overview of Components

An overview of the SAP ASE workload analyzer option components describing the general workflow.

The general workflow for a workload capture is:

1. Start a workload capture from the SAP ASE Cockpit.
2. The production SAP ASE server writes the raw workload data into one or more PCAP files.
3. After the capture finishes, the workload is captured and all the PCAP files are generated.
4. Workload analyzer generates analytical and statistical information about the workload capture.
5. View the analytical and statistical information from SAP ASE Cockpit.

The general workflow for a captured replay is:

1. After you have finished a workload capture, and the workload file is available from the repository server, start a replay workload request from the SAP ASE Cockpit.
2. Workload analyzer generates a replay of a captured workload.

3. View and analyze the captured replay from SAP ASE Cockpit.

10.2 The Repository Database Server

The SAP ASE workload analyzer option uses a database to store the captured workload and the analysis of the workload.

This data is stored in the `sybcatdb` database in an SAP ASE server. The resource requirements of this database may be significant and it is recommended that a separate SAP ASE server from the production server should be used to host the repository database.

The SAP ASE Cockpit connects to the repository database server in order to store the captured workload, to perform and display analysis of the workload and to replay the workload on a target SAP ASE server. Information about the connection to the repository server is stored and reused by SAP ASE Cockpit once it has been entered.

To set up the repository database, run the `installsybcatdb` installation script. See *SAP ASE Workload Analyzer Users Guide > Running the installsybcatdb Script*.

10.2.1 Creating a Repository Connection

You must connect to a repository database before you can load and analyze a captured workload. All captured workloads and their analytical data are stored in the repository database.

Prerequisites

- To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.
- Configure the repository database using the UTF-8 character set.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Settings* > *Repository*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*.

5. Specify the following for the repository database:
    - Repository Name
    - Server Type (**SAP ASE**)
    - Hostname
    - Port
    - Username
    - Password
6. Click *Finish*.

10.2.2 Editing a Repository Connection

Once a repository connection is created, you can modify its settings.

Prerequisites

- To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.
- Users must be disconnected from the repository.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Settings* > *Repository*.
3. In the left pane, do one of:
    - Click the arrow to the right of the name.
    - Click the *Actions* button.
4. Select *Edit*.
5. Specify the following for the repository database:
    - Repository Name
    - Server Type (**SAP ASE**)
    - Hostname
    - Port
    - Username
    - Password
6. You have the option to immediately connect to a repository after saving the connection information.
7. Click *OK*.

10.2.3 Connecting and Disconnecting to a Repository Database

Decide which repository database server to connect to. Connecting to a repository database is required to use the SAP ASE workload analyzer option. Without a repository database connection, you can only perform a database capture. You can both start and stop a capture without a repository.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Settings* > *Repository*.
3. In the right pane, select a repository name, and then select *Connect* or *Disconnect*.
   The status of the repository database is updated in the Workload Analyzer's Repository page tab.

10.2.4 Removing a Repository Database Server From the Repository List

Removing a repository database server from the repository list does not remove the database from the repository database server.

Prerequisites

- To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.
- SAP ASE Cockpit must be disconnected from the repository database server.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.

2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Settings* > *Repository*.
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Click *Remove*.
5. Select *Yes* to confirm the deletion.

Results

When the deletion is complete, the repository database server is removed from the repository list.

10.3 Capture an SAP ASE Workload

SAP ASE workload analyzer captures the complete production workload without disrupting currently running SAP ASE transactions.

Prerequisites

- To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.
- Back up your database using `dump database` before starting the capture from your production server. If the states of the tables in the application database are not identical to the states at the beginning of the capture on the production server, you may see Duplicate key errors if there are unique indexes on tables and there are already rows in those tables with the same values that the application attempts to create during replay. By performing a database dump, when you restore the database to the test server to prepare for a replay, the tables will not contain any data that was added during the capture.
- The SAP ASE server must have operating system permission to open any capture files. The permission checks for `dbcc workload_capture` differ based on your granular permissions settings.

Setting	Description
Enabled	Only users with `set tracing any process` permission can active capturing.
Disabled	Only users with SA or SSO role can activate capturing.

Context

The captured workloads contain every SQL transaction taking place inside SAP ASE during the capture period, so that you get detailed analytical information about the server's behavior. The captured workload is also used to replay the workload.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Captures*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *New*. The Capture Wizard starts.
5. On the Name page, specify a name for the capture.

   You can specify a capture name or accept the default the wizard assigns. The wizard uses a format of `<servername_date_time>`, such as `server1_20150428_1029200`.

   You see an error message if:
   - You use the default file name, but the current process does not have write permission to the `$SYBASE` directory, where the default file name is saved to.
   - The parent directory you specify does not exist.
   - The process does not have write permission to the parent directory.

   (Optional) Add any comments for this capture.
6. In the Filters screen, select:

Option	Description
A login filter	○ *Include all logins* ○ *Include selected logins* – select from list ○ *Exclude selected logins* – select from list
An application filter	○ *Include all applications* ○ *Include selected applications* – select from list ○ *Exclude selected applications* – select from list

   Use the *Add* and *Remove* buttons to control the application filter.

   The application list displays the applications that are logged in to the SAP ASE server at the time you use this wizard.
   - The *Add* button to add applications that are not currently active. Type a name in the add field and click *Add*
   - The *Remove* button to remove select an application from the list and click *Remove*

   You see the changes you make when you open the capture wizard.
7. In the Options screen, specify the following:

Option	Description
Location	Where to store captured workload files to.
File size	(Optional) Whether to stop the capture when the file reaches a specific size. The default file size is 4096 MB. The wizard calculates and displays the amount of free space you have.
TDS response data	Whether to capture all response TDS data (rather than last response packet for each request). Selecting this option may require additional storage space.
Cockpit TDS data	Whether to ignore TDS data from SAP ASE Cockpit. The default for this option is set to On to filter out the SAP ASE Cockpit commands from the workload capture.

8. Click *Next* and then click *Finish*.

   SAP ASE writes the raw workload data into one or more PCAP files.

   In the Capture Status screen, information is displayed to indicate that workload capture is in progress or scheduled.

   During the capture period, you can close the status dialog – or even log out of cockpit – without stopping the capture. To reopen the status dialog, select the *Status* context menu of the capture.
9. (Optional) Click *Stop Capture* to stop the current workload capture.

   When the capture process is complete, the captured workload displays in the Captures window. The status of the capture changes from "Capturing" to "Stopped" in the list of captures in the Captures window.

   A capture does not stop automatically unless:
   - You turned on the *Stop on capture PCAP file size limit* setting, and the file size reaches its limit.
   - You click *Stop Capture* to stop it manually.

   > **i** Note
   >
   > When a capture is stopped on a server with a large number of engines, the finalization of the capture may take a minute or more.

Results

After you create a capture, you can analyze the workload. See Analyzing Captured Workloads [page 446].

10.4 Delete a Captured Workload From a Repository Database

Remove captured workloads that are no longer needed from the repository database.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Captures*.
3. In the right pane, select a workload capture, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select a capture name from the list and select *Delete Capture*.
5. Select *OK* to confirm the deletion.

10.4.1 Delete PCAP Files for Captures

Remove PCAP files that are no longer needed.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Context

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Captures* .
3. In the right pane, select a workload capture, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select a capture name from the list and select *Delete Pcap Files*.
5. Select *OK* to confirm the deletion.

10.5 Analyzing Captured Workloads

Analytical information from captured workloads include requests from IP addresses, a histogram displaying the timing and number of requests, and a summary of additional basic capture information.

The workset in the Workload Analyzer lets you view:

- A basic capture summary, such as capture duration, number of sessions, number of requests, and number of errors.
- A histogram of longest running requests and the most frequent running requests.
- Requests from IP, login, or application that sent the most number of requests.

> **i** Note
>
> To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

10.5.1 Display the Workload Session Report

View the number of connections for the workload and basic information about each session.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Captures*.
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Open Capture Dashboard* to view the Capture Dashboard.

   If *Open Capture Dashboard* is not available, the replay has not yet been analyzed. Select *Analyze*. The capture dashboard option displays after the replay is analyzed.
5. In the dashboard, click *Sessions* to see individual workload connection information:

Option	Description
SPID	The server process ID for the session.
IP Address	The IP address from where the requests were sent.
Application Name	The name of the application from which the requests were sent.
Login Name	The login account associated with the session.
Login Time	The date and time the user logged into a session. **i Note** The default sort of the list is on this column.
Logout Time	The date and time the user logged out of session.
Session Duration	The time spent in a single session.
Number of Requests	The number of query requests per session.
Number of Errors	The number of errors experienced for each session.
Average Execution Duration	The average time used to process requests in a session.

6. Double-click the row to display the details of individual execution requests made during the session.
7. Click:

Option	Description
All Requests	View all requests for the given session and double-click a row to display detailed information about the request such as the request text.
Dynamic SQLs	View Dynamic SQL for a given session and double-click a row to partially display the prepared statement and parameters associated with the request. Double-click an item from the *Execution List* to fully display the prepared statements, parameters, and requested text associated with the request.

8. (Optional) Double-click a row to display detailed information.
9. If the query has been repeated multiple times, click *Repeated Request* to view the query text, and a summary that displays the following information:
   - The number of times the request was repeated.
   - The total execution time.
   - The minimum execution time.

- The average execution time.
- The maximum execution time.

The Repeated Request Info page also displays the execution list, which shows the individual execution requests made during the session.

10. If the query contains dynamic SQL, click *Dynamic SQL* to view more information.

    To view full details of the statement, double-click an item in the *Execution List*.
11. To learn more about the errors in your query, select *Error Details*.
12. (Optional) Click the arrows at the bottom of the page to scroll through multiple pages.
13. Click *OK* when you are done.

10.5.2 Display Workload Requests

The Request Explorer displays a list of all requested actions on the captured workload.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Captures*.
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Open Capture Dashboard* to view the Capture Dashboard.

   If *Open Capture Dashboard* is not available, the replay has not yet been analyzed. Select *Analyze*. The capture dashboard option displays after the replay is analyzed.
5. In the dashboard, click *Requests* to view:

Option	Description
SPID	The server process ID.
Start Time	The date and time a query was sent.

Option	Description
	Note The default sort of the list is on this column.
Execution Duration	The time used to process the request.
IP Address	The location from where the request was sent.
Login Name	The login account associated with the request.
Application Name	The name of the application from which the requests were sent.
Request text	The query text. If the query text is truncated because it is long,double-click the request row to view the complete text in the Request Info screen..

6. Select a query from the list to view a quick preview of the requested text associated with a long query. Click the same query again to hide the quick preview.
7. (Optional) Double-click a row to display detailed information.
8. If the query has been repeated multiple times, click *Repeated Request* to view the query text, and a summary that displays the following information:
   - The number of times the request was repeated.
   - The total execution time.
   - The minimum execution time.
   - The average execution time.
   - The maximum execution time.

   The Repeated Request Info page also displays the execution list, which shows the individual execution requests made during the session.
9. If the query contains dynamic SQL, click *Dynamic SQL* to view more information.

   To view full details of the statement, double-click an item in the *Execution List*.
10. To learn more about the errors in your query, select *Error Details*.
11. (Optional) Click *20*, *50*, or *100* to change the number of results listed per page view.

10.5.3 Display the Workload Error Report

View errors associated with a captured workload.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Captures* .
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Open Capture Dashboard* to view the Capture Dashboard.

   If *Open Capture Dashboard* is not available, the replay has not yet been analyzed. Select *Analyze*. The capture dashboard option displays after the replay is analyzed.
5. In the dashboard, click *Errors* to display the following, grouped by error numbers:

Option	Description
Error Number	The number assigned to the error.
Total count	How many times the error occurred.
Ratio	Out of the total number of errors, the percentage of times that this error occurred.
Severity	The severity level of a message indicates the type and severity of the problem that SAP ASE has encountered. **i Note** The default sort of the list is on this column.
Message Sample	The error message. Text for multiple occurrences of the same error may be different due to variable values contained within the messages.

6. Double-click a row to view the details of the query, or an error number to view:

Option	Description
Start Time	The date and time a query was sent.
Execution Duration	The time used to process the request.
IP Address	The location from where the request was sent.
Login Name	The login account associated with the request.
Application Name	The name of the application from which the requests were sent.

7. If the query has been repeated multiple times, click *Repeated Request* to view the query text, and a summary that displays the following information:
   - The number of times the request was repeated.
   - The total execution time.
   - The minimum execution time.
   - The average execution time.
   - The maximum execution time.

   The Repeated Request Info page also displays the execution list, which shows the individual execution requests made during the session.

8. If the query contains dynamic SQL, click *Dynamic SQL* to view more information.

   To view full details of the statement, double-click an item in the *Execution List*.
9. To learn more about the errors in your query, select *Error Details*.

10.5.4 Display the Longest Running Workload Requests

You can display the longest running workload requests.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Captures* .
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Open Capture Dashboard* to view the Capture Dashboard.

   If *Open Capture Dashboard* is not available, the replay has not yet been analyzed. Select *Analyze*. The capture dashboard option displays after the replay is analyzed.
5. In the dashboard, the Top Long Running Requests chart displays up to 10 of longest running queries, along with:

Option	Description
Rank	The position of the query in the list.
Execution Duration	How long the request took to execute.
Request Start Time	The query start time.
Request Text	The query text.

   You can also click the chart to view the complete list of queries.
6. (Optional) Click *20*, *50*, or *100* to change the number of results listed per page view.
7. (Optional) Double-click a row to display detailed information.

10.5.5 Display the Top Frequent Running Workload Requests

You can display the most frequent running workload requests.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Captures*.
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Open Capture Dashboard* to view the Capture Dashboard.

   If *Open Capture Dashboard* is not available, the replay has not yet been analyzed. Select *Analyze*. The capture dashboard option displays after the replay is analyzed.
5. In the dashboard, the Top Frequent Running Requests chart displays up to 10 of the most frequently executed queries in the capture, along with:

Option	Description
Rank	The position of the query in the list.
Repeated Count	How many times the request occurred.
Total Execution Duration	The total time to run the request.
Request Text	The query text.

   You can also click the chart to view the complete list of queries.
6. (Optional) Double-click a row to display detailed information.
7. (Optional) Click *20*, *50*, or *100* to change the number of results listed per page view.

10.5.6 Display the Workload IP Address Report

The dashboard displays the top three IP addresses that send the most requests. Or you can view the complete report of all IP addresses.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Captures*.
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Open Capture Dashboard* to view the Capture Dashboard.

   If *Open Capture Dashboard* is not available, the replay has not yet been analyzed. Select *Analyze*. The capture dashboard option displays after the replay is analyzed.
5. In the dashboard, click *IP Address Report* for a list of IP addresses used in the captured workload to display:

Option	Description
IP Address	The location from where requests were sent.
Number of Requests	The number of query requests sent from the IP address. **i Note** The default sort of the list is on this column.
Number of Sessions	The number of sessions associated with the IP address for the captured workload.
Number of Errors	The number of errors experienced with the IP address.
Total Session Duration	The total time used to process requests for the IP address.
Total Execution Duration	The total time used to execute requests for the IP address.

6. (Optional) Double-click a row to display detailed information.
7. (Optional) Click *20*, *50*, or *100* to change the number of results listed per page view.

10.5.7 Display the Workload Login Report

The dashboard displays the top three logins that send the most requests. Or you can view the complete report of all logins.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Captures*.
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Open Capture Dashboard* to view the Capture Dashboard.

   If *Open Capture Dashboard* is not available, the replay has not yet been analyzed. Select *Analyze*. The capture dashboard option displays after the replay is analyzed.
5. In the dashboard, click *Login Report* to display:

Option	Description
Login Name	The login name of the sent requests.
Number of Requests	The number of query requests sent from the login. **i Note** The default sort of the list is on this column.
Number of Sessions	The number of sessions associated with the login for the captured workload.
Number of Errors	The number of errors experienced with the login.
Total Session Duration	The total time used to process requests for the login.
Total Execution Duration	The total time used to execute requests for the login.

6. (Optional) Double-click a row to display detailed information.
7. (Optional) Click *20*, *50*, or *100* to change the number of results listed per page view.

10.5.8 Display the Workload Application Report

The dashboard displays the top three applications that send the most requests. Or you can view the complete report of all applications.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Captures*.
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Open Capture Dashboard* to view the Capture Dashboard.

   If *Open Capture Dashboard* is not available, the replay has not yet been analyzed. Select *Analyze*. The capture dashboard option displays after the replay is analyzed.
5. In the dashboard, click *Application Report* to display:

Option	Description
Application Name	The application name that sent the requests.
Number of Requests	The number of query requests sent from the application. **i Note** The default sort of the list is on this column.
Number of Sessions	The number of sessions associated with the application for the captured workload.
Number of Errors	The number of errors experienced with the application.
Total Session Duration	The total time used to process requests for the application.
Total Execution Duration	The total time used to execute requests for the application.

6. (Optional) Double-click a row to display detailed information.
7. (Optional) Click *20*, *50*, or *100* to change the number of results listed per page view.

10.5.9 Display the Capture Status

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Captures*.
3. In the left pane, do one of:
   - Click the arrow to the right of the capture name.
   - Click the *Actions* button.
4. Select *Status*.

10.6 Importing a Captured Workload into a Repository Database

Import previously created captured workloads into a repository database.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Captures*.
3. In the left pane, do one of:

- Click the arrow to the right of the name.
- Click the *Actions* button.

4. Select *Import* to open the SAP ASE Workload Import Wizard.
5. On the Name page, enter a workload capture name and, optionally, any comments.
6. Specify the file location and select the file in the list. The file must be accessible to the SAP ASE Cockpit and the file path relative to the SAP ASE Cockpit location. Or, specify the path location of where multiple capture files reside, then select one or more files from the list.

10.7 Replay a Captured Workload

Run replays of captured workloads to measure and analyze application performance.

With SAP ASE workload analyzer, you can:

- Pinpoint potential issues such as why certain queries are running slowly.
- Determine the longest running query.
- Test new features and run them against a captured workload to verify performance.
- Capture the workload on the target server that is running the replay and compare performance against the original replay.
- Compare the differences between a source workload and a replay workload.

10.7.1 Creating a Replay

Use the Replay Wizard to specify workload replay. You can then later view the replay from an SAP ASE Cockpit that is managing the SAP ASE server, which is usually a different cockpit from the one that is managing the SAP ASE server that generated the workload.

Prerequisites

- To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.
- The SAP ASE server must have operating system permission to open any capture files. The permission checks for `dbcc workload_capture` differ based on your granular permissions settings.

Setting	Description
Enabled	Only users with `set tracing any process` permission can active capturing.
Disabled	Only users with SA or SSO role can activate capturing.

- There is a previously created captured workload.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Replays*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.

   Alternatively, you can:
   1. Right-click on the workload you want to replay from the capture list
   2. Click the arrow to the right of the workload name.
   3. Click *Replay*.
4. Select *New*.
5. On the Name page, specify a name and any comments for the replay.
6. On the Workload page:
   - Select *ALL* for the scope of the search
   - Set the scope of the search and select the captured workload to replay.
7. On the Filters page, select:

Option	Description
A login filter	○ *Include all logins* ○ *Include selected logins* (select from list) ○ *Exclude selected logins* (select from list)
An application filter	○ *Include all applications* ○ *Include selected applications* (select from list) ○ *Exclude selected applications* (select from list)

   Click *Replay sessions which login failed in the source workload* if you wish to replay failed login sessions.
8. In the Speed page, change the default value of 1.0 to change the speed at which to run the replay. The values range from 0.1 for the slowest, and 2.0 for the fastest speed.
9. In the Password page, specify passwords to use in the replay.
10. On the Options page, select:

Option	Description
Capture the workload during the replay	If you keep this default, you can also specify the location in which to save the PCAP file.
Use SSL connections in the replay	If you did not capture a workload using SSL, do not use SSL during replay. Since the average execution time for queries is longer when using SSL, and this could impact the performance of a replay.
Reset server time to original workload capture start time	When date and time adjustment is not used during replay (default setting), the date and time on the replay SAP ASE server will be the actual time at which the replay occurs. If you check this box, when the replay begins, the date and time of the replay SAP ASE server are set to the time at which the capture originally started.

11. Click *Next*, then click *Finish*.

    On the Replay Status page, information displays to indicate that replay workload is in progress or scheduled.
12. (Optional) Click *Stop Replay* to stop the replay you specified.

    You can close the status dialog without stopping the replay. To reopen the status dialog, select the *Status* context menu of the replay.

10.7.2 Compare Source Workloads to Replay Workloads

Compare the workload you captured with a replay workload to identify differences.

Prerequisites

For a full comparison, analyze both source and workload replays using SAP ASE version 16.0 SP03 or later. If you have a captured replay from versions of SAP ASE 16.0 SP02, perform the capture and replay processes again using SAP ASE from 16.0 SP03 before you generate a comparison. Versions of SAP ASE earlier than 16.0 SP03 are affected.

Context

Comparing your captured (source) workload with a workload replay allows you to check for differences in the number of requests, average and individual request execution times, number of errors, and so on. Identifying differences in execution time or error rate can be helpful in understanding differences in performance or application behavior.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Replays*.
3. In the right pane, select a captured replay and select *Compare*.

   SAP ASE cockpit compares the source workload with the workload replay you selected, and displays a comparison of the average request execution duration of the two workloads. The dialog also provides the following information about both workloads:
   - Workload names
   - Workload comments
   - Server names
   - Start times

- Workload duration
- Number of sessions
- Number of requests
- Number of errors

10.7.2.1 Display the Compare Session Report

View the number of connections for the comparison between the captured workload with a workload replay and basic information about each session.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Replays*.
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Open Compare Dashboard* to view the Replay Compare Dashboard.

   If *Open Compare Dashboard* is not available, the replay has not yet been analyzed. Select *Analyze*. The compare dashboard option displays after the replay is analyzed.
5. In the dashboard, click *Sessions* to see the following individual replay connection information:

Option	Description
SPID	The server process ID for the session.
Session Duration	The time spent in a single session.
Session Duration Diff	The difference in time spent in a single session when comparing the source to the replay.
Number of Requests	The number of query requests per session.
Number of Errors	The number of errors experienced for each session.
Error Number Diff	The difference in number of errors experienced for each session when comparing the source to the replay.
Average Execution Duration	The average time used to process requests in a session.

Option	Description
Average Execution Duration Diff	The average time difference used to process requests in a session when comparing the source to the replay.

6. (Optional) Click *20*, *50*, or *100* to change the number of results listed per page view.
7. (Optional) Click the arrows at the bottom of the page to scroll through multiple pages.
8. Double-click the row to display the following details of individual execution requests made during the session:

Option	Description
Changed Percentage	The percentage of decrease in performance.
Execution Time Diff	The difference in time to execute a request when comparing the source to the replay.
Start Time	(Default sort order for the list) The date and time a query was sent.
Execution Duration	The time used to process the request.
Number of Errors	The number of errors experienced.
Request text	The query text. If the query text is truncated because it is long, double-click the request row to view the complete text in the Request Info screen..

9. (Optional) Double-click a row to display the full Request Text.
10. Click *OK* when you are done to return to the previous screen.

10.7.2.2 Display List of Compare Requests

The Request Explorer displays a list of all requested actions on the replay comparison.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Replays*.
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Open Compare Dashboard* to view the Replay Compare Dashboard.

If *Open Compare Dashboard* is not available, the replay has not yet been analyzed. Select *Analyze*. The compare dashboard option displays after the replay is analyzed.

5. In the dashboard, click *Requests* to view details about the comparison, source and replay:

Option	Description
Changed Percentage	The percentage decrease in performance.
Different Execution Time	The difference in time to execute a request.
Start Time	(Default sort order for the list) The date and time a query was sent.
Execution Duration	The time used to process the request.
Number of Errors	The number of errors experienced.
Request text	The query text. If the query text is truncated because it is long, double-click the request row to view the complete text in the Request Info screen.

6. Select a query from the list to view a quick preview of the requested text associated with a long query. To hide it, click *Hide* on the text panel.
7. (Optional) Click *20*, *50*, or *100* to change the number of results listed per page view.
8. (Optional) Double-click a row to display detailed information.

10.7.2.3 Display the Compare Error Report

View errors associated with a replay comparison.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Replays*.
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Open Compare Dashboard* to view the Replay Compare Dashboard.

   If *Open Compare Dashboard* is not available, the replay has not yet been analyzed. Select *Analyze*. The compare dashboard option displays after the replay is analyzed.

5. In the dashboard, click *Errors* to view details about the comparison, source and replay:

Option	Description
SPID	The server process ID.
Count Diff	The difference in number of errors that occurred between the source and the replay.
Ratio Diff	Out of the total number of errors, the difference in the percentage of times that this error occurred.
Total count	How many times the error occurred.
Ratio	Out of the total number of errors, the percentage of times this error occurred.
Error Number	The number assigned to the error.
Severity	(Default sort order for the list) The severity level of a message indicates the type and severity of the problem that SAP ASE has encountered. See *Diagnosing System Problems* in the *System Administration Guide Volume 1* for more information about error severity levels.
Message Sample	A sample of the error message showing the number of errors and the error severity. Text for multiple occurrences of the same error may be different due to variable values contained within the messages.

6. Double-click a row to view the details of the query:

Option	Description
Start Time	(Default sort order for the list) The date and time a query was sent.
Execution Duration	The time used to process the request.
Number of Errors	The number of errors experienced for each session.
Request Text	The query text. If the query text is truncated because it is long, double-click the request row to view the complete text in the Request Info screen.

7. (Optional) Double-click a row to display detailed information about the Request Text, Source Error Message, and Replay Error Message.

10.7.2.4 Display the List of Requests With the Most Improved Performance

The Top Performance Improved Requests chart displays queries with the most improved performance, and compares them to the source capture.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Replays*.
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Open Compare Dashboard* to view the Replay Compare Dashboard.

   If *Open Compare Dashboard* is not available, the replay has not yet been analyzed. Select *Analyze*. The compare dashboard option displays after the replay is analyzed.
5. In the dashboard, the Most Improved Requests chart displays up to 10 of the requests with the most improved performance. Click the chart to view the following information about the comparison, source and replay:

Option	Description
Rank	The position of the query in the list.
Performance Improved Percentage	The percentage by which the request's performance was improved.
Performance Improved Time	The time to run the request with improved performance.
Repeated Count	How many times the request occurred.
Average Execution Time	The average time to run the request.
Request Text	The query text.

6. Double-click the row to display the details of individual execution requests made during the session.

Option	Description
Changed Percentage	The percentage of decrease in performance.
Different Execution Time	The difference in time to execute a request.
SPID	The server process ID for the session.
Start Time	(Default sort order for the list) The date and time a query was sent.
Execution Duration	The time used to process the request.
Number of Errors	The number of errors experienced.
Request text	The query text. If the query text is truncated because it is long, double-click the request row to view the complete text in the Request Info screen.

7. (Optional) Click *10*, *50*, *100*, or *500* to change the number of results listed per page view.
8. (Optional) Double-click a row to display detailed information.

10.7.2.5 Display the List of Requests With the Most Decreased Performance

The Top Performance Decreased Requests chart displays those queries with the largest decrease in performance, and compares them to the source capture.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Context

This chart displays queries with performances that have experienced the biggest performance decreases, which may not necessarily be the same as queries with the worst performance.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Replays*.
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Open Compare Dashboard* to view the Replay Compare Dashboard.

   If *Open Compare Dashboard* is not available, the replay has not yet been analyzed. Select *Analyze*. The compare dashboard option displays after the replay is analyzed.
5. In the dashboard, the Most Decreased Performance chart displays up to 10 of the requests with the most decreased performance. Click the chart to view the following information about the comparison, source and replay:

Option	Description
Rank	The position of the query in the list.
Performance Decreased Percentage	The percentage by which the request's performance was decreased.
Performance Decreased Time	The time to run the request with decreased performance.
Repeated Count	How many times the request occurred.
Average Execution Time	The average time to run the request.
Request Text	The query text.

6. Double-click the row to display the following details of individual execution requests made during the session:

Option	Description
Changed Percentage	The percentage of decrease in performance.
Different Execution Time	The difference in time to execute a request.
SPID	The server process ID for the session.
Start Time	(Default sort order for the list) The date and time a query was sent.
Execution Duration	The time used to process the request.
Number of Errors	The number of errors experienced.
Request text	The query text. If the query text is truncated because it is long, double-click the request row to view the complete text in the Request Info screen.

7. (Optional) Click *10*, *50*, *100*, or *500* to change the number of results listed per page view.
8. (Optional) Double-click a row to display detailed information.

10.7.3 Deleting Replays and PCAP files

You can delete both a replay from the repository database, as well as its associated PCAP file. Deleting the replay does not remove its associated PCAP file.

Since you only need to retain a PCAP file if you plan to run a replay from it, you can safely remove all PCAP files when you delete their associated replays.

If you are removing both a replay as well as its associated PCAP file from the repository, remove the PCAP file before removing the replay.

Deleting the replay does not remove the PCAP files. If you want to remove both the replay and the PCAP files from the repository, you should remove the PCAP files first.

10.7.3.1 Delete PCAP Files

Remove PCAP files that you no longer need. If you want to remove a PCAP file's associated replay, remove the PCAP file first.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Context

Generally, you can delete the PCAP file after you load and analyze it. Do not delete PCAP files if you want to load them again in the future.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Replays*.
3. In the right pane, select a replay, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select a replay name from the list and select *Delete PCAP Files*.
5. Select *OK* to confirm the deletion.

10.7.3.2 Delete a Replay From a Repository Database

Remove replays that are no longer needed from the repository database.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Replays*.
3. In the right pane, select a replay, and do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select a replay name from the list and select *Delete Replay*.
5. Select *OK* to confirm the deletion.

> **i** Note

10.7.4 Analyzing Replays

Analytical information from workload replays include requests from IP addresses, a histogram displaying the timing and number of requests, and a summary of additional basic replay information.

The workset in the workload analyzer lets you view:

- A basic replay summary, such as replay duration, number of sessions, number of requests, and number of errors.
- A histogram of longest running requests and the most frequent running requests.
- Requests from IP, login, or application that sent the most number of requests.

10.7.4.1 Display the Replay Session Report

View the number of connections for the workload replay, as well as basic information about each session.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Replays*.
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Open Replay Dashboard* to view the Replay Dashboard.

   If *Open Replay Dashboard* is not available, the replay has not yet been analyzed. Select *Analyze*. The replay dashboard option displays after the replay is analyzed.
5. In the dashboard, click *Sessions* to see the following individual replay connection information:

Option	Description
SPID	The server process ID for the session.
IP Address	The IP address from where the requests were sent.
Application Name	The name of the application from which the requests were sent.
Login Name	The login account associated with the session.

Option	Description
Login Time	(Default sort order for the list) The date and time the user logged into the session.
Logout Time	The date and time the user logged out of the session.
Session Duration	The time spent in a single session.
Number of Requests	The number of query requests made in a session.
Number of Errors	The number of errors experienced in the session.
Average Execution Duration	The average time used to process requests in a session.

6. Select one of these options to view::

Option	Description
All Requests	View all requests for the session. Double-click any row to view detailed information about the selected request.
Dynamic SQLs	View Dynamic SQL for the session. Double-click any row to view a partial display of the SQL statement and parameters for the request. Double-click an item from the Execution List to view the complete SQL statement, parameters, and requested text for the request.

7. If the query has been repeated multiple times, click *Repeated Request* to view the query text, and a summary that displays the following information:
   - The number of times the request was repeated.
   - The total execution time.
   - The minimum execution time.
   - The average execution time.
   - The maximum execution time.

   The Repeated Request Info page also displays the execution list, which shows the individual execution requests made during the session.
8. To learn more about the errors in your query, select *Error Details*.
9. (Optional) Click the arrows at the bottom of the page to scroll through multiple pages.
10. Click *OK* when you are done.

10.7.4.2 Display Replay Requests

The Request Explorer displays a list of all requested actions on the captured workload replay.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Replays*.
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Open Replay Dashboard* to view the Replay Dashboard.

   If *Open Replay Dashboard* is not available, the replay has not yet been analyzed. Select *Analyze*. The replay dashboard option displays after the replay is analyzed.
5. In the dashboard, click *Requests* to view:

Option	Description
SPID	The server process ID.
Start Time	(Default sort order for the list) The date and time a query was sent.
Execution Duration	The time used to process the request.
IP Address	The location from where the request was sent.
Login Name	The login account associated with the request.
Application Name	The name of the application from which the request was sent.
Request text	The query text. If the query text is truncated because it is long, double-click the request row to view the complete text in the Request Info screen.

6. (Optional) Double-click a row to display detailed information.
7. If the query has been repeated multiple times, click *Repeated Request* to view the query text, and a summary that displays the following information:
   - The number of times the request was repeated.
   - The total execution time.
   - The minimum execution time.
   - The average execution time.
   - The maximum execution time.

   The Repeated Request Info page also displays the execution list, which shows the individual execution requests made during the session.
8. If the query contains dynamic SQL, click *Dynamic SQL* to view more information.

   To view full details of the statement, double-click an item in the *Execution List*.
9. To learn more about the errors in your query, select *Error Details*.
10. (Optional) Click *20*, *50*, or *100* to change the number of results listed per page view.

10.7.4.3 Display the Replay Error Report

View errors associated with a captured workload replay.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Replays*.
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Open Replay Dashboard* to view the Replay Dashboard.

   If *Open Replay Dashboard* is not available, the replay has not yet been analyzed. Select *Analyze*. The replay dashboard option displays after the replay is analyzed.
5. In the dashboard, click *Errors* to display the following, grouped by error numbers:

Option	Description
Error Number	The number assigned to the error.
Total count	How many times the error occurred.
Ratio	Out of the total number of errors, the percentage of times that this error occurred.
Severity	(Default sort order for the list) The severity level of a message indicates the type and severity of the problem that SAP ASE has encountered.
Message Sample	The error message. Text for multiple occurrences of the same error may be different due to variable values contained within the messages.

6. Double-click a row to view the details of the query, or an error number to view:

Option	Description
Start Time	The date and time a query was sent.
Execution Duration	The time used to process the request.
IP Address	The location from where the request was sent.
Login Name	The login account associated with the request.
Application Name	The name of the application from which the requests were sent.

7. If the query has been repeated multiple times, click *Repeated Request* to view the query text, and a summary that displays the following information:

- The number of times the request was repeated.
- The total execution time.
- The minimum execution time.
- The average execution time.
- The maximum execution time.

The Repeated Request Info page also displays the execution list, which shows the individual execution requests made during the session.

8. If the query contains dynamic SQL, click *Dynamic SQL* to view more information.

   To view full details of the statement, double-click an item in the *Execution List*.
9. To learn more about the errors in your query, select *Error Details*.

10.7.4.4 Display the Longest Running Replay Requests

You can display the queries that were executed for the longest period of time in the replayed workload sorted by the amount of time they were executed. The Top Longest Running Requests graph on the Replay Dashboard lists up to 10 queries.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Replays*.
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Open Replay Dashboard* to view the Replay Dashboard.

   If *Open Replay Dashboard* is not available, the replay has not yet been analyzed. Select *Analyze*. The replay dashboard option displays after the replay is analyzed.
5. In the dashboard, the Top Long Running Requests chart displays up to 10 of longest running queries, along with:

Option	Description
Rank	The position of the query in the list.

Option	Description
Execution Duration	How long the request took to execute.
Request Start Time	The query start time.
Request Text	The query text.

To view the complete list of queries, click the chart.

6. (Optional) Click *20*, *50*, or *100* to change the number of results listed per page view.
7. (Optional) Double-click a row to display detailed information.

10.7.4.5 Display the List of Most Frequently Executed Queries

You can display the queries that were executed most frequently in the replayed workload.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Replays*.
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Open Replay Dashboard* to view the Replay Dashboard.

   If *Open Replay Dashboard* is not available, the replay has not yet been analyzed. Select *Analyze*. The replay dashboard option displays after the replay is analyzed.
5. In the dashboard, the Top Frequent Running Requests chart displays up to 10 of the most frequently executed queries in the capture, sorted by the number of times they were executed, along with:

Option	Description
Rank	The position of the query in the list.
Repeated Count	How many times the request occurred.
Total Execution Duration	The total time to run the request.
Request Text	The query text.

To view the complete list of queries, click the chart.

6. (Optional) Click *20*, *50*, or *100* to change the number of results listed per page view.
7. (Optional) Double-click a row to display detailed information.

10.7.4.6 Display the Replay IP Address Report

The dashboard displays the top three IP addresses that send the most requests by default. You can view a list of all the IP addresses and the workload that they generated by clicking on the IP Address chart.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Replays*.
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Open Replay Dashboard* to view the Replay Dashboard.

   If *Open Replay Dashboard* is not available, the replay has not yet been analyzed. Select *Analyze*. The replay dashboard option displays after the replay is analyzed.
5. In the dashboard, click *IP Address Report* for a list of all IP addresses used in the replay to display:

Option	Description
IP Address	The location from where requests were sent.
Number of Requests	(Default sort order for the list) The number of query requests sent from the IP address.
Number of Sessions	The number of sessions associated with the IP address for the captured workload.
Number of Errors	The number of errors experienced with the IP address.
Total Session Duration	The total time used to process requests for the IP address.
Total Execution Duration	The total time used to execute requests for the IP address.

6. (Optional) Click *20*, *50*, or *100* to change the number of results listed per page view.
7. (Optional) Double-click a row to display detailed information.

10.7.4.7 Display the Replay Login Report

The dashboard displays the top three logins that send the most requests by default. You can view a list of all of the logins and the workload that they generated by clicking on the login chart.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Replays*.
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Open Replay Dashboard* to view the Replay Dashboard.

   If *Open Replay Dashboard* is not available, the replay has not yet been analyzed. Select *Analyze*. The replay dashboard option displays after the replay is analyzed.
5. In the dashboard, click *Login Report* to display:

Option	Description
Login Name	The login name of the sent requests.
Number of Requests	(Default sort order for the list) The number of query requests sent from the login.
Number of Sessions	The number of sessions associated with the login for the captured workload.
Number of Errors	The number of errors experienced with the login.
Total Session Duration	The total time used to process requests for the login.
Total Execution Duration	The total time used to execute requests for the login.

6. (Optional) Click *20*, *50*, or *100* to change the number of results listed per page view.
7. (Optional) Double-click a row to display detailed information.

10.7.4.8 Display the Replay Application Report

The dashboard displays the top three applications that send the most requests by default. You can view a list of all the applications and the workload that they generated by clicking on the applications chart.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Replays*.
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Open Replay Dashboard* to view the Replay Dashboard.

   If *Open Replay Dashboard* is not available, the replay has not yet been analyzed. Select *Analyze*. The replay dashboard option displays after the replay is analyzed.
5. In the dashboard, click *Application Report* to display:

Option	Description
Application Name	The application name that sent the requests.
Number of Requests	(Default sort order for the list) The number of query requests sent from the application.
Number of Sessions	The number of sessions associated with the application for the captured workload.
Number of Errors	The number of errors experienced with the application.
Total Session Duration	The total time used to process requests for the application.
Total Execution Duration	The total time used to execute requests for the application.

6. (Optional) Click *20*, *50*, or *100* to change the number of results listed per page view.
7. (Optional) Double-click a row to display detailed information.

10.7.4.9 Display the Replay Status

You can display a dialog showing the status of completed or running replays.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Replays*.
3. In the left pane, do one of:
   - Click the arrow to the right of the replay name.
   - Click the *Actions* button.
4. Select *Status*.

10.8 View the Log Level Preferences

The Log Level setting determines how much diagnostic information is included in the SAP ASE log file for the Workload Analyzer feature.

Prerequisites

To use the dashboard, you require a workload user login or `sa_role` permissions on the SAP ASE workload analyzer repository server. See *Add a Workload User Login* for more information.

Context

Warning: Do not change this setting unless advised to do so by SAP Customer Service. Increasing the setting of Log Level from the default value of Info may degrade the performance of the SAP ASE server due to an increase in data written to its log file and additional disk space that data requires.

Procedure

1. From the SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, expand *ASE Servers* > *Workload Analyzer* > *Settings* > *Preferences*.
3. In the left pane, do one of:
   - Click the arrow to the right of the name and select *Modify*, or
   - Click the *Actions* button and select *Modify*.
4. Specify the log level for the workload analyzer.
5. Click *OK*.

10.9 Restrictions

There are some restrictions on capturing, analyzing and replaying workloads at the same time.

When multiple SAP ASE Cockpit instances share the same workload repository database, it is not possible for more than one of those cockpit instances to either analyze a captured workload or perform a replay.

This table shows what client #2 is permitted to do when client #1 is already performing a specific action, in a set-up where the two clients are using the same cockpit server:

Table 10: Restrictions for Two Clients are Using the Same Cockpit Server

	Can client #2 start a capture?	Can client #2 start an analysis?	Can client #2 start a replay?
Client #1 is performing a capture	Not allowed	Allowed	Not allowed
Client #1 is analyzing	Allowed	Not allowed	Not allowed
Client #1 is replaying	Not allowed	Not allowed	Not allowed

The following table shows what client #2 is permitted to do when client #1 is already performing a specific action, in a setup where each client is using its own cockpit server:

Table 11: Restrictions When Two Clients are Using Their Own Cockpit Servers

	Can client #2 start a capture?	Can client #2 start an analysis?	Can client #2 start a replay?
Client #1 is performing a capture	Allowed	Allowed	Allowed
Client #1 is analyzing	Allowed	Not allowed	Not allowed
Client #1 is replaying	Allowed	Not allowed	Not allowed

11 Collect Diagnostic Data

Collect comprehensive SAP ASE configuration and environment data for diagnostic analysis. SAP Technical Support uses this information to diagnose server issues, thus expediting customer cases.

The two types of diagnostic data you can collect are:

- Field diagnostic data – includes configuration and environment information about SAP ASE at the time it is run. The `sybdiag` utility command is invoked to collect this information.
- Optimizer diagnostic data – provides a way to analyze SQL queries to optimize their performance. The `sp_opt_querystats` system procedure is invoked to collect this information.

11.1 Preparing to Collect Diagnostic Data

Prerequisites for collecting diagnostic data.

Context

Perform the following to use all the functionality of the diagnostic data wizard:

Procedure

- Users must be granted the sa_role and mon_role to send diagnostic data through the diagnostic wizard to SAP Technical Support via e-mail message.
- The administrator must configure the e-mail server for any user to send the diagnostic data as an e-mail attachment using the diagnostic wizard.

11.2 Collecting Field Diagnostic Data

Collect comprehensive diagnostic data about the configuration and environment of SAP ASE at the time it is run. This data can be used by SAP Customer Support to diagnose server issues.

Prerequisites

Register and authenticate the agent to enable the collection of diagnostic data.

Context

Diagnostic data is obtained by executing the `sybdiag` utility. See `sybdiag` in the *Utility Guide*.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, click *ASE Servers*
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, select *Diagnostic Data*.
6. From the Diagnostic Data page, click *Collect Field Diagnostic Data*.
7. In the Diagnostic Data page, specify:
   - Record name – is the name associated with the diagnostic data package in the repository. This record name is not the name of the diagnostic file, which is long and complex, but uses a short default format that is easy to associate with your server. The default format is `<servername>_<number>`, where `<servername>` is the name of your server, and `<number>` is the lowest unused number. You can change the record name.
   - Output directory – is the path in which to store the diagnostic data file. The path can be either absolute or relative to the release directory, but must point to the location of the server node. The default value is the release directory.
8. On the Feature Types page, select the type of diagnostic data to collect:
   - Operating system information
   - Configuration data
   - Monitoring data
   - External files – consists of the configuration file, error log, interfaces file, and so on

   By default, all of these options are selected.

9. On the Upload Options page, specify whether to upload the diagnostic data to SAP Technical Support immediately after the data is collected. You can perform an upload as a separate step later.

   If you select *Upload the package to SAP Customer Support*, you can upload diagnostic data package via e-mail notification. By default, the Upload Options page lets you delete the diagnostic data package after a successful upload. This operation is skipped if the upload task fails.
10. Click *Next* to start the collection process on the Summary page.

Related Information

Collecting Optimizer Diagnostic Data [page 481]
Submitting Diagnostic Data via E-mail Message [page 484]
Deleting a Diagnostic Data File [page 485]

11.3 Collecting Optimizer Diagnostic Data

Collect diagnostic data to send to SAP Technical Support to perform detailed analyses in optimizing SQL queries and improving performance.

Prerequisites

Register and authenticate the agent to enable the collection of diagnostic data.

Make sure Job Scheduler is installed, enabled, and running. You must also be logged in to Job Scheduler with a login that has sa_role permissions and either js_user_role or js_admin_role before you collect optimizer diagnostic data; otherwise, you see an error message on the Introduction page, and the *Next* button becomes disabled.

Context

Diagnostic data is used to optimize complex SQL queries by executing the `sp_opt_querystats` system procedure. See `sp_opt_querystats` in *Reference Manual: Procedures*.

Set the environment variable SAP_JRE7.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, click *ASE Servers*
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. In the left pane, select *Diagnostic Data*.
6. From the Diagnostic Data page, click *Collect Optimizer Diagnostic Data*.
7. In the Diagnostic Data page, specify:
   - Record name – is the name associated with the diagnostic data package in the repository. This record name is not the name of the diagnostic file, which is long and complex, but uses a short default format that is easy to associate with your server. The default format is `<servername>_<number>`, where `<servername>` is the name of your server, and `<number>` is the lowest unused number. You can change the record name.
   - Output directory – is the path in which to store the diagnostic data file. The path can be either absolute or relative to the release directory, but must point to the location of the server node. The default value is the release directory.
8. In the text field of the Query SQL page, specify the SQL statement to collect diagnostic information for. You can either:
   - Type a SQL query directly into the text field, or,
   - Click *Import* to display a window, from which you can navigate to, and select your saved file.

   Click *Clear* to remove text you added in the field.
9. On the Diagnostic Options page, if you select *Customize diagnostic options*, you see a number of options. Equivalent to the `<diagnostic_option>` parameter of `sp_opt_querystats`, each option performs a `set` command behavior. By default, all but the last three items—execute the query, show data, and use debug mode—are selected:

Option	Description
Enable statistics I/O	Collects information about physical and logical I/O and the number of times a table has been accessed. The output follows the query results and provides actual I/O performed by the query.
Enable statistics time	Is the query execution time generated by `set statistics time`.
Enable showplan	Is the estimated plan cost calculated by the optimizer.
Use option `show_missing_stats long`	Collects information about missing statistics found for any of the tables involved in the query.
Enable statistics resource	Displays the compilation and execution resources used, such as procedure cache, sorting, and temporary databases.
Enable statistics plancost	Displays the estimated values for logical I/O, physical I/O, and row counts compared to the actual ones evaluated at each operator, and reports on CPU and sort buffer cost.
Execute `"show switches"`	Shows enabled trace flags and switches.

Option	Description
Use option `show long`	Is the logical operator tree for the query generated by the `set option show long` command. If you unselect this option, the shorter `set option show` is used. The default is `set option show long`.
Execute the query	After you execute the query, the query execution time generated by `set statistics time`.
Show data	When selected, suppresses the `set nodata on` option.
Use debug mode	Collects enhanced progress information.

10. If you selected *Customize diagnostic options*, clicking*Next* displays the Optimization Goals window. Choose the strategy that best fits your query environment:

Option	Description
`allrows_mix`	(Default) Instructs the query processor to allow both nested-loop joins and merge joins. The query processor measures the relative costs of each join type to determine which to use.
`allrows_oltp`	Instructs the query processor to use the nested-loop join operator.
`allrows_dss`	Instructs the query processor to use nested-loop, merge-, or hash-joins. The query processor measures their relative costs to determine which join it uses.

11. On the Upload Options page, specify whether to upload the diagnostic data to SAP Technical Support immediately after the data is collected. You can perform an upload as a separate step later.

    If you select *Upload the package to SAP Customer Support*, you can upload diagnostic data package via e-mail notification. By default, the Upload Options page lets you delete the diagnostic data package after a successful upload. This operation is skipped if the upload task fails.
12. Click *Next* to start the collection process on the Summary page.

Related Information

Collecting Field Diagnostic Data [page 480]
Submitting Diagnostic Data via E-mail Message [page 484]
Deleting a Diagnostic Data File [page 485]

11.4 Upload Diagnostic Data

Upload collections of diagnostic data for review by SAP Technical Support.

You can upload diagnostic data packages:

- During data collection – select the upload option in the Diagnostic Data wizard as the last step during data collection.
- After data collection – manually select to upload data packages that are created by the Diagnostic Data wizard.

You can further specify how the files are uploaded by sending an e-mail message to SAP Technical Support that includes the package of diagnostic files as an attachment.

11.4.1 Submitting Diagnostic Data via E-mail Message

Submit field and optimizer diagnostic data to SAP Technical Support as an e-mail attachment.

Prerequisites

Use this process only if you are using the Diagnostic Data wizard to specify e-mail notification information, or if you have already created a diagnostic data package and saved it to the cockpit repository.

- The administrator must configure an e-mail server.
- (Optional) Contact SAP Technical Support to obtain your case ID number before you send the diagnostic data as an e-mail attachment.

If you do not set up your e-mail server information before you configure the diagnostic data wizard, an error message will be shown on the Upload Options page when you select Send e-mail notification with the diagnostic data package, and you are not able to proceed to E-mail Notification page.

Context

To access the E-mail Notification window:

- While you are creating a diagnostic data package – select *Send e-mail notification with the diagnostic data package* in the Upload Options page in the Diagnostic Data wizard.
- After you created a diagnostic data package and saved it to the repository – right-click the package record in the Diagnostic Data summary window, select *Upload Packages*, then select *Send e-mail notification with the diagnostic data package*.

Procedure

In the E-mail Notification page, complete these fields:

Option	Description
Recipient E-mail	The recipient's e-mail address.
E-mail Subject	The subject title of the e-mail message.
Case Number	(Optional) Your case number, if your diagnostic data is related to a ticket you have already opened with SAP Technical Support.

Related Information

Collecting Field Diagnostic Data [page 480]
Collecting Optimizer Diagnostic Data [page 481]
Deleting a Diagnostic Data File [page 485]

11.5 Deleting a Diagnostic Data File

Delete field and optimizer diagnostic data packages.

Context

You can configure the Diagnostic Data wizard to automatically delete a package after it creates and uploads the package to SAP Technical Support. You can also delete diagnostic data packages from the repository from the Diagnostic Data summary page after they have been created.

Procedure

1. In SAP ASE Cockpit, click the *EXPLORE* tab.
2. In the left pane, click *ASE Servers*.
3. In the right pane, do one of:
   - Click the arrow to the right of the name.
   - Click the *Actions* button.
4. Select *Properties*.
5. Select *Diagnostic Data*.
6. Select the diagnostic data package and select *Delete* from the menu.
7. In the Delete Option page, there is an option to delete the package from the remote server node as well as remove the record from the repository. By default, this option is selected.
8. On the Summary page, you see information about the delete settings you made for the package.
   A Task Message pane appears, and displays the status of the package deletion.
9. Click *Finish*.
   The Diagnostic Data Delete wizard closes, and the package you selected for deletion no longer appears in the list of diagnostic data packages in the Server Properties page.

Related Information

Collecting Field Diagnostic Data [page 480]
Collecting Optimizer Diagnostic Data [page 481]
Submitting Diagnostic Data via E-mail Message [page 484]

12 Troubleshoot SAP ASE Cockpit

Solve problems that occur in SAP ASE Cockpit.

12.1 Data Display Problems

Troubleshoot problems that involve object or monitor display issues.

12.1.1 Browser Refresh (F5) Causes Logout

Problem: Pressing the *F5* key to refresh your browser logs you out of SAP ASE Cockpit.

Solution: Avoid using *F5* when logged into SAP ASE Cockpit.

Browser refresh updates the loaded application or pages in the browser—in this case, the Adobe Flash on which SAP ASE Cockpit is built.

Consequently, pressing *F5* logs you out of servers, including SAP ASE Cockpit.

12.1.2 Cannot Monitor an SAP ASE Server or Display the Statistics Chart

The *Monitor* and Statistics Chart context menu items for a monitored SAP ASE server are grayed out.

Solution: Make sure your user account is authenticated on the SAP ASE server. To monitor the SAP ASE server, you must also make sure that your account has been granted `mon_role`.

Related Information

Role Assignment in SAP ASE Cockpit [page 78]

12.1.3 Database Objects Are Not Updated

Problem: Changes made to database objects are sometimes not visible in SAP ASE Cockpit dialogs or screens.

Solution: Select *Refresh* from the Actions pull-down to see the updated values for the database objects.

You may see this problem when you:

- Click *Finish* on a wizard, and do not see the updates (that should be generated by the wizard action) on your current screens.
- Create or update database objects outside of SAP ASE Cockpit.

12.2 Data Collection and Alert Problems

Troubleshoot problems that involve data collection and generation of alerts.

12.2.1 Collection Job for SAP ASE Fails

Problem: A collection job for SAP ASE may fail when the `number of open databases` is too low.

Solution: Modify the value of `number of open databases` by using either the Server Configuration page on the MONITOR tab, or these steps:

1. Log in to the SAP ASE:
   `isql -S<server_name> -U<sa user name> -P<sa password>`
2. Run this command to display the current configuration value:
   `sp_configure 'number of open databases'`
3. Run this command to change the current configuration value:
   `sp_configure 'number of open databases', <number>`
   Add 10 to the current configuration value and substitute this number for `<number>`.

Related Information

Setting Server Configuration Parameters [page 68]

12.2.2 Data Collections Fail to Complete

Problem: A collection frequently times out or generates errors citing the REJECT_DUPLICATE_RESOURCE_AND_COLLECTION policy, but no problems with the monitored resources are evident.

The errors appear in the log and on the collection history screen.

Solution: Try to determine why the collection is taking so long. For example, are network delays slowing down traffic between SAP ASE Cockpit and the monitored server?

In the case of network delays and other resource-related problems, the interval between collections might be shorter than the time needed to finish the collection. To fix this problem, increase the time between collections.

12.2.3 Alerts Are Not Generated

Problem: Alerts are not being generated in SAP ASE Cockpit.

Solution: Schedule a job to run the data collection that supports your alerts. See the data collections topic for your SAP ASE Cockpit product module for information on which collections must be scheduled.

12.3 Authentication and Access Problems

Troubleshoot problems that involve log in, starting, stopping, and authentication.

12.3.1 Fatal Error #2035 Prevents Successful Log in

Problem: When trying to connect to SAP ASE Cockpit in Firefox, fatal error #2035 appears before the login screen appears.

Solution:

1. Clear the Firefox cache.
2. Restart Firefox.
3. Enter the SAP ASE Cockpit URL.

12.3.2 Cannot Log In

Problem: Cannot log in to SAP ASE Cockpit Web console.

Solution: Make sure that SAP ASE Cockpit has been configured:

- To allow logins through the operating system
- To grant appropriate roles to your login account

Ask the SAP ASE Cockpit administrator to help you check.

12.3.3 Features Are Not Enabled Although You Have sa_role

Problem: Some features are not enabled even though you are using a login account that has sa_role on the managed server.

Solution: If your login account was granted `sa_role` after you opened the Monitor view, exit from the monitor view and reauthenticate. This causes SAP ASE Cockpit to reconnect to the server and the new connection acquires the updated login privileges.

12.3.4 Cockpit Fails to Start

Problem: SAP ASE Cockpit does not start.

Solution 1: Port conflict

Solution: SAP ASE Cockpit might use a port that is used by another server or application. To check for port conflicts:

1. Execute this command:

   ```
   cockpit --info ports
   ```

   The command lists all the ports on which SAP ASE Cockpit and its services listen, indicates whether each port is in use, and shows the service running on each port. If the SAP ASE Cockpit is not running, any port shown to be in use represents a conflict.
2. If you discover a conflict, use `cockpit --port` to change the port used by the SAP ASE Cockpit service.

Solution 2: Insufficient memory

Increase the maximum memory setting if you see this error when you try to start: `Could not create the Java Virtual machine.`

12.3.5 SAP Adaptive Server and Replication Server Fails to Start

(Linux platform only) If the environment variable `LANG` is set to `POSIX`, the start up script for both SAP Adaptive Server and the Replication Server, which is invoke by the cockpit, will fail to run.

To resolve this issue, set the `LANG` environment explicitly in the start up script file to `en_US.UTF-8`.

For example, add the following lines to the `RUN_<myServer>.sh` start up script:

```
LANG=en_US.UTF-8
export LANG
```

For more information, see SAP Note - http://service.sap.com/sap/support/notes/2022985

12.3.6 Authentication Removed After Host Name Change

Changing the SAP ASE host name in the interfaces file to a different name removes the authentication and connection information for the SAP ASE cockpit.

When the SAP ASE cockpit is started, the first query entry of the interfaces is used to establish the host name and port number. If you change the host name in the interfaces file, the SAP ASE server is treated as a new server when the SAP ASE cockpit is restarted.

For example, the following information in the interfaces file is used to establish the host name and port number:

- `master=NLWNSCK,host1,5000`
- `query=NLWNSCK,host1,5000`

The new entry's host name is `localhost`.

- `master=NLWNSCK,localhost,5000`
- `query=NLWNSCK,localhost,5000`
- `master=NLWNSCK,host1,5000`
- `query=NLWNSCK,host1,5000`

Once the host name is changed, both the ASE Agent and Replication Management Agent (RMA), must be manually registered. SAP also recommends that you change the host name in ASE Agent Plug-in configuration file (`agent-plugin.xml`).

12.4 Performance Problems

Troubleshoot problems that involve performance and memory errors.

12.4.1 Out of Memory Errors

Problem: SAP ASE Cockpit generates `OutOfMemory` errors and might fail to start.

Solution:

- If the `OutOfMemory` error says that SAP ASE Cockpit is out of heap space, increase the maximum memory setting (`<COCKPIT_MEM_MAX>` or `jvmopt=-Xmx`).
- If the `OutOfMemory` error says that SAP ASE Cockpit is out of permanent generation space, increase the permanent memory setting (`<COCKPIT_MEM_PERM>` or `jvmopt=-XX:MaxPermSize`).
- Repeated `OutOfMemory` errors may indicate a memory leak. `OutOfMemory` errors generate heap dumps. Heap dump files have a file extension of `.hprof`, in the `COCKPIT-4\log` directory.

Send the heap dump files to Technical Support for analysis.

12.4.2 Performance Statistics Do Not Cover Enough Time

Problem: Instead of graphing performance counters over a long time period, the statistics chart shows only very recent data.

Solution: Ask your SAP ASE Cockpit administrator to change the repository purging options to keep statistical data available for as long as you need it. By default, statistics are purged frequently to conserve disk space.

12.4.3 SAP ASE is Responding Slowly

Problem: A monitored SAP ASE server is responding slowly. How do you tell whether the problem lies in the network or the server?

Solution: On the Monitor tab for the server in question, select *Engines*. On the Engines screen, select an engine from the Engines table and check the *Engine CPU Utilization* graph. If the graph shows high activity for the period of slow response, the engine might be overloaded. If the graphs for all engines on this server show low activity, a network problem is more likely.

Related Information

Displaying Engine Utilization [page 172]

12.4.4 Memory Warnings at Startup

Problem: When SAP ASE Cockpit starts, you see warnings about system memory or heap memory allocation.

Solution: Increase the maximum memory setting (`<SCC_MEM_MAX>` or `jvmopt=-Xmx`).

12.5 Workload Analyzer Error Messages

Troubleshoot problems that involve workload analyzer issues.

Error Message	Link to Description
`Required repository database version <repo_verion_required> is incompatible with current version <repo_version_current>.`	Required Repository Database Version is Incompatible with the Current Version [page 493]
`You don't have permission to capture workload from this server,`	Capture Workload Permission Problems [page 494]
`You don't have permission to replay workload on this server.`	Replay Workload Permission Problems [page 494]
`Start capture failed.`	Starting Workload Capture Fails [page 495]
`Start replay failed.`	Starting Workload Replay Fails [page 495]
`Capture analysis failed`, or `Replay analysis failed.`	Capture Analysis Fails, or Replay Analysis Fails [page 495]
`Replay comparison failed.`	Replay Comparison Fails [page 496]

> **i Note**
>
> This is not a complete list of workload analyzer error messages. If you encounter an error message that is not listed in this section, you can search the SAP knowledge base for a solution, or report the incident to SAP Support. For more information, see https://support.sap.com/kb-incidents.html.

12.5.1 Required Repository Database Version is Incompatible with the Current Version

Error Message: `Required repository database version <repo_verion_required> is incompatible with current version <repo_version_current>.`

This message may be displayed from the SAP ASE cockpit when you are connecting to the repository database. The repository and the cockpit server work together to complete the workload analyzer tasks (capture, replay, analyze, compare, and so on). The version information in cockpit server and repository database need to be consistent. To ensure the consistency, we have the same version information defined for both the cockpit server and repository. It is represented as “x.y”. The x stands for the major version number, and the y for the minor version number. For example, the latest version is 7.0. Each time there is a table or view change in the repository database, the major version number is increase. When there are only stored procedure changes in the repository database, the minor version number is increased.

The scenarios are:

- The <repo_version_current> in the error message is "0.0". This means that cockpit server cannot read the version information from the specified repository. This indicates the version table (t_repodbversion) or the related stored procedure (p_getsybcatdbver) does not exist in the repository database or are corrupted. This issue can be resolved by executing the repository installation script against the repository server. The installation script is located at `$COCKPIT\plugins\ASEMAP\scripts\installsybcatdb`.
- The <repo_version_current> in the error message is not "0.0", but less than the <repo_verion_required>. This means the repository database is obsolete to the running cockpit server. You are running a newer cockpit server but trying to connect to a repository with an older version. This issue can be resolved by executing the repository installation script against the repository server. The installation script is located at `$COCKPIT\plugins\ASEMAP\scripts\installsybcatdb`. The installation script will perform an upgrade process on the existing data in the repository database. Ths means the data in the repository database will not be lost after executing the installation script, but will be updated to a newer version.
- The <repo_version_current> in the error message is not "0.0", but greater than the <repo_verion_required>. This means the repository database is newer than the running cockpit server. You are trying to connect to a repository with a version that is newer than the running cockpit server. This issue can be resolved by either connecting to another repository that is consistent with the running cockpit server, or drop and recreate the repository database and execute the repository installation script on the new repository database. The installation script is located at `$COCKPIT\plugins\ASEMAP\scripts\installsybcatdb`. This process will remove all the existing data in the repository database.

12.5.2 Capture Workload Permission Problems

Error Message: `You don't have permission to capture workload from this server.`

This message may be displayed at the bottom of the first page (introduction page) in the Capture Wizard. Appropriate privileges need to be checked before capturing or replaying workload on the SAP ASE server. When granular permissions is enabled, the `set tracing any process` privilege is required. When granular permissions is disabled, the SA or SSO role is required.

12.5.3 Replay Workload Permission Problems

Error Message: `You don't have permission to replay workload from this server.`

This message may be displayed at the bottom of the first page (introduction page) in the Capture Wizard. Appropriate privileges need to be checked before capturing or replaying workload on the SAP ASE server. When granular permissions is enabled, the `set tracing any process` privilege is required. When granular permissions is disabled, the SA or SSO role is required.

12.5.4 Starting Workload Capture Fails

Error Message: `Start Capture Failed.`

This message may be displayed after you click *Finish* the Capture Wizard. The most common cause of this message is that the SAP ASE server has already started a workload capture. You might see a description such as `Capture <capture_name>(<capture_id>) has been running` in the error message box. For this situation:

- Check if there are any other users running a workload capture from a different cockpit window,
- Execute `dbcc workload_capture(status)` on the server to check the current capture status.
- Check the server errorlog file to see whether there are any errors when starting the capture.

12.5.5 Starting Workload Replay Fails

Error Message: `Start Replay Failed.`

This message may be displayed after you click *Finish* the Replay Wizard. The most common cause of this message is that the SAP ASE server has already started a workload capture. By default, the "capture workload during replay" option is enabled for replay analysis and comparison. You might also see a description like `Failed to start capturing for replay <replay_name>(<replay_id>) from the SAP ASE server <ASE_name>` in the error message box. For this situation:

- Check if there are any other users running a workload capture from different cockpit window,
- Execute `dbcc workload_capture(status)` on the server to check the current capture status.
- Check the server errorlog file to see whether there are any errors when starting the capture.

12.5.6 Capture Analysis Fails, or Replay Analysis Fails

Error Message: `Capture analysis failed`, or `Replay analysis failed.`

This message may be displayed after you start a capture analysis or replay analysis. Workload analysis is a complex and time consuming process. There are many possible causes that could lead to the analysis failed.

The most common situations are:

- When the error message descriptions includes: `Can't allocate space for object 'xxx' in database 'sybcatdb' because 'default' segment is full/has no free extents`, the repository database `sybcatdb` has no free space on the data segment. The analysis process will be aborted. To resolve this issue, extend the data segment of `sybcatdb`.
- When the error message descriptions includes: `Can't allocate space for object 'xxx' in database 'sybcatdb' because 'logsegment' segment is full/has no free extents`, the repository database `sybcatdb` has no free space on the log segment. The analysis process will be aborted. To resolve this issue, user should extend the log segment of `sybcatdb`.
- When the error message descriptions includes: `Can't allocate space for object 'xxx' in database 'tempdb' because 'default' segment is full/has no free extents`, the

temporary database (often refers to `tempdb`) has no free space on the data segment. The analysis process will be aborted. To resolve this issue, user should extend the data segment of temporary database.

> **i** Note
>
> A related scenario is when there is low free space on the log segment of temporary database. No message is shown in the cockpit UI, but the analysis progress does not update and it appears that the analysis process hangs. In this situation, the analysis progress might be quite slow and you will see a repository server errorlog message such as, `Space available in the log segment has fallen critically low in database 'tempdb'. All future modifications to this database will be suspended until the log is successfully dumped and space becomes available`. You can wait for the current analysis, or stop the analysis and extend the log segment of the temorary database, and then restart the analysis. To save time, it is recommended to stop analysis, extend the log segment and restart analysis.

12.5.7 Replay Comparison Fails

Error Message: `Replay comparison failed.`

This message may be displayed on the cockpit UI after you start a replay comparison. The replay and its parent capture are both required to be analyzed before starting the workload comparison. When the error message includes the following text, the selected replay has not been analyzed.

```
Replay <replay_name>(<replay_id>) has incorrect status <replay_status> in compare phase
```

To resolve this issue, analyze the replay and then restart the workload comparison.

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