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CA Technologies Product References

This document references the following CA products:

- CA ARCserve® Backup (CA ARCserve Backup)
- CA Storage Resource Manager (CA SRM)
- CA Unicenter® Service Accounting (Unicenter Service Accounting)

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## Documentation Changes

The following documentation updates have been made since the last release of this documentation:

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<tr>
<td><strong>Microsoft Exchange Objects</strong> (see page 292)</td>
<td>Updated this section with the Exchange 2010 objects information.</td>
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<td><strong>Using the CA SRM Exchange Registration Wizard</strong> (see page 299)</td>
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<td><strong>Virtual Host VMware Environment Objects</strong> (see page 394)</td>
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<td><strong>Define File Level Collection and Storage Analysis</strong> (see page 64)</td>
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Chapter 1: Introduction

CA Storage Resource Manager (CA SRM) assists storage managers to formulate enterprise-wide, multiplatform network storage management procedures and supervise their implementation.

This guide describes the concepts and procedures you need to know to configure and operate CA SRM. This chapter introduces you to CA SRM.

Note: Because CA SRM operates within the Windows environment, you can use many Windows functions (like moving, resizing, minimizing, and maximizing windows) from within CA SRM. You can also use familiar Windows commands to cascade, tile, and arrange windows. For more information about Windows commands and functions, see your Windows documentation and the CA SRM online help.

This guide is intended for the following audiences:

- Executives who want an overview of the capabilities and constraints of their company's storage management system to formulate adequate storage management guidelines
- Storage Managers or network administrators (or their equivalent) responsible for defining storage management procedures
- Operators responsible for executing the procedures and maintaining the system

This guide assumes that you understand basic terminology about the following:

- Personal computers
- Local area networks
- Storage management

This section contains the following topics:

- Introducing CA SRM (see page 16)
- CA SRM Components (see page 18)
- Backup Resource Management (see page 23)
- Application Database Resource Management (see page 24)
- Application Email Resource Management (see page 25)
- Network Storage Resource Management (see page 26)
- CA SRM Services (see page 27)
- Schedule and Execute Services (see page 34)
- Service Results (see page 36)
- Reports (see page 37)
- Attention Messages (see page 38)
- Enterprise Definition Language (see page 38)
- MS SQL Server (see page 38)
Introducing CA SRM

CA SRM provides:

- Online viewing of storage data, trend analysis, reporting, scheduling, automation, and remote task execution capabilities for large, complex networks
- Collection of comprehensive storage information continually from all computers running Windows, UNIX, and NetWare, both local and remote, presented in a unified format
- Maintenance of an extensive database of information describing storage management tasks and data collected from the network
- Facilities that process and display data obtained from various supported applications
  
  **Note:** Support for some of these applications is provided under separate license. Contact your CA account manager for information about licensing terms and conditions.
- Policy-driven backup for CA ARCserve Backup.
- Agent-less data collection from Windows servers

The CA SRM Windows Client is the main interface to CA SRM objects and functions. You can use the CA SRM Windows Client to access these objects and functions (both host and network-based), browse objects, define constructs, execute services, view, print, and export reports, and much more.

Objects

CA SRM stores information in the database in the form of objects. CA SRM objects are typically one of the following types:

- Objects that represent network entities, such as domains, computers, clusters, volumes, users, CA ARCserve Backup servers, Oracle instances, and so on
- Objects created by CA SRM to facilitate storage management tasks
Storage Management Services

CA SRM provides the following types of storage management services:

- Storage usage-related information collected from network nodes and applications managed by CA SRM Open Systems
- Online viewing of storage usage-related information, both current (snapshot) and historic (trend), with extensive browsing and querying capabilities
- Reports on all aspects of the storage environment
- Automation, such as scheduling, alerts, messaging, and notification
- Distributed execution of tasks on local and remote computers running supported operating systems

Basic Operational Steps

The following list summarizes the basic steps in a CA SRM operation:

- CA SRM agents collect information about the storage assets of and the capacity used by all managed computers. High-level summary information is stored in the CA SRM database for use later in monitoring and reporting.
- Storage Managers define automated tasks that they want CA SRM to initiate. These tasks can include:
  - Generating reports
  - Monitoring resources
  - Issuing alerts
  - Executing an external application, for example, an antivirus solution
You can always execute services on demand or schedule them for deferred or periodic execution. CA SRM stores service definitions in the CA SRM database. See the individual chapters for a description of each option that CA SRM manages.

- When CA SRM receives a service request from the storage manager or from a queue of scheduled services, it obtains the task parameters it needs to execute the service from the database and assigns the task to one or more available computers. Then it routes the results to designated users according to the service definition. For example, if CA SRM receives a request to produce a given report, it retrieves the necessary information from the database, assigns the report to one or more eligible computers for data collection and formatting, and outputs the formatted report.

Several hardware and software components participate in the execution of a CA SRM task. The hardware is the network and the computer registered in CA SRM. This chapter describes the CA SRM software components and the interactions between the various components.
CA SRM Components

The following list describes the components of CA SRM:

**Application Server**
Server that controls and schedules the activities of all CA SRM components, wherever they reside.

**CA SRM Windows Client**
Graphical user interface that provides access to CA SRM functions and objects.

*Note:* You can connect any number of CA SRM Windows Clients to an Application Server, but you cannot connect a CA SRM Windows Client to more than one Application Server at the same time. You can use a CA SRM Windows Client with different Application Servers; however, only one Application Server can connect to a specific CA SRM Windows Client at the same time.

**Activity Monitor**
Utility that monitors the execution of CA SRM services, accessed from the CA SRM Windows Client.

**CA SRM Database**
Database that stores information about all network objects known to CA SRM; it also stores user-defined constructs.

**Runtime Services**
Services activated on a computer that is managed by CA SRM. For more information about services, see CA SRM Services in this chapter.

**CA SRM Agent**
Platform-specific CA SRM software executing on managed computers.

**Managed Computer**
Any computer managed by CA SRM.

**Fast File Scan Database**
To improve your file search performance, you can scan files from a cached database. This is a compressed highly efficient database for keeping file system information. The Fast File Scan (FFS) creates this database. Each FSDB contains the file information of one volume.

**CA SRM Object Server (BOS)**
BOS is the CA SRM server object housing component that establishes and maintains the environment where all the servers exist.
Application Server

The Application Server is the main CA SRM component. It interacts with all other components.

Processes that run on the Application Server include the following:

- Evaluating requests
- Scheduling the operations necessary to service the request
- Storing the scheduled operation descriptions
- Matching the requests for services with currently available resources
- Initiating service execution

The processes the Application Server performs are transparent to the user. After you initially configure the Application Server, you do not need to perform any other tasks, unless troubleshooting is required.

CA SRM is shipped with two concurrent database connections for the Application Server. If you want more, contact your CA representative.

If you change the domain of the Application Server machine, the original domain data remains in the Domain table. To collect data about the new domain, you need to uninstall and then reinstall the Application Server.

CA SRM Windows Client

The CA SRM Windows Client is the primary interface to CA SRM. It provides access to the following CA SRM functions:

- Registration of network objects and CA SRM options
- Browsing of network contents
- Definitions of CA SRM constructs
- Definitions and execution of services and procedures
- Processing the results of service execution (viewing, printing, exporting in various formats)
Home Page

The Home Page provides shortcuts to many of the Windows Client features:

- **Important Information**—This section includes web sites with news and support information.

- **Setup Environment to be Managed**—This section provides access to registering Open System computers and z/OS host configurations.

- **Administration**—This section provides a shortcut to much of the toolbar features including the Object Tree, Activity Monitor, User manager, logs and the Scheduler.

- **Advanced Management**—This section presents links to the services.

- **Storage Analysis**—This section details the key storage metrics regarding managed objects such as computers at risk or total storage by owner. It also presents high-level graphical representation of your storage information. You can put any view on the Home Page, including tables, graphs, and trend reports.

You can publish summaries to the right side of the Home Page. To do this, you need to select Publish to Home Page in the View Definition's Destination dialog. In order to see a summary on the Home Page, you must select this box in one of the view definitions otherwise the My Storage Summary section remains blank:

![Home Page Screenshot]

Object Tree

You access all CA SRM functions from the Main menu of the CA SRM Windows Client. The Object Tree is the major feature on the Main menu.

The expandable and collapsible Object Tree lists all the source objects known to CA SRM in a hierarchical tree structure. A folder icon represents each object in the tree. A source object contains all the fields updated by the data collection services for that object. All fields—or any subset of them—can participate in user-defined views based on that object.
When you select an object from the Object Tree, CA SRM displays a table listing all instances of this object found in the database. CA SRM formats the table according to the settings of the selected view. For example, you can view the data in a standard table or as a graph. Whatever you select, CA SRM automatically saves the information about how you prefer to view the data in the Object Tree as part of each storage manager’s preferences. CA SRM retrieves this information to restore your settings each time you access the CA SRM Windows Client. You can also configure CA SRM to display selected objects in the Object Tree only.

You can customize the Object Tree to meet your specific needs by using a solution. A solution is a reduced version of the Object Tree that only includes objects and views that you specify. CA SRM provides several predefined solutions. For example, the Object Tree in the Oracle View Solution contains only Oracle objects. You can use one of these predefined solutions or create and save your own.

For more information about customizing the Object Tree, see the Windows Client guide.

**Table Operations**

You can control the display of information in the tables. For example, you can perform general sorting and filtering operations on each table to narrow the list of objects and arrange them in any order you choose. You can perform the following operations on tables:

- Presenting numeric data graphically
- Printing and exporting table data as reports
- Selecting which object attributes display
- Defining the fonts and number formats used to display information
- Setting color attributes based on a user-defined condition

**Table View**

CA SRM lets you save the characteristics of a table display—for example font, number and width of columns, sort order, and filter criteria—as a user view. CA SRM lists all user views of an object in the Object Tree. You can export the information contained in the tables in a variety of formats for processing by other applications or for printing as a report. For more information about table views, see the Windows Client guide.
CA SRM Components

Activity Monitor

You can view the state of services using the CA SRM Activity Monitor. The Activity Monitor display separates services into active services and procedures, services on hold, services that have completed operation, and registered Window managed computers with the necessary launcher software. You can monitor all pending, completed, and active jobs, and reschedule pending or completed jobs. You can record the actions of the Activity Monitor in an Activity Log.

CA SRM Database

The CA SRM database contains information about network objects such as domains, computers, volumes, users, and information about other objects that CA SRM manages. CA SRM data collection services collect this information from the managed objects.

The database also includes services and constructs created by CA SRM, which describe the management tasks to perform and the resources available to perform those tasks.

CA SRM Agent

The CA SRM Agent is a platform-specific CA SRM software component that is incorporated into the Application Server installation or installed and executed separately on a managed computer.

Managed Computer

CA SRM recognizes several types of network objects, such as domains and computers. CA SRM maintains information about object attributes and the relationships between objects. For more information about object relationships, see the online help.

CA SRM Object Server (BOS)

The BOS provides the servers with the services they need to operate. BOS is responsible for all the external incoming communication for every server it maintains. BOS implements the Listener component and listens on the user defined (single) communication port. To run the BOS Windows service on managed computers, the security used to install the managed computer software must have administrator rights on all of the managed computers.
Backup Resource Management

CA SRM supports the following backup options:
- CA ARCserve Backup
- IBM Tivoli Storage Manager (TSM)
- Legato NetWorker
- Veritas NetBackup

CA ARCserve Backup

The CA SRM data collection agent gathers data from CA ARCserve Backup and imports it into the CA SRM database. The CA SRM data collection agent then calculates a variety of statistical data, such as totals, averages, severity values, durations, and so on. Using CA SRM, you can monitor all pending, completed, and active jobs, and reschedule pending or completed jobs. You can view information about your storage devices and media, change drive compression modes, and perform media maintenance functions such as formatting, erasing, and retention.

CA SRM provides access to the CA ARCserve Backup databases. Using the CA SRM Windows Client, you can do the following:
- Display company-wide views of CA ARCserve Backup objects
- Run extensive reports and queries on the CA ARCserve Backup database
- Monitor CA ARCserve Backup objects

You can display a snapshot of the enterprise backup state in a unified view and do the following:
- List all CA ARCserve Backup servers in a color-coded display that indicates the average status of all executed backups
- List statistical information about each CA ARCserve Backup server
- Display a dynamic report regarding the performance of a problematic server

IBM Tivoli Storage Manager

CA SRM backup support for IBM Tivoli Storage Manager (TSM) lets you easily obtain information about all TSM activity on the network, regardless of network size and complexity, and take immediate action when necessary.
**Legato NetWorker**

CA SRM backup support for Legato NetWorker lets you easily obtain information about Legato NetWorker activity on the network. CA SRM automatically extracts information from the Legato NetWorker server and copies it to the CA SRM database. You can then perform queries on this data, produce reports, analyze trends, and so on.

**Veritas NetBackup**

CA SRM backup support for Veritas NetBackup lets you easily obtain information about Veritas NetBackup activity on the network. CA SRM automatically extracts information from the Veritas NetBackup server and copies it to the CA SRM database. You can then perform queries on this data, produce reports, analyze trends, and so on.

**Application Database Resource Management**

CA SRM supports the following database options:

- IBM DB2
- Microsoft SQL Server
- Oracle
- Sybase

**IBM DB2**

CA SRM gathers data from your IBM DB2 resources to help you better manage the storage-related aspects of this database. Some of the data CA SRM collects includes instances, containers, tables, and users. After you see this aggregated data, you can make more informed decisions about your storage needs.

**Microsoft SQL Server**

CA SRM provides the information you need to manage the storage-related aspects of Microsoft SQL servers more efficiently. CA SRM collects information about databases, file groups, data files, log files, and tables. You can then use this information to set alerts, plan capacity, report on raw devices, and so on.
Oracle

CA SRM assembles and presents the information you need to manage the storage-related aspects of Oracle database engines more efficiently. CA SRM collects a variety of data to assist you in tasks like tuning the system, setting alerts, planning capacity, reporting on raw devices, and so on. You can also display unified views of data collected from multiple database instances running on different platforms.

Sybase

CA SRM collects the Sybase information necessary for you to effectively manage the storage-related aspects of the Sybase databases. This information includes instances, segments, users, tables, devices, databases and usage. You can then perform queries on this data, produce reports, analyze trends, and much more.

Application Email Resource Management

CA SRM supports the following email resource options:

- Lotus Domino
- Microsoft Exchange

Lotus Domino

CA SRM enables you to more effectively manage the storage of your Lotus Domino servers. Some of the data CA SRM collects includes domains, clusters, and mailboxes. You can then use this information to set alerts, produce reports, and study trends.

Microsoft Exchange

CA SRM lets you monitor storage of your Microsoft Exchange servers. You can use the information stored in the CA SRM database to create reports, execute queries, and define thresholds. CA SRM collects age and size information for servers, mailboxes, and public folders. For Microsoft Exchange servers, you can also collect data about mailbox stores, public stores, and storage groups.
Network Storage Resource Management

CA SRM supports the following network storage options:

- Disk Arrays
- NetApp Filers
- Virtual Host Environment
- Virtual Storage Environment
- SAN Fabric

Disk Arrays

CA SRM can collect data from a number of popular disk array devices, such as EMC Symmetrix, EMC CLARiiON, Hitachi Freedom Storage series, HP StorageWorks, Engenio (formerly LSI Logic), SUN StorEdge, and IBM TotalStorage Enterprise Storage Server series.

CA SRM gives you end-to-end mapping of your physical disks to your local storage objects, letting you see exactly which files and applications are stored on which disks in your array. The Risk Assessment capabilities of CA SRM help you identify the disks in your array that are low on storage space and that contain the most valuable data. You can also unify the views of your various arrays into a single view, letting you see data on all your disk array devices concurrently. CA SRM also collects hardware information for each disk in your array, including information about physical disks, logical volumes, and so on.

NetApp Filers

CA SRM increases your knowledge of your storage devices by including NetApp filers. You can collect information about a number of objects, including volumes, qtrees, quotas, snapshots, and snapshot definitions.

Virtual Host Environment

CA SRM can collect and monitor storage capacity and other information from a server virtualization product, for example, VMWare ESX server and Microsoft Hyper-V server. Virtual Host Environments allows you to correlate the virtual hosts to the physical environment. You can view both the logical and physical relationships of the infrastructure stack and reporting on utilization of resources.

Virtual Host Environment registration helps you discover a virtual host server [ESX Server], all the virtual machines [virtual guests] existing on the virtual host server, and detailed information about the components of the virtual host server.
Virtual Storage Environment

CA SRM adds support for collecting and reporting data from IBM SVC Storage Virtualization appliance. The IBM Storage Volume Controller (SVC) data collection agent is responsible for collecting high level information like Clusters, Nodes, MDisk groups, MDisks, VDisks and so on from IBM SVC installed node by communicating to SMI-S provider configured on any platform which will reside on the managed server machine.

Virtual Storage Environment registration enables you to discover a SVC application, all the SVC clusters, and detailed information about the components of the virtual storage environment.

SAN Fabric

SRM collects information from SAN switches and provide understanding of the SAN fabric and topology, dependencies, and relationships.

CA SRM Services

CA SRM Services are mechanisms to define and execute specific data collection and storage management operations. You can activate a service as follows:

- **On demand**—Execute an operation immediately or at a specific time in the future. For example, you could schedule data collection for after work hours so the information is ready when you return.
- **Periodically**—Execute an operation at a regularly scheduled time. For example, you could schedule data collection to occur every Sunday night at 12:00.

You can group services together and execute the group as a procedure. A procedure is a sequence of service invocations executed with one command. Services in a procedure can run in parallel or in sequence. When services run in sequence, a service can start only after the previous one terminates.

CA SRM supports the following services:

- **Automate**—Used to test certain conditions in the system and take a predefined action on the objects that match the condition.
  
  **Note:** CA SRM previously referred to Automate service as the Threshold service.

- **Backup**—Used to backup files and volumes automatically using a CA ARCserve Backup server.

- **Classes**—Use this service to define and name a collection of database objects. You can use a class wherever you would use an existing CA SRM object, for example, in queries.
- **File Groups**—Used to periodically collect file information (based on selected classes) from a selection type. For more information about classes, see CA SRM Classes in this chapter.

  **Note:** CA SRM previously referred to File Groups service as the Group Data Collection Service.

- **Procedures**—Used to execute services in a defined sequence or concurrently, as determined by the availability of resources and by timing conditions. For example, you can use a procedure to perform a sequence of reports over a specified period. You can incorporate any service into a procedure.

- **Query**—Used to direct queries to the network, the CA SRM database, or both. The Query service returns the requested information in a dynamic table created specifically to display the results of that query, or it exports the information in one of a variety of formats that can be imported by other applications for post-processing. You can use aggregate functions to perform statistical operations on collected data.

- **TSM Message Scanner**—Used to scan the TSM servers for client-related and server-related messages.
  - **Client Messages**—Scans the TSM Server Activity Log file for client messages. The service can accumulate the information in Result files, generate attentions to notify users about potential problems on TSM clients, and set severity indicators on the TSM client object.
  - **Server Messages**—Scans the TSM Server Activity Log file for server messages. The service can accumulate the information in Result files, generate attentions to notify users about potential problems on the TSM server, and set severity indicators on the TSM server object.

**Automate Services**

An Automate service monitors system resources, provides an automatic alert when a resource reaches a critical level, and takes action when certain condition are met. You can define Automate services for an individual object, a collection of objects, or an aggregate function applied to object attributes. You can define Automate services for the following objects:

- **Network Storage**—Disk Arrays, Managed Computers, NetApp Filers, and SAN
- **Applications**—DB2, Exchange, Lotus Domino, Oracle, SQL, and Sybase
- **Backup Products**—Backup Servers, Legato, TSM, and Veritas
You can define the threshold condition for which CA SRM creates the Automate service as an EDL conditional expression. You can also combine conditions. When a resource reaches the threshold, CA SRM takes any of the following actions:

- Sends a message about the event through email or SNMP, or to the Windows event log
- Executes a Windows command or service
- Executes a predefined CA SRM service or procedure

CA SRM executes the action you request for every object that meets the threshold criteria and executes it in the context of each object. You can also use parameters to pass information to the action that starts when a threshold is met. At execution time, CA SRM substitutes the formal parameters defined in the body of the message with data obtained from the network or the database.

For example, you can define an Automate service that monitors the amount of free storage space remaining on all volumes on a particular server. When free space on a volume drops below a level you specify, CA SRM can issue an alert or start a cleanup service for every affected volume.

You can test the threshold condition on information retrieved from the database or on information retrieved in real time from the network.

**Notes:**

- If the command line contains parameters, CA SRM applies the specified actions to every object that meets the threshold condition. If the command line does not contain parameters, CA SRM applies the specified actions once.
- CA SRM consolidates attention messages issued by the Automate service into a single message.

**Backup Services**

If you register a CA ARCserve Backup server as a managed object in CA SRM and the machine on which CA ARCserve Backup is installed as a managed computer, you can backup files or volumes from managed computers within CA SRM. You can choose the backup policy to apply and whether to activate the service immediately or schedule it for a specific time.
Classes

CA SRM requires the definition of certain objects, called constructs, to perform storage management at your site. CA SRM classes are user-defined named constructs representing logical groups of storage management objects. You can use a class wherever you would use a CA SRM object or list of objects to provide the source of a service definition. Use classes to specify objects that conform to certain criteria.

For example, you can define the class W2000.SERVERS as the collection of all computers running under the Windows 2000 operating system, and the class ACCOUNTING as all the users who belong to the Accounting group.

CA SRM provides templates to help you define classes to meet your particular storage management needs.

File Groups Services

The File Groups service collects information about files and sorts it according to criteria defined in a class, for example, files larger than 1 MB. The File Groups service then summarizes this information in a report under Group Results and Group Details in the Object Tree. One service can collect information about several classes.

For example, consider an organization that uses email, order entry, help desk, and accounting. By defining four classes and a File Groups service that collects file data and creates group results for each of these applications, the CA SRM can include the information about the storage used by each system in the same report.

Procedure Service

A procedure is a group of services. Procedures help you to automate storage management functions because they let you execute a series of operations with a single command, as opposed to executing each operation separately. You can combine several services into one procedure and then invoke them in sequence or concurrently.

Query Service

A query service lets you create a new source object by defining the data selection type and conditions. For example, you can define a new object that retrieves information about all files owned by a particular user and not accessed in the last 12 months.
File Queries

You can now create any file query using attributes appearing in the fast scan database (FSDB) from a previously scanned or updated FSDB. Without a scan, the query must access the file system for the missing attributes. To avoid this, an option to execute a file search from FSDB is now included in the query definition dialog:

File Scanning

To improve your file search performance, you can scan files from a cached database or you can scan an entire volume. The cached data is put into the fast scan database (FSDB). This is a compressed highly efficient database for keeping file system information. The Fast File Scan (FFS) creates this database. The FSDB updates with each data collection. When you create a query, you select which method you want.

In addition to the FSDB, CA SRM uses segmented two-phase file search to alleviate the problem of large volume searches. The first and second phases run serially.
There are three file search operation modes:

- **File system based distributed mode**—The individual file searcher output is segmented for overlapping between the first and the second phase. This is identical to the previous file search with the addition of the segmented operation mode. We recommend this mode when real-time file data is needed and when attributes not collected by the fast file scan are needed.

- **FSDB based distributed mode**—The file search is executed and distributed on each managed file server (or on its proxy). The actual file search, however, operates on a previously created and cached FSDB. The output for every distributed file searcher agent is handled in the segment operation mode to overlap the first and the second phases. We recommend this mode when:
  - The environment and the query contain a large number of servers.
  - The amount of output records is significantly smaller than the number of traversed files (for example, when you request aggregated output).

- **FSDB based central mode**—The file search is always executed on the Application Server machine from a previously created and cached FSDB. After creation, this FSDB is automatically transferred from the remote host to the Application Server machine. We recommend this mode when:
  - The query contains only a few volumes with a large amount of files (for example, scanning NetApp Filers).
  - The query generates the same amount of output records as the number of traversed files (for example, when you generate detailed file reporting).

The file scan engine scans files under the system account privileges on each Windows managed computer regardless of the security that was provided during the registration of this managed computer. This ensures reporting on all of the files that reside on the target server.

To change the file scan default:

1. Right-click the Application Server icon in the system tray and select Maintain Configuration.
   
   The Application Server Configuration Values Setup dialog appears.

2. Select File Scan from the Sections drop-down list.

3. Select System account based file scan and then clear the Yes box.

Even if you run the scan under the system account, it still does not guarantee that you will receive the file-system information. According to Microsoft documentation, the daily users of those computers that you want to scan can limit the default system account privileges that CA SRM is trying to use.

**Note:** This feature is relevant only to the Windows managed servers. For Unix file scanning, you need to change the rsc.conf flag on each UNIX server that you want scanned.
Query Stored Results from the Database

CA SRM displays the information obtained by the query in a dynamically created table called the Query Results table. The object attributes you select when you define a query service determine the format of the Query Results table. CA SRM treats the query result as a construct and stores it in the CA SRM database. You can open, sort, and filter Query Results tables like any other database table.

Export Query Results

You can export Query results in a variety of different formats, including formats that support post-processing by other applications, such as Microsoft Excel. You can also create reports based on your Query results, which can then be printed, emailed, or posted to the Web.

You can also create queries that perform statistical operations on the collected data and produce aggregate results (for example, the sum of all data file sizes on a volume or the average volume size on a server).

TSM Messages Scanner Service

The TSM Messages Scanner Service collects information about server-related and client-related messages. The following describes the two types of messages:

Server Messages

CA SRM scans the Activity log of TSM servers and accumulates ANR-type event information in Result files. The service generates attentions to notify users about potential problems on the TSM server and sets severity indicators on the TSM server object.

Client Messages

CA SRM scans TSM logs within a given time range and retrieves relevant ANS-type information from the TSM Activity log. The service sends information derived from the log files as attention messages to the destination specified in the Attention dialog or writes the information to output files. Use pattern files to control the contents of the attention messages and of the output files. There are two types of output files:

- **Extract file**—Includes all log records that do not contain a substring specified in the Patterns file
- **Result file**—Includes all the log records that contain a substring specified in the Patterns file grouped by user-defined severity criteria
Schedule and Execute Services

CA SRM can schedule and execute operations automatically. When you start CA SRM, the Scheduler creates an execution schedule of all services and procedures defined in the CA SRM database. All services scheduled for execution appear on the CA SRM Monitor display. When you define a new service or procedure, CA SRM schedules it for execution immediately. CA SRM initiates the actual execution according to a user-defined timing condition and depends on resources available at that particular moment.

The storage manager can request the execution of on-demand services. When certain jobs are running, an operator must be present to respond to attentions generated by the system.

Although you can launch services on demand, you typically schedule services to execute periodically at a specified time. When the service activates, CA SRM may use several computers to perform the selected task. You can perform any number of services concurrently if you have enough resources available.

Important! When you install the Application Server, the Open_System task is automatically popped in to the Schedule list, by default. You can delete the scheduled tasks that you do not want to run, from the list. However, do not delete the Open_System task, since the trend files maintenance is dependent on this task. If you delete this task, the corresponding entry gets deleted from the OASchedules_.MDB file, at \BrightStor SRM Data\Central. Contact CA Support to get the updated MDB file.

CA SRM uses an internal construct called a job to execute services. A job is the translation of a service request into a set of executable steps. Jobs are not visible to the user, but understanding how CA SRM uses jobs can help explain the principles on which CA SRM bases the scheduling of services.

A job is comprised of tasks. A task is a program that performs a portion of the job’s work.

All jobs are input to the Scheduler, which checks their timing conditions and determines the time interval within which the next execution of the job must take place. The following example shows the sequence of events:

1. Service definition
2. Job
3. Schedule

![Diagram showing the sequence of events: Service definition → Job Builder → Scheduler → Dispatcher → Schedule](image)
1. The Job Builder translates various service definitions into jobs.

2. The Job Builder sends the jobs as input to the Scheduler.

3. Based on the job’s timing requirements and its last execution time, if any, the Scheduler produces a timetable, which is a list of time intervals within which a job executes. The timetable passes to the Dispatcher.

   The Dispatcher verifies the actual availability of the required resources at the time of scheduled execution and executes the steps that make up each job.

When you submit a service or procedure for scheduling, the Scheduler checks the last time CA SRM executed the job and the current date and time, and determines the intervals within which the next execution of the job must take place. For example, if the timing of a service requires that the job run every Tuesday and Thursday after 17:00, and if the current day is Wednesday, the next execution of the job must take place on Thursday between 17:00 and 24:00.

**Note:** The scheduler does not check resource availability. Because resource availability changes from day-to-day and from hour-to-hour, the Scheduler cannot guarantee that the job will execute at the scheduled time, only that the Scheduler will submit the job for execution at that time. A job execution priority scheme ensures jobs that already started can complete before a new job starts.

When a job completes execution, it reschedules for the next execution according to its timing condition.

**Execute Services from the Command Line**

CA SRM lets you execute a predefined schedule from the command line. To do this, use VDPXSRV.

**VDPXSRV**

CA SRM can start the Application Server using mechanisms that access workload scheduling systems, such as the Workload Management component of Unicenter®, Autosys, or third-party scheduling products. CA SRM uses the VDPXSRV command line utility to interact with these workload-scheduling systems.

VDPXSRV executes in the following two modes, which are controlled by command line parameters:

- **Synchronous**—VDPXSRV waits until the launched service or procedure stops. The execution of VDPXSRV is successful if the specified service or procedure terminates normally.

- **Asynchronous**—VDPXSRV terminates immediately after scheduling the service or procedure. The execution of VDPXSRV is successful if the specified service or procedure is found and starts.
If the execution of VDPXSRV fails, CA SRM automatically issues a Result file containing a description of the problem. The default name of the Result file is VDPXSRV.LOG. When the VDPXSRV utility successfully executes, CA SRM deletes or resets the existing VDPXSRV.LOG file.

**Note:** You can use the command line parameter to overwrite the file name.

**Monitor Service Execution**

The CA SRM Monitor lets you view the state of executing services. On the Monitor display, CA SRM separates services into active services and procedures, services on hold, and services that have completed operation (successfully or as the result of an error).

Icons in the Scope pane (left pane) represent all the available services. Double-clicking the plus sign of the icon expands the view to show that service's components. If you click the Service icon, a table displays the Result pane showing a summary and status of the service or the tasks of the service. You can also view a progress window for every active task, statistical information for completed services, and the status of launchers currently active on all the computers managed by CA SRM. For more information about the Monitor, see the online help.

CA SRM lists attentions and messages issued by the system for running services separately. Each attention and message displays with its own icon. Where applicable, exception handling dialogs display for attentions that require operator intervention.

You can record Monitor actions in an Activity log and then view and print the log.

**Service Results**

CA SRM displays service results under Service Results in the Object Tree. You can display the following service results:

- **Query Results**—List of tables created dynamically by the Query service.
- **Group Results**—A collection of files sorted into various classes and used to produce a distribution report. For example, CA SRM could sort classes associated with minimum and maximum file size into a distribution report showing files by size.
- **Group Details**—Detailed information about group results, by volume.
Reports

Large multiplatform networks can store millions of files. This large amount of stored data poses severe storage management problems for storage administrators. They must track data accumulation trends and dynamics, locate and remove obsolete data, maintain and enforce space usage quotas on individuals and groups of users, and so on. CA SRM reports provide you with information about the state of your storage use and operations, and present multiple views of your information in concise, easy-to-understand formats.

Report results can be printed, displayed on the screen, written to a file, sent by email, published to the Web, or exported to other applications (such as word processors, database programs, and spreadsheets) for further processing. You can also run reports and export them automatically on any schedule.

Customize Reports

Because CA SRM bases reports on views, and because all CA SRM views are completely customizable, reports are also completely customizable. For example, in the Network Storage folder of the Object Tree, expanding Computers displays several predefined views. One of these views is Computers at Risk, as shown in the following example:

This preconfigured view alerts you to those computers in the CA SRM database that have the least amount of free space. This view presents any computer that has more than 70 percent of its total space occupied in yellow; those with more than 85 percent of their space occupied in orange; and those with more than 95 percent of their space occupied in red. You can generate a report on this view and schedule it to run at any interval, then send it to the printer, an email recipient, the Web, and so on.

You can easily modify any view. For example, if you want the cutoff point to be 85 percent instead of 70 percent, you can modify the current view to exclude the additional computers by choosing View Definition from the View menu. Running a report on the modified view instantly shows the changes you made.

You can also run a report based on a query that you have defined. When you define a query, CA SRM creates a view automatically in the appropriate folder of the Object Tree. You can then run a report on this view, just as you would run a report on any other view.
Attention Messages

CA SRM calls messages *attentions*. The most common attention notifies managers that an executing service has terminated. The system can also issue operational attentions that require actions and acknowledgments on the part of the operator. For example, an attention may ask the operator to add paper to a printer or confirm that the service should overwrite an existing file while exporting data.

The following mechanisms distribute attentions:
- Messages sent to the CA SRM Monitor
- Email messages
- Entries in the Windows Event Log on the Application Server
- Simple Network Management Protocol (SNMP) traps

CA SRM supports SNMP traps (also called alerts). The SNMP agent running on the Application Server sends unsolicited notification messages to SNMP management workstations.

Enterprise Definition Language

CA SRM lets you browse through the various CA SRM objects and select them directly as sources for services. However, advanced users can specify the queries in the CA SRM special purpose language, Enterprise Definition Language (EDL).

EDL is an efficient way of manipulating database objects. The more complex the storage monitoring task, the more you need to use EDL statements to define it.

Each CA SRM object has a set of appropriate attributes (for example, the attributes of the object FILE are size, creation date, last access date, and so on). EDL lets you build relational expressions that include CA SRM objects, their attributes, and their relationship to other objects. For example, the following conditional statement returns the list of directories owned by the user JBROWN:

```
DIRECTORY WHERE DIRECTORY_OWNER_NAME = "JBROWN"
```

You can save EDL expressions under a class name. Classes are an efficient way of supplying parameters to service definitions.

MS SQL Server

CA SRM utilizes Microsoft SQL Server as the database server.
Chapter 2: Configuring CA SRM

Perform the following tasks to enable CA SRM to manage your storage environment:

- Register the objects in your storage environment, for example, domains, computers, and volumes.
- Define the tasks you want CA SRM to perform. In CA SRM these tasks are referred to as services.

After you have defined the objects that you want CA SRM to manage and the services you want it to perform, you can do the following:

- Configure email
- Configure weekends and holidays on the Application Server
- Configure the Application Server as a Windows service

**Note:** You may also need to define classes for query services. For more information about defining classes for query services, see the CA SRM Basic Techniques section in the *CA SRM User Guide*. 
The following diagram illustrates how a Storage Administrator can configure CA SRM to manage the storage environment:

This section contains the following topics:

- **Start the CA SRM Components** (see page 41)
- **Register Managed Objects** (see page 42)
- **Create Organization, Location, and Contact** (see page 42)
- **Configure Services** (see page 43)
- **Configure SNMP Alerts** (see page 45)
- **Configure Email** (see page 47)
- **Configure Schedules on the Application Server** (see page 50)
- **Maintain Policy** (see page 52)
- **Run the Application Server as a Windows Service** (see page 54)
Start the CA SRM Components

To configure CA SRM, start the Application Server (see page 41) and Windows Client (see page 41). To monitor the services that you run, start the Activity Monitor (see page 42).

Start the Application Server

You do not need a User ID to start the Application Server, since you log in as an administrator. You can also start the CA SRM Application Server as a Windows service.

Note: For more information about Windows service, see the Run the Application Server as a Windows Service (see page 54) section.

- Start the CA SRM Application Server by clicking Start, Programs, CA, Storage Resource Manager, Application Server.

Note:
- We recommend that when the CA SRM Windows Client is running, define a User ID and password. To do this, from the CA SRM Windows Client, select Tools, User Manager, and click the Add User icon.
- For security reasons, change your password regularly.

Stop the Application Server

Stop the Application Server by right-clicking the Application Server icon on the Windows taskbar and select Terminate.

Start the Windows Client

You do not need a User ID to start the Application Server, since you log in as an administrator. However, if you add other users, log in with a user ID and password.

- Start the CA SRM Windows Client by clicking Start, Programs, CA, Storage Resource Manager, Windows Client.

  The CA SRM Client dialog and CA SRM Object Tree dialog opens.

Note: If only one server is defined, the CA SRM Windows Client starts automatically; however, if more than one server is defined, select the server to which you want the CA SRM Windows Client to connect.
Start the Activity Monitor

The Activity Monitor monitors the execution of CA SRM services. Select Activity Monitor from the Open Systems menu to display the Activity Monitor.

Troubleshooting the Active Monitor

If the computer's host name is not the same as its NetBIOS name, the Activity Monitor does not start, and you get the following error:
Initialization error in:InitMRT. Application Server is not responding.

To resolve this issue, change the host name to match the NetBIOS name. You can view the computer's NetBIOS name by entering the following command at the command prompt:
nbtstat -n

Register Managed Objects

CA SRM provides an intuitive wizard that lets you register managed objects easily.

Follow these steps:

1. From the Windows Client, select Open Systems, Register.
2. Select the appropriate object type.
3. Follow the wizard’s instructions to complete the registration.

When you define objects in the CA SRM database, CA SRM automatically performs the associated tasks with managing these objects.

Create Organization, Location, and Contact

Add an Organization

You can add an organization or can select an organization from the drop-down list on the Set Organization and Location dialog.

Follow these steps:

1. Add the details of the new organization and click OK.
   The new organization is added to the list.
2. (Optional) Click New Contact (see page 163) to add a contact.
Add a Location

You can add a location or can select a location from the drop-down list on the Set Organization and Location dialog.

Follow these steps:

1. Add the details of the new location and click OK.
   The new location is added to the list.
2. (Optional) Click New Contact (see page 163) to add a contact.

Add a Contact

You can add a contact or can select a contact from the drop-down list on the Set Organization and Location dialog.

Follow these steps:

1. Type the name, telephone number, and email address of the new contact.
2. You can access your default address book by clicking the To: Button and selecting the email address from there.
3. Click OK.
   The new contact is added to the list.

Configure Services

You can use the CA SRM browsing facilities to display basic network data quickly. However, if you want to customize the view, establish services and procedures that meet your specific needs.

You can define and save simple or complex storage management operations and schedule them for execution periodically or on demand.

Note: For more information about available services, see CA SRM Services in the User Guide.
Create Procedures

You can group individual services into a procedure. A procedure executes these services in the sequence you specify.

Follow these steps:
1. Start the Windows Client.
2. From the Object Tree, expand Services, and then select Procedures.
3. Right-click Procedures and select New.
4. Type the name of the procedure in the Procedure dialog.
5. (Optional) Add a description of the procedure.
6. Click OK.

The Procedure table opens.

7. (Optional) Select Browse services from the Configuration menu, to add services to your procedure.

The Services dialog opens listing all the defined CA SRM services.

8. (Optional) To add a service to the current procedure, highlight it and click the Include Selected Objects button. Rename the selected service before you can include it in the procedure.
Configure SNMP Alerts

CA SRM includes a Management Information Base (MIB) file that defines the structure of SNMP traps. You can configure CA SRM to generate SNMP traps.

You can use the MIB to integrate CA SRM with Network Management solutions that support SNMP.

**Note:** CA SRM supports SNMP through the supplied MIB and the ability to issue SNMP traps. CA SRM does not include an SNMP agent and does not support get or set SNMP operations.

**Important!** To issue SNMP traps (alerts), SNMP services must be installed and operational on the computer on which the Application Server is installed.

Perform the following tasks to configure the SNMP alert component of CA SRM on the Application Server:

- Add the Windows SNMP service. For more information, see your Windows documentation.

- [Customize the Windows SNMP service](#) (see page 46).

- [Customize the SNMP alerts](#) (see page 46).

- [Test the SNMP configuration](#) (see page 47).
Customize the Windows SNMP Service

Follow these steps:

1. From the Windows Control Panel, select Administrative Tools, Services.
   The Services dialog opens.
2. Select the SNMP service that you want to establish as an interactive service.
   The Service Control window opens.
3. Click the Startup tab and check the Allow Service to Interact with Desktop check box.
4. Click the Traps tab and type the SNMP community name in the Community Name field.
   Note: By default, the community name is Public.
5. Click Add and type the Trap Destination.
   The Trap Destination is the computer to which you want to send traps. For example, you could enter the computer that has Unicenter® event management components that are installed and operational, or the computer operating your network management product.
6. Using the standard Service Controls, stop and restart the SNMP service to enable the changes.

Customize SNMP Alerts

You can customize the contents of the SNMP traps that are issued by the CA SRM Application Server. To customize the SNMP alerts, edit the NOTIFY.INI file, which is at ...
\Windows\System32.

You might find several settings in this file, however, change only the following two settings:

Application Server Description
Assigns a unique string to each Application Server running in your environment and identifies the specific Application Server that issued a given SNMP trap.
Default=CA SRM Application Server

Contact Person
Assigns a unique string to each Application Server running in your environment and identifies the contact person to be contacted when an Application Server issues an SNMP trap.
Test the SNMP Configuration

Follow these steps:

1. Activate the CA SRM SMPMGR.EXE Trap Manager from \Software\Bin on the Application Server computer.
   
   **Note:** The Trap Manager requires SNMP. Although the Trap Manager service is installed on computers with SNMP, it does not start automatically.

2. Click Send Alert to send an alert to your SNMP Manager.

3. Verify that the CA SRM SNMP Manager you activated in Step 1 received the alert.

Configure Email

CA SRM uses the following components to handle email:

**Application Server** (see page 47)

Sends emails defined in the Attention dialog for CA SRM services, for example, Automate

**CA SRM Windows Client** (see page 49)

Sends emails defined in the Output Action dialog, for a table or view in the Object Tree

Configure Application Server Email

The Application Server sends email using the following protocols:

- Messaging Application Programming Interface (MAPI)
- Simple Mail Transfer Protocol (SMTP)

By default, the Application Server uses SMTP and supplies its own SMTP server. However, you can configure the Application to use MAPI, or to use a different SMTP server.
If you use MAPI mail, you can configure the Application Server to send email to multiple recipients using the following modes:

**One email to each of several recipients**

Selecting this option sends the same email individually to each recipient. The list of other recipients appears in the body of the message.

**One email to all recipients**

Selecting this option is more economical, although it has the disadvantage of not sending the emails if one or more addresses on the list is incorrect.

**Note:** If the recipient list contains one or more invalid addresses, you get an error message. If you send multiple emails, the error message includes a list of the email that was not sent. If you send a single email to multiple recipients, the error message contains no such list.

**Follow these steps:**

1. Right-click the Application Server icon on the Windows taskbar and select Show.

   The Application Server toolbar opens.

   **Note:** When the Application Server is running, the icon is activated. If the Application Server is not running, select Start, Programs, CA, Storage Resource Manager, Application Server.

2. Click Options on the Application Server toolbar.

   The CA SRM Startup Options dialog opens.

   If you are using MAPI mail, go to Step 4. If you are using SMTP mail, go to Step 5.

3. (Optional) If you are using MAPI mail, type the profile name you created in a MAPI-compatible mail client in the Profile text box, and the password used by the profile in the Password and Confirm text boxes.

4. (Optional) If you are using SMTP mail, do one of the following:

   ■ If you want CA SRM to supply its own SMTP server, select Use SMTP Mail and check Act as SMTP Server.

   ■ If you want to use your company’s mail server, select Use SMTP Mail and type the IP address of your company’s SMTP Server. Type the User Name and Password to access this server.

5. Click OK.

You have now configured the Application Server email.
Test Email Setup

Follow these steps:

1. From the TroubleShoot menu of the CA SRM Application Server GUI, select Send Mail.
   The CA SRM Mail Sender dialog opens.
2. Type the name of a valid mail recipient, subject, and message text in the respective text boxes.
   Note: To simplify checking the delivery, you can address the mail to yourself.
3. (Optional) If you want to add an attachment, click Attach and select the document that you want to attach.
4. Click Send to send the message, then Close to exit the Mail Tester dialog.
5. Select Logs from the Actions menu of the CA SRM Application Server.
   The Operation & Error Messages dialog opens.
6. Check the Errors pane for error messages relating to e-mail.
7. (Optional) Verify that the test message was delivered successfully.

CA SRM Windows Client

The CA SRM Windows Client sends email using SMTP.

Note: You cannot send email from the CA SRM Windows Client using MAPI.

The CA SRM Windows Client supplies its own SMTP mail server. However, you can configure the CA SRM Windows Client to use your company mail server.

Note: For more information about using your company mail server, see the online help.

CA SRM uses the same login security to access the mail server as that defined for the user to access the CA SRM Windows Client.
Configure Schedules on the Application Server

Many organizations have unique scheduling requirements for weekends and holidays. You can tailor your weekend and holiday scheduling with CA SRM.

**Follow these steps:**

1. Right-click the Application Server icon on the Windows taskbar and select Show.
   
   The Application Server toolbar opens.

   **Note:** When the Application Server is running, the icon is activated. If the Application Server is not running, select Start, Programs, CA, Storage Resource Manager, Application Server.

2. Click Options on the Application Server toolbar.

   The CA SRM Startup Options dialog opens.

3. Click the Weekend tab. Check the check boxes next to the day or days observed as a weekend in your organization.

   **Note:** By default, Saturday and Sunday are selected.
4. Click the Holidays tab. The Defined Holidays panel lists the days specified as holidays by your organization. Holidays appear in the Holiday Descriptions list.

**Note:** If you click a holiday, its definition (expressed in EDL format) appears in the EDL Definition text box.

**Example:** The following image example shows the Holidays tab with Christmas information specified:

![Holidays Tab Example]

5. (Optional) To add an unlisted holiday, click New and type a description of the holiday and its EDL definition in the appropriate fields.

**Note:** For more information about EDL definitions, see the Enterprise Definition Language in the User Guide.

6. (Optional) To remove a holiday, select the holiday and click Delete.

7. Click OK.

The schedules on the Application Server are configured now.
Maintain Policy

The maintenance policy manages the amount of data that is retained by the collector. CA SRM calculates an average for the data objects that are based on a time that you determine and keeps only this average value. For example, if you collect once a day, you can consolidate those daily values into a single weekly value.

Each Application Server holds only one maintenance policy. However, you can modify the details of the policy for each object, so that each object has its own version of the policy.

Modify an Object's Maintenance Policy

You can modify the maintenance policy of an object to control the data consolidation and retention of that object.

Follow these steps:

1. Select Maintenance Policy from the Open Systems menu.

   The Modify Maintenance Policy dialog opens.
2. Select the object from the Object/Query name list and click Modify.

A dialog that allows you to change the policy for the selected item appears.
3. Modify the following fields to modify the policy.

**Consolidate records from every time slice of \( n \) units into one record**

Specifies the amount of data you want to combine into a single record. You can consolidate by the following time units:

- Minutes
- Hours
- Days
- Weeks
- Months

**While leaving the last \( n \) units intact**

Specifies the amount of data you want to retain.

For example, if you specify a value of one week, the policy consolidates all records together into a single average value except for the previous week.

4. Click OK.

The new policy is assigned to the object.

---

**Run the Application Server as a Windows Service**

You can run the Application Server as a Windows application or as a Windows service. The default mode is to run as a Windows application. However, we recommend that you run the Application Server as a Windows service because service mode is more secure.

**Note:** If the Windows user logs off when running the Application Server as a Windows application, the Application Server terminates.
Change the Application Server Mode and User Details

Ensure that the Application Server is not running. Shut down the Application Server by right-clicking the Application Server icon on the Windows taskbar and selecting Terminate.

Follow these steps:

1. From the Start menu, select Programs, CA, Storage Resource Manager, Utilities, Application Server Configuration Utility.

   The Application Server Configuration wizard runs and displays information about the mode in which the Application Server is running.

   The following example shows an Application Server defined in Standard Mode:

   ![Application Server Configuration Window]

   Application Server Configuration Utility modifies the Application Server operation mode. You can choose to activate the Application Server in interactive (Standard) mode, or as a Windows service. Click Next to continue.

   Current Settings:

   - Application Server is currently defined to run in Standard Mode.
   - The following Windows security information will be used:

     - User Name:
     - Domain:
   - To change the Application Server mode click NEXT

2. Click Next.

   The Mode Selection dialog opens.

4. Type the Windows login information of the user whose access rights are used by the Application Server, when configuring the Application Server to operate as a Windows service.

   **Note:** This user does not have to be the same user as the one configuring or activating the Application Server. However, the user must have the same scope (for example, domain or local) as the currently logged-in user.

   (Optional) You can change this user information (for example, users may change their passwords) using following steps:
   a. Switch to standard mode
   b. Switch back to service mode

5. Click Next.

   The Summary dialog displays the settings you selected.

6. Click Next and then Finish to complete the setup.

---

**Start the CA SRM Application Server as a Service**

Ensure that the Application Server is not running. Shut down the Application Server by right-clicking the Application Server icon on the Windows taskbar and selecting Terminate.

**Follow these steps:**

1. From the Windows Control Panel, open the Services dialog and select the CA SRM Application Server.
2. Click Startup and select Automatic, if you want the Application Server to start every time the computer is rebooted.
3. Click Start to start the Application Server as a service.

---

**Work with the Application Server in Windows Service Mode**

When you have configured the Application Server to run as a Windows service, the Application Server icon does not appear in the Windows taskbar.

You can control the behavior of the Application Server through the Services dialog, as in the same way you control any other Windows service.

**Note:** For more information about controlling Windows services, see your Microsoft documentation.
Access the Services Dialog

To access the Windows Service Control, click Start on the taskbar, and select Settings, Control Panel, Administrative Tools, and Services.

**Important!** Do not pause the Application Server from the Services dialog of the Windows Control Panel.
Chapter 3: Managing Network Storage Objects

CA SRM manages many types of network storage objects. CA SRM keeps information about the attributes of the objects and the relationships between the objects. This chapter describes how you can manage the standard network storage objects provided with CA SRM.

Note: For more information about supported platforms see the documentation on the CA SRM software distribution CD-ROM or access the CA web site at ca.com.

This section contains the following topics:

- Network Storage Objects (see page 59)
- Storage Analysis Objects (see page 62)
- Data Collection (see page 67)
- Register New Objects (see page 70)
- Register Windows Computers (see page 70)
- Register UNIX and Linux Computers (see page 89)
- Register NetWare Computers (see page 99)
- Register Indirectly Collected Computers (see page 109)
- Define a Query Service (see page 115)
- Define an Automate Service (see page 120)
- Update the CA SRM Agent (see page 124)
- Fabric Full Path Analysis (see page 125)

Network Storage Objects

CA SRM manages the following Network Storage objects:

- **Domains**
  - Network domains as defined by the supported operating systems.

- **Computers**
  - NetWare servers, Windows servers or computers, and UNIX file servers.

- **Shares**
  - Objects that represent Windows shared directories.

- **Mounted Drives**
  - The point at which the network storage object is installed. It can also refer to a partition without an allocated drive letter.
Volumes
Logical storage entities as defined by the supported operating system.

Volume Groups
(UNIX only) Object represents collections of physical disks managed as a single resource by the Logical Volume Manager (LVM).

Physical Disks
Object represents physical drives on which data resides. Physical disks are usually subdivided into partitions that can map to different logical volumes.

Files
Files on any network server. CA SRM collects both size and space information about files:
- File size shows the amount of actual data in the file.
- File space is the space occupied by the file on the disk. File space is less than (smaller than) file size if the file is compressed or if it is a sparse NetWare file. File space typically exceeds file size by an amount that depends on the block size used by the file system.

Users
Object represents network users.

Note: Do not confuse network users with CA SRM Users. The supported operating systems define network users while CA SRM users are users with the authority to log on to CA SRM.

Quotas
Objects that represent disk allocation and usage by users.

Traps
Objects that collect specific data and send it to management consoles. You can send traps to one or more consoles. Trap data can include errors, critical errors, and emergency notifications. You can specify the type and severity level of traps to collect.

NetApp
Objects that represent storage items on Network Appliance filers (NetApp filers). For more information about managing NetApp filer objects, see the chapter “Managing Network Appliance Filer Objects.”
Disk Arrays

Objects that represent disk array storage items. For more information about managing disk array objects, see the chapter “Managing Disk Arrays.”

SAN Fabric

Objects that represent SAN storage items. For more information about managing SAN network objects, see the chapter “Managing SAN Fabric.”

UNIX Volumes

CA SRM does not collect certain information about the following Solaris and Linux volumes; therefore, you cannot perform a query on them.

Solaris:

- Proc—These are not real files
- Swap—Swap space
- Tmpfs—Temporary file system
- Autofs—Auto mount
- FD—Floppy disks

Note: On Solaris the /tmp is of type swap; therefore, information is not collected about it.

Linux:

- Floppy disks
- Proc
- Swap
- Devpts
- Devfs
- Supermount file system types

UNIX Volume Naming Conventions

In order to see all platforms the same way, CA SRM uses the Universal Naming Convention on all UNIX paths. To make sure all paths comply with this standard, a special character "^" is used in place of both forward, "/", and back slashes, "\".
Storage Analysis Objects

CA SRM collects storage data about file systems automatically and uses the information to populate a set of storage analysis reports for direct and indirect Windows computers, UNIX, and NetApp volumes.

The storage analysis reports are grouped under a Storage Analysis “object” in the Object Tree. To access the storage analysis reports, expand the Network Storage folder, then expand the Storage Analysis folder.

You can use the Storage Analysis reports to monitor your volume and file data. The reports calculate file-based statistics at the volume level and provide additional data about the distribution of the files on the volume. They also provide total data for all registered storage analysis objects, for example, NetApp filers, disk arrays.

The data collection traverses the files on each volume, starting at the root directory, and rolls each file into a number of condition-based groups. The data collection provides statistics for the following:

- Age or size distribution of files
- Aggregates on a file attribute, like ownership or file type (extension)
- Directory size totals
- Volume totals

A group is calculated for the following values:

- Size (sum of file sizes)
- Space (sum of space files occupy)
- Count (number of files in the group)
- Size percentage of the overall volume or share file size
- Count percentage of the overall number of files on the volume or share

The bucket sizes break down as follows:

Zero
- Less than 1 byte

Tiny
- Less than 32,768 bytes (8k)

Small
- Less than 131,072 bytes (128k)

Medium
- Less than 1,048,576 bytes (1 MB)
Large
Less than 16,777,216 bytes (16MB)

Huge
Less than 134,217,728 bytes (128 MB)

Gigantic
More than 134,217,727 bytes

The bucket ages break down as follows:
New
Less than 1 day

Current
Less than 7 days

Recent
Less than 30 days

Old
Less than 180 days

Mature
Less than 730 days

Ancient
More than 729 days

Each record statistic includes the following administrative attributes:

- Volume name
- Group name
- Server name

CA SRM saves the calculated statistics in the database in separate tables for each type of statistic. CA SRM creates these tables when you install the product. The tables have a fixed definition and function like other object tables.

The storage analysis reports are predefined. You cannot define new ones; however, you can define which statistics to collect.

Collecting data and calculating statistics can take time and load the computer; therefore, CA SRM does not collect all information by default. On Windows computers, you can use the change journal to expedite the process.
Define File Level Collection and Storage Analysis Statistics

You can specify the data collection settings to define the file level collection and storage analysis statistics that you want to collect. You can specify these settings even during the Computer Registration.

From r12.7 SP1, CA SRM supports the file and storage analysis on the volumes level apart from the computers level. By enabling the File and Storage Analysis settings on the volumes, you can set the custom storage analysis flag on the required volumes. In addition, you can disable the file storage analysis on the unwanted volumes.

For related information, see the Setting Data Collection Properties.

Follow these steps:

1. Open the CA SRM Windows Client main window.
   The File Level Collection and Storage Analysis Settings dialog opens.
3. Select one of the File Storage Analysis Modes from the dropdown menu.

   **Computer**

   Selecting this option displays all the listed computers and NetApp filers (NAS devices) for which you can set the file storage analysis.

   **Note:** The storage analysis flags are applied to all the corresponding volumes of these selected computers / NetApp filers when you save them.
Volumes

Selecting this option displays all the volumes (volumes of computers / NetApp filer shares). By enabling file and storage analysis on the volumes level, you can perform the following operations:

- Set custom storage analysis flags on required volumes
- Disable the file storage analysis on unwanted volumes

Note:

- By default, the volumes mode is selected.
- The file storage analysis is applicable only to the CIFS / Windows shares of NetApp filers. We recommend you to use the Indirect Collection (see page 112) to enable file storage analysis for NFS exports of NetApp filers.

![File Level Collection and Storage Analysis Settings](image)
4. Select the check box under the File Level Collection column.

This action allows you to select the settings under the Storage Analysis column.

**Note:** Enabling the File Level Collection flag, allows you to modify Storage Analysis flags as well as enables Volume Data Collection for the specific managed machine. Click a cell under the Storage Analysis option to view the list of analysis types available for the collection.

5. Select the check boxes corresponding to the statistics, you want to collect.

**Note:** If you enable the file level collection and check some of the storage analysis options, the statistics are collected only for the selected volumes. However, if you want to enable the same flags for all the volumes in a computer, use the Computer mode in the File Storage Analysis Mode drop-down.

6. Click the Save icon in the tool bar to save your settings.

**Example:**

If you have selected two computers (with ten volumes per computer) from the list, and have set the storage analysis flags. The storage analysis flags are saved for the corresponding (2 x 10 = 20) volumes of the selected computers.
Data Collection

CA SRM collects storage information about a computer through the CA SRM Agent. Use the CA SRM Computer Registration Wizard to install the agent on that computer.

For Windows servers, you can register a proxy collector from a computer running the Application Server and collect data using the Windows Management Interface (WMI). Data collected using the WMI collects only basic host information, such as volumes, physical disks, and partitions. It does not collect volume-based storage consumption statistics or quota information.

**Note:** If you collect data using the WMI, you can register only one proxy collector on each domain and that proxy collector must have administrative access rights to the remote computers.

Most operating systems support the CA SRM Agent; however, some UNIX-based systems do not. If you want to register a computer running an unsupported operating system, select the Indirect Collection option.

UNIX machines do not update owner information with ad-hoc collections. Collecting owner information is a very lengthy process, using Collect Now only updates the storage assets of the machine. The user information refreshes once daily.

**Note:** To help ensure that the Windows Client displays the most recent data collection, refresh open user views.

Direct, Indirect, Agentless Data Collection, and Two-phase Data Collection

When you register computers, you have the option to select the type of collection. The most complete is direct collection. The direct collection is an option from the Managed computer. Using direct collection, you can collect the following information:

- Windows computers for:
  - Logical Volumes
  - Physical Disks
  - Partitions
  - Quota
  - Owners
  - Security Groups
Data Collection

- Shares
- HBAs
- HBA Ports
- HBA Ports Performance

- UNIX for:
  - Logical Volumes
  - Volume Groups
  - Physical Disks
  - Partitions
  - Owners
  - Security Groups
  - Mounted Drives
  - HBAs
  - HBA Ports
  - HBA Ports Performance

- NetWare for:
  - Logical Volumes
  - Owners
  - Security groups

If you register a computer to use direct collection, you can use file scanning search.

Agentless collection means CA SRM does not install the agent on the computer you want to register. This type of collection collects information about Windows computers for:

- Logical Volumes
- Physical Disks
- Partitions
When you register a computer as agentless, you cannot use file scanning search.

Indirect collection is a way to collect data from a computer with an operating system CA SRM does not currently support. Proxy collector does the indirect collection. This type of collection collects information about:

- Windows computers for Logical Volumes
- UNIX computers for Logical Volumes

When you register a computer using indirect collection, you can use file scanning search.

The two-phase data collection is done using SMI-S 1.02 and 1.1. Two-phase data collection means CA SRM executes the collected raw data on a proxy server without any application server database access and update database executed on the application server.

- Independent Data Collection—Using a proxy server, raw data is collected and executed on the managed server without any application server database access.
- Local Data Collection—The File Transfer Agents pulls the data from the managed object and updates and executes the collected data on the application server database.

The advantages of two-phased data collection are:

- Decentralized management
- Detached and local data collection

**UNIX Security**

The UNIX agent uses several security modes for various tasks:

- Installation security runs as root. This is required to deploy the installation scripts.
- System data collection runs as root.
- File data collection and automation services run under the user’s credentials. Therefore file information is limited by the user’s permissions. You can allow file data collection to run as root by setting the flag:
  
  `FILE_SEARCH_AS_ROOT=1` in the `rsc.conf` file.
- Automate cannot run beyond the user’s permissions and you cannot override this.
Register New Objects

After installing CA SRM, you should register the storage objects about which you want CA SRM to collect data. CA SRM can only collect information about those objects that have been registered in its database.

Use the CA SRM Computer Registration Wizard to register new computers. Before you perform the registration process, select the operating system of the computers you want to register, or nominate a proxy collector and select Indirect Collection. The option you select dictates how you proceed with the CA SRM Computer Registration Wizard. You can run the CA SRM Computer Registration Wizard from any Windows Client.

Activate the CA SRM Computer Registration Wizard

To activate the CA SRM Computer Registration Wizard from the Open Systems menu, select Register, Network Storage, and then Computers and Domains. Alternatively, from the Domains or Computers table, select the Configuration menu and click Register.

Register Windows Computers

To register a Windows computer with CA SRM, perform the following steps:

1. Check the prerequisites and pre-registration notes.
2. Select the operating system.
3. Select a domain and define domain security.
4. Select the computers to be managed.
5. Set the data collection properties.
6. Set data collection security.
7. Install the agent.

These steps are explained in the following sections.
Prerequisites and Pre-registration Notes

Use the following list to check for registration prerequisites:

- The CA SRM Computer Registration Wizard requires local administrative rights on the Application Server and on each computer that you want to manage.
- The CA SRM Computer Registration Wizard needs a basic level of security to collect operating system information from a target computer; therefore, you must ensure that you are logged onto the CA SRM Windows client computer as a domain user with Administrator privileges.
- To activate the CA SRM Computer Registration Wizard, you must have Administrator privileges to the computer you want to register. Use the following notes if you want to use the Microsoft model of resource and user domains:
  - If the Managed Computer domain trusts the Application Server domain, use the security of the Application Server domain.
  - If the Application Server domain trusts the Managed Computer domain, use security from the Managed Computer domain.
  - If both the Application Server domain and the Managed Computer domain trust domain X, use security from domain X.

  **Note:** If you cannot give Administrator privileges to the computer you want to register, for example, the computer belongs to a non-trusted domain, you must manually install the CA SRM Agent on the computer you want to register and then add it to the CA SRM database using the CA SRM Computer Registration Wizard. To install the CA SRM Agent, you can use the CA SRM installation CD. To manually install the CA SRM Agent, you can also select setup.exe from the following directory on the Application Server:

  \BrightStor\SRM Data\Database\Configuration\InstallAgent\NT

- If the collection process ends with an error:

  Logon failure: the user has not been granted the requested logon type at this computer.

  Verify that the domain user stored in CA SRM for the proxy server has all the privileges to login to the domain.

- Remote agent installation requires that the ADMIN$ administrative share exist on every target computer.
- To enable CA SRM to discover Windows domains, you must enable NetBIOS over TCP/IP using the Network Connections settings in the Windows Control Panel. For more information, see your Windows Systems Administrator.
- The maximum length of a file or directory path is 512 characters.
Use the following list to check for data collection prerequisites:

- The CA SRM agent requires the Log On Locally right. Users defined for data collection must have this right on every Windows computer managed by CA SRM.
- CA SRM uses standard Microsoft APIs to collect volume and user information. To enable data collection, the Windows user must be a member of one of the following:
  - Local Group Account (for every Managed Computer)—Authorized as an Account Operator or Local Administrator
  - Global Group Account (for every Windows domain)—Authorized as a Communication, Print, Backup, or Server Operator

The rights of the Windows user defined for data collection applies to file collection.
- CA SRM collects top-level administrative shares and registers them as volumes in the database.

**Firewalls**

If you are managing computers that cross enterprise firewalls, you must ensure that CA SRM components can communicate with each other. To do so, open the indicated ports on the firewall, and make any other changes noted.

- Between the Application Server and a Windows Managed Computer: the BOS port (as defined in BOS.INI, typically 1245) needs to be open in both directions.
- Between the proxy collector and the UNIX Managed Computer, make sure no other applications use the RSCD fixed port-7167.
  - One fixed port for the CA SRM UNIX Agent-7167.
    - Open this port on the firewall.

**Registering Windows Clusters**

To collect data from a Windows cluster or a clustered virtual server, you must register the following components of the cluster:

- All the physical nodes that belong to the cluster
- The cluster itself
- If an application such as Exchange or SQL Server is running as a virtual server, the clustered virtual server (that is, the physical drive on which the application resides)
The general steps you must take to register these pieces are outlined below:

1. Identify the nodes that belong to the cluster.

2. Determine how you should install the CA SRM Windows Agent on the nodes:
   - If the nodes belong to the same domain as the CA SRM Application Server, you can register the nodes using the Computer Registration Wizard.
   - If the nodes do not belong to the same domain as the CA SRM Application Server, you must manually install the CA SRM Windows Agent on each node using the installation media.

3. Using one of the methods described in the previous step, install the CA SRM Windows Agent to a local drive on each cluster node.
   
   **Note:** The Windows Agent must be installed on a local drive, not a clustered drive. The Windows Agent is not a cluster-aware application.

4. After installing the CA SRM Windows Agent on all of the nodes, register the cluster itself using the Computer Registration Wizard.

**Example**

Consider a Windows cluster in an Active/Passive configuration. The cluster has two nodes, A and B, and a SQL Server instance running as a virtual server on a shared disk. To collect information about this cluster, you must register the following pieces.

- Node A
- Node B
- The cluster itself
- The clustered virtual server

Additionally, if you wanted to collect application information from the SQL Server instance, you would need to register the instance using the Microsoft SQL Registration Wizard.

**Prerequisites for Windows Cluster Support**

CA SRM supports the collection of data from Active/Active and Active/Passive Windows clusters managed by Microsoft Cluster Server (MSCS). Cluster data can be collected from all platforms supported by MSCS. For more information about supported platforms or MSCS, visit [Microsoft’s web site](https://www.microsoft.com).

In addition, the CA SRM Windows Agent must be installed on each component of the cluster.
How Data is Collected from Clusters

Consider a Windows cluster in an Active/Passive configuration. The cluster has two nodes, N1 (active) and N2 (passive). N1 has the physical volumes C, D, E, Q and S. N2 has the physical volumes X and Y. The cluster has a quorum disk Q, and an Exchange virtual server is installed on a shared disk S.

Provided that you have registered the physical nodes, the cluster, and the virtual server, the following table describes how volume data is collected from the nodes, the virtual server and the cluster.

<table>
<thead>
<tr>
<th>Node</th>
<th>Volumes from which Data is Collected</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1</td>
<td>C, D and E</td>
</tr>
<tr>
<td>N2</td>
<td>X and Y</td>
</tr>
<tr>
<td>Cluster</td>
<td>Q</td>
</tr>
<tr>
<td>Virtual Server</td>
<td>S</td>
</tr>
</tbody>
</table>

Additionally, if you wanted to collect application-specific information from the Exchange server, you would need to register the Exchange server using the Exchange Registration Wizard.

Clustering Terms

Please see the following list for definitions of clustering terms used in the CA SRM documentation.

Cluster

The virtual entity that represents the two cluster nodes, which are working together as a single resource. The cluster functions as though it were a physical machine, with its own name and IP address, but is in fact only a representation of such an object.

When we refer to "the cluster" in the documentation, this is the object we are referring to.

Cluster Node

A physical computer system which has the Microsoft Cluster Service (MSCS) installed, and which belongs to a cluster.
Group

A set of resources, which may be dependent upon one another, defined and managed via MSCS. No resource can belong to more than one group, and a group can only belong to one node at any given time. For failover purposes, all resources in a group are treated as a single entity and failed over together.

For example, you might define a Web Server group that consists of the following resources:

- IIS
- Microsoft SQL
- A network name and IP address

Clustered Virtual Server

A group which contains a unique network name and an IP address, and therefore is accessible as though it were a physical server.

Note: Do not confuse clustered virtual servers with servers managed by virtualization software, such as VMware or Microsoft Virtual Server.
Select the Operating System

To select the operating system

1. From the Open Systems menu of the CA SRM Windows Client, select Register, Network Storage, and then Computers and Domains. You can also start the CA SRM Computer Registration Wizard by selecting Configuration, Register from the Computers table.

2. Click Next on the Welcome window. The Select Operating System dialog opens:

3. Select the Windows option button and click Next.
Select a Domain and Defining Domain Security

In the Selecting a Domain and Defining Security dialog, provide the name of the domain and the proper security credentials for the computers you want to register:

**CA SRM Computer Registration Wizard**

**Selecting a Domain and Defining Security**

Select the domain in which you want to discover candidate computers. Local administrative rights are needed to install CA SRM software on all computers that you want to manage.

- **Discover computers in domain:** Workgroup

- **Domain Administrative Security**
  - **User Name:**
  - **Password:**

- **Registration Type**
  - **Managed computers**
  - **Agentless computers**

- **IP Addresses**
  - **Use Host Names**
  - **Use Fixed IP Addresses**

- **Software destination location:** C:\Program Files\CA\EightStar SRM

The following list describes the fields on this dialog:

**Discover computers in domain**

Select the domain that contains the computers you want to register. You can register any number of computers in a given domain during each instance of the CA SRM Computer Registration Wizard, but you can only register computers from one domain at a time.

**User Name**

Enter the name of a user with at least Administrator privileges on the computers you want to register. Typically, users that are members of the Domain Admin group have Administrator privileges on all computers within a particular domain. If you want to register several computers in a domain, consider entering the name of a user with Domain Admin privileges.

**Password**

The password for the user name.
Registration Type

Specify whether this computer is a managed computer or an agentless computer.

If you select Managed computers, the CA SRM Agent is installed, which enables CA SRM to collect detailed data.

If you select Agentless computers, CA SRM collects basic data using WMI. You need to be an administrator on the Application Server, and a member of the local Administrator group on the target machine.

IP Addresses

Specify whether you want to use the host name or the numeric IP address for the computer.

Software destination location

Specify the location in which you want the CA SRM agent to be installed on the target computers.

When you finish entering this information, click Next to start the Discovery process.

Select the Computers To Be Managed

CA SRM’s Discovery feature searches your network for computers in the selected domain running the Windows operating system. When the process completes, CA SRM lists all eligible computers in the Candidates table of the Selecting Computers to be Managed dialog:
To select a computer for registration, highlight the computer in the Candidates table and click the right arrow. The computer moves to the To Be Managed table.

To remove a computer from the To Be Managed table, click the left arrows.

When you have added all the computers that you want to the To Be Managed table, click Next.

In addition, please note the following:

- When using the Windows Client on Vista to register Windows hosts, CA SRM may fail to discover any candidate hosts if the domain contains a large number of machines. This is due to a problem with the implementation of the "net view" command on Windows Vista. If this happens, you need to add each host manually. You can check for this problem by issuing the following command on the problem domain:
  
  ```
  net view /D:<domain-name>
  ```
  
  If this command fails, CA SRM cannot discover machines in the domain, and you must add them manually.

- The Discovery process may take a few moments to complete. How quickly CA SRM detects all computers in the selected domain depends on the size of the domain and the speed of your connection.

- If there is a computer that you want to add to the CA SRM database, but which is not listed in the Candidates table, you can add it manually in the next step.
Set the Data Collection Properties

On the Setting Data Collection Properties dialog, you can do the following:

- Specify the data collection frequency
- Specify whether to collect quota information about Windows computers
- Specify whether or not to collect file level data collection and storage analysis statistics
- Add a non-published computer to the list of computers to be managed
Specify the Data Collection Frequency

By default, CA SRM is set up to perform data collection once each day. To change how often CA SRM collects data for a particular computer, select the value in the Frequency column (Every 1 Day, for example). The Data Collection Frequency dialog opens.

Use the text boxes and drop-down menus to indicate how often you want CA SRM to collect data on the selected computer.

Example

To have data collected once each week at 5:00 p.m. on a Friday, follow these steps:

1. Change the value of the Every drop-down menu from Days to Weeks.
2. Change the value of the On drop-down menu from Any Day to Friday.
3. Check the Specific Time check box and enter the value for 5:00 p.m. in military time (17:00).
4. Click OK.

Collect Quota Information

Check the Collect Quota check box on the Setting Data Collection Properties dialog if you want to collect quota information about the selected computer. CA SRM collects storage quota limit information about a user-to-volume basis.

Important! Collecting quota information significantly increases the amount of time it takes to perform data collection on the selected computer. Ensure that you need this data before selecting this option.

Before you can collect quota data, you must enable quota management. To enable quota management, follow these steps:

1. Double-click My Computer.
2. Right-click the volume on which you want to collect quota information and select Properties from the pop-up menu.
3. Click the Quota tab.
4. Check the Enable quota management check box.

For more information about quota management, see your Microsoft documentation.
Add a Non-published Computer

The Discovery feature of the CA SRM Computer Registration Wizard detects only computers with physical IP addresses; therefore, some computers in the selected domain may not appear in the Candidates table.

To manually add a computer that was not detected by the CA SRM Computer Registration Wizard

1. From the Setting Data Collection Properties dialog, click Add Computer. The Non-published Computer dialog opens:

2. Enter the name of the computer you want to add and click OK. CA SRM adds the computer to the To be Managed table.

   To add more computers, click Another. CA SRM adds the computer to the To be Managed table, and the Non-published Computer dialog clears, letting you enter another computer name. When you finish, click OK.

3. Check the To be Managed table in the Setting Data Collection Properties dialog and verify that CA SRM was able to determine the computer's IP address. If CA SRM did not add the IP address, or if the address is incorrect, double-click the cell in the IP Address column and manually enter the computer's IP address.

Set Data Collection Security

From the Setting Data Collection Security dialog, enter the user name and password of a user with Administrator privileges on the computers you have selected to be managed. Click Next.

Set Organization and Location

You can add a location, organization or contact to the machine you want to register. All of these settings are optional.
Add a Location

To attach a geographic location to the computer or server, select one from the drop-down list. You can manually add a location by clicking New Location. Type the location information and select a contact in the Create New Location dialog.

Add an Organization

To attach an organization to the computer or server, select one from the drop-down list. You can manually add an organization by clicking New Organization. Type the organization name and select a contact in the Create New Organization dialog.

Add a Contact

Add a contact by clicking New Contact in the Organization or Location dialogs. Type the name, telephone number, and email address of the new contact person in the Create a New Contact dialog. You can access your default address book by clicking the To: button and select the email address from there. Clicking OK returns you to the New Location or New Organization dialog.

Install the Agent

The Summary dialog displays licensing information. Click Install to install the Windows Agent on the selected computers.

The Installation Progress appears and displays the progress of the CA SRM agent installation on the computers selected for registration.

To cancel the installation, select the computer and click Stop. To cancel the install on all computers, click Stop All.

When the installation is complete, click Finish. Click Close on the final wizard dialog.

Command Line Interface (COMPREG)

The Command Line Interface (COMPREG) is a mechanism that lets you register one or multiple computer(s) from a Windows command line. You can activate the Command Line Interface from the Application Server. It resides in the \SOFTWARE\BIN subdirectory under the directory in which you installed CA SRM.
The Command Line Interface offers the following features:

- Activates a procedure or a service that was defined and executed using the HOLD timing condition
- Provides security consistent with the operating system environment
- Passes EDL parameters to the service being executed
- Provides online help assistance
- Provides error logging to a file

You can execute the Command Line Interface in two modes, each controlled by command line parameters:

- **Synchronous mode**—In which the Command Line Interface waits until the launched service or procedure terminates. The execution of the Command Line Interface is successful if the specified service or procedure terminates normally. In synchronous mode, the Command Line Interface logs the success or failure of the service or procedure.

- **Asynchronous mode**—In which the Command Line Interface terminates immediately after the service or procedure is scheduled. The execution of the Command Line Interface is successful if the specified service or procedure was found and started.

If the execution of the Command Line Interface fails, it creates a result file that contains a description of the problem.

The default name of the file is COMPREG.LOG and you can find it in the following directory:

- For 32 bit operating systems: C:\Program Files\CA\Brightstor SRM\Bin.
- For 64 bit operating systems: C:\Program files(x86)\CA\Brightstor SRM folder\Bin
  
  **Note:** This directory path for 64-bit operating systems is for fresh installations only.

**Command Line Interface Execution**

If the [Command Line Interface parameters](page 87) pass verification, the Command Line Interface contacts the Application Server and requests the execution of the service or procedure according to command line parameters. The service or procedure to be invoked must be defined (including clicking EXECUTE) before the Command Line Interface execution. You must use a special timing construct (HOLD keyword) in the service definition. When you see this keyword to specify the timing condition, the service is built but not scheduled.

**Note:** You can view the services with timing condition HOLD through CA SRM Monitor under Services on Hold.
Register Windows Computers

The Application Server checks whether the requested service or procedure exists. If not, it returns an error. Then the Application Server modifies the timing specified in the Command Line Interface parameters for immediate execution, schedules the service, and returns control to the Command Line Interface.

After the service is scheduled, and if the Command Line Interface was invoked in asynchronous mode, the Command Line Interface deletes the result file and exits. If it was invoked in synchronous mode, the Command Line Interface waits for the service or procedure to complete and deletes or creates the result file depending on the completion code.

Usage:

```
-s AS -h Host -i IP -d Domain -o System
-u User -p Password -t DomainType -w timeout -b NIS -v [StorageAnalysisFlags]]
```

Example

The following example illustrates command line interface execution:

For 32-bit: C:\Program Files\CA\BrightStor SRM\Bin>compreg.exe
For 64-bit: C:\Program Files(x86)\CA\BrightStor SRM\Bin>compreg.exe

```
-s 155.35.58.50 -h sheko01 -i 2k3ee -i 155.35.59.104 -d ca.com -o Windows -u ganba01 -p xxxxx -w 5000
-v 1111111111
```

Session started at: 08/04/08 12:34:17
Log file name : C:\BrightStor SRM Data\Database\Log\cse_err.log
Machine name : ganba01-test01.ca.com
Starting Computer Registration...
Checking local host name and IP address
Checking user security...
Getting information from local BOS
Registering SHEKO01-2K3EE on Application Server 155.35.58.50
Successfully Completed

Note: This directory path for 64-bit operating systems is for fresh installations only.

If the Command Line Interface command line is missing one or more variables, the service is not executed and an error message is written to the log file.

If the Command Line Interface command line contains extra variables, the service executes and an error message displays in the Application Server error log window.
Command Line Interface Parameters

To prevent unauthorized users from executing the Command Line Interface, it can be activated only from the command line of the computer running the Application Server.

We strongly recommend that you lock the Application Server using a screen saver with a password.

Use the following syntax to activate the Command Line Interface:

For 32-bit: `C:\Program Files\CA\BrightStor SRM\Bin>compreg.exe`
For 64-bit: `C:\Program Files(x86)\CA\BrightStor SRM\Bin>compreg.exe`

`-s AS -h Host -i IP -d Domain -o System`  

**Note:** This directory path for 64-bit operating systems is for fresh installations only.

The following describes the parameters:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-s</td>
<td>Specifies the Application Server address.</td>
</tr>
<tr>
<td>-h</td>
<td>Specifies the Client host name.</td>
</tr>
<tr>
<td>-i</td>
<td>Specifies the Client IP Address.</td>
</tr>
<tr>
<td>-d</td>
<td>Specifies the Domain\NIS name.</td>
</tr>
<tr>
<td>-o</td>
<td>Specifies the Operating System (Windows\Unix)</td>
</tr>
<tr>
<td>-u</td>
<td>Specifies the User Name,</td>
</tr>
<tr>
<td>-p</td>
<td>Specifies the User Password.</td>
</tr>
<tr>
<td>-t</td>
<td>Specifies the Domain Type (Domain\Workgroup), default=Domain.</td>
</tr>
<tr>
<td>-w</td>
<td>Specifies the timeout interval (seconds), default=3 minutes.</td>
</tr>
<tr>
<td>-b</td>
<td>Belongs to a security NIS (Yes/No), default=No.</td>
</tr>
<tr>
<td>-v</td>
<td>Enable volume collections for file-level data and Specify storage analysis flags.</td>
</tr>
</tbody>
</table>
Storage Analysis Flags: XXXXXXXXXXX where each X is either 0 or 1

1-Age Analysis by Access Date
2-Age Analysis by Modify Date
3-Size Analysis
4-File Extension Analysis
5-File Extension Analysis by Owner
6-Security Group Analysis
7-Directory Analysis
8-Owner Analysis
9-Size Analysis by Owner
10-Age Analysis by Owner (Access)
11-Age Analysis by Owner (Modify)

Example

10001000001 represents storage analysis flags (1,5 and 11) are enabled.

Note:
- Command line parameters are case-insensitive. You can abbreviate them up to one letter (for example, /p instead of /PROC).
- '\' can be used instead of '/'.

Register UNIX and Linux Computers

To register a UNIX or Linux computer with CA SRM

1. Check the prerequisites and preregistration notes.
2. For Linux computers, verify that the necessary GCC libraries are installed on the target computers.
3. Select the operating systems of the computers you want to register.
4. (Optional) Set the security scheme. This step applies only if the computer belongs to a security Network Information System (NIS).
5. Select the computers to be managed.
6. Install the agent.

These steps are explained in the following sections.

Prerequisites and Preregistration Notes

Before registering any UNIX or Linux computers, check the following list of prerequisites and preregistration notes.

- You must have the SNMP daemon or service installed on your computer to enable CA SRM to automatically discover UNIX computers.
- CA SRM does not collect Domain Owners from NIS environments because it regards all owners in NIS environments as local.
- CA SRM reports on raw partitions (slices on which no file system is mounted) on all supported UNIX platforms.
- Daemon installation is available on all supported versions of AIX, Solaris, HP-UX 11.x, and Linux versions 2.4.3 and above. Inetd installation is available only on AIX and HP-UX 11.x.
- The Solaris agent always runs as a daemon.
- Volume Statistics on Veritas File Systems are not supported for volumes with layout version 6. This version is the default for Veritas VM 4.1. To find out the layout version of a volume, use the following Unix command:
  
  fstatp
Ensure your Solaris system has all of the required operating system patches installed. If you are running Solaris 8 or 9, the patch requirements are as follows:

Patches for Solaris 8
- Solaris 8 SPARC 108434-17, 108435-17
  - 108434-17: SunOS 5.9: 32 bit Shared Library Patch for c++
  - 108435-17: SunOS 5.9: 64 bit Shared Library Patch for c++

Patches for Solaris 9
- Solaris 9 SPARC 111711-11, 111712-11
  - 111711-11: SunOS 5.9: 32 bit Shared Library Patch for c++
  - 111712-11: SunOS 5.9: 64 bit Shared Library Patch for c++

Ensure your HP-UX or Solaris or AIX computers have SSH installed to have secured mode of file transfer in your registered UNIX computers.

Note: Initially, the registered UNIX computers try to transfer the files in a secured mode using the secured file transfer protocol (SFTP and SCP). If the secured mode is disabled, then using the unsecured mode (FTP), the files are transferred and pushed to the registered UNIX or Linux computers.

The following SRM supported versions of UNIX or LINUX do not have SSH by default that disables the secured mode of files transfer. You must explicitly install the OpenSSH suite on the following versions of Unix or Linux computers to enable secured file transfer.
- HP HPUX - 11iv1 (PA-RISC 32bit) 11.11
- Sun Solaris - (SPARC 32bit) 8
- IBM AIX - 32-bit 5.3
- IBM AIX - 32-bit 6.1
Verify the GCC Libraries for Linux

In order for CA SRM to successfully collect data from a Linux computer, the computer must have the GNU Compiler Collection (GCC) libraries compiled and installed. If the computer does not have these libraries, CA SRM will not be able to collect Volume Statistics information or run file queries on the computer, and you will receive errors if you try to do so.

To ensure that you have the required GCC libraries and that they are set up correctly, you must follow these steps:

1. Verify that you have the required native libraries needed to compile the GCC libraries.
2. Create symbolic links to some of the native libraries.
3. Compile the GCC libraries on the target computer.
4. Ensure that all users of the system have read and execute permissions on the GCC libraries.
5. (Optional) Confirm the installation.

Verify the Presence and Locations of the Native Libraries

The following table lists the native Linux libraries that need to exist on the target system before you can compile the GCC libraries. You must have both the native libraries and the GCC libraries installed on the system to collect Volume Statistics and run file queries on the target system.

Make sure that the given libraries exist in the specified locations.

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Native Library</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linux</td>
<td>libstdc++.so.6</td>
<td>/usr/lib</td>
</tr>
<tr>
<td></td>
<td>libgcc_s.so.1</td>
<td>/lib</td>
</tr>
</tbody>
</table>

Create Symbolic Links

Before compiling the GCC libraries, you must create symbolic links to some of the native libraries. To create the symbolic links, enter the following command:

```
ln -s libgcc_s.so.1 libgcc_s.so
```
Compile the GCC Libraries

In order for CA SRM to successfully collect data from a Linux computer, the computer must have the GNU Compiler Collection (GCC) libraries compiled and installed. If the computer does not have these libraries, CA SRM will not be able to collect Volume Statistics information or run file queries on the computer, and you will receive errors if you try to do so.

You must have version 3.4.5 of the GCC libraries on each Linux system you want to register. Version 3.4.5 is the only version of the GCC libraries that CA SRM supports.

If you do not have the GCC libraries, you can download them from the GCC website:

http://gcc.gnu.org/releases.html

Follow the installation instructions that accompany the GCC libraries to build and install the libraries. Use the default configuration settings.

Grant Privileges on Libraries

In order for SRM to successfully collect data from a Linux computer, all users on the system must have read and execute privileges on the native and GCC libraries. To grant these privileges, run the following command on each library:

chmod a+rx <library_name>

where <library_name> is the library on which you are granting the privileges.

Example

chmod a+rx libstdc++.so.6

Confirm the Installation

The Linux agent installation automatically checks for a proper GCC library installation. If the GCC installation on the target computer is not set up correctly, the Linux agent installation detects the problem and reports it to you during the installation.

However, if you want to manually confirm that the GCC libraries are set up correctly, you can do so by running the following command after installing the Linux agent:

usr/rsc/fscanner –q –pay tmp.fsdb /usr/rsc

If the command is successful, CA SRM is able to collect Volume Statistics information and run file queries on the computer. If you receive a message about missing libraries, you must correct the problem before SRM will be able to collect Volume Statistics information or run file queries on the computer.
Select the Operating System

To select the operating system

1. From the Open Systems menu of the Windows Client, select Register, Network Storage, then Computers and Domains.

2. Click Next on the Welcome dialog. Select Operating System dialog opens:

   ![Select Operating System](image)

   The wizard will automatically locate computers which you can manage with this product. At the first step, tell us what category of machines you want the wizard to work with.

   - Direct Collection
     - Windows
     - UNIX
     - NetWare
   - Indirect Collection
     - Using NPS server
     - Using DFS server

3. Select UNIX and click Next. The Security Scheme dialog opens:

   ![Security Scheme](image)

   The wizard needs to know what security scheme is used.

   - Belongs to a security NIS
   - Does not belong to a security NIS

### Chapter 3: Managing Network Storage Objects
Set the Security Scheme

From the Security Scheme dialog, you must specify whether the UNIX computers that you want to register belong to a security NIS.

If the computers do not belong to a security NIS, select the Does not belong to a security NIS button and click Next. Go to "Selecting the Computers to be Managed" later in this chapter.

If the computers do belong to a security NIS, follow these steps:

1. Select the Belongs to a security NIS option button and click Next.
   
   The NIS Identification dialog opens

2. Select an NIS name from the drop-down list. If the NIS you want is not listed, enter the name of the NIS.

3. Click Next.
Select the Computers to be Managed

On the Setting properties for standalone computers dialog, you can do the following:

- Specify the computers you want to manage
- Specify the data collection frequency
- Add a computer manual
- Specify a proxy collector

Specify Managed Computers

CA SRM registers all of the computers listed in this dialog. To deselect a computer for registration, highlight the computer and click Delete.

Specify the Data Collection Frequency

By default, CA SRM is set up to perform data collection once each day. To change how often CA SRM collects data for a particular computer, click the value in the Frequency column (Every 1 Day, for example). The Data Collection Frequency dialog opens. For more information about using this dialog, see Setting Data Collection Frequency in this chapter.
Add Computers Manually

To add a computer manually

1. Click Add Computers to open the Add Computers dialog.
2. The Add Computers dialog lets you manually add a computer not detected by the CA SRM Computer Registration Wizard to the To Be Managed table:

![Add Computer dialog](image)

3. Click on the Computer drop-down list to see if any computers were discovered. The computers discovered using SNMP gets populated in the drop-down list.
4. Provide the following information:

   **IP Address**
   
   Type the IP address of the computer.

   **Installation Security**
   
   Type the user name and password of a user with Superuser privileges on the target computer.

   **Communication Security**
   
   Select the communications method, Telnet or SSH, and enter the user name and password of a user with access to the target computer.
Data Collection Security

Type the user name and password of a user that has access to the target computer.

Data Collection Frequency

Specify how often you want the target computer to collect the data. CA SRM collects data once each day. To change the frequency, click the ellipsis button to open the Data Collection Frequency dialog.

Software Destination Location

Type a directory on the target computer in which to install the CA SRM agent. You can specify any directory except a subdirectory of /usr/rsc.

Install Agent as Daemon

Select this check box, if you want to install the agent as a daemon.

Note: RSCD agent listens on a fixed port 7167. Verify that no other applications use this port.

5. To add another computer, click Another. When you finish, click OK.

Specify a Proxy Collector

To specify a proxy collector, select the value in the Proxy Collector column:

Select the name of the proxy collector from the Proxy Collector drop-down list.

Set Organization and Location

You can add a location, organization or contact to the machine you want to register. All of these settings are optional.
Register UNIX and Linux Computers

Add a Location

To attach a geographic location to the computer or server, select one from the drop-down list. You can manually add a location by clicking New Location. Type the location information and select a contact in the Create New Location dialog.

Add an Organization

To attach an organization to the computer or server, select one from the drop-down list. You can manually add an organization by clicking New Organization. Type the organization name and select a contact in the Create New Organization dialog.

Add a Contact

Add a contact by clicking New Contact in the Organization or Location dialogs. Type the name, telephone number, and email address of the new contact person in the Create a New Contact dialog. You can access your default address book by clicking the To: button and select the email address from there. Clicking OK returns you to the New Location or New Organization dialog.

Installing the Agent

The Summary dialog displays all the information needed to install the CA SRM agent on the target computers. To initiate the installation, click Install.

When the install is complete, click Finish. Click Close to exit the CA SRM Computer Registration Wizard.

UNIX Volume Naming Conventions

In order to see all platforms the same way, CA SRM uses the Universal Naming Convention on all UNIX paths. To make sure all paths comply with this standard, a special character "^" is used in place of both forward, "/", and back slashes, "/".
Register NetWare Computers

To register a NetWare computer with CA SRM

1. Check the prerequisites and pre-registration notes.
2. Select the operating system of the computers you want to register.
3. Set the security scheme.
4. (Optional) Select the computers to be managed. This step applies only if the computer belongs to a security Novell Directory Service (NDS).
5. (Optional) Set the data collection properties. This step applies only if the computer belongs to a security NDS.
6. (Optional) Set the data collection security. This step applies only if the computer belongs to a security NDS.
7. (Optional) Set the properties for the standalone computers. This step applies only if the computer does not belong to a security NDS.
8. Complete the installation.

These steps are explained in the following sections.

Note: The computer from which you are registering the computer must have the Novell client software installed.
Prerequisites and Pre-registration Notes

Use the following list to check for prerequisites and pre-registration notes:

- Before running the CA SRM Computer Registration Wizard, ensure that the NetWare Client or the Novell IntranetWare client is installed on your computer. You can download the NetWare Client from Novell from the following web site:
  http://download.novell.com
- The SLP protocol must be enabled on all NetWare servers.
- NetWare 4 and NetWare 5 use the NDS security scheme. NetWare 3 does not have NDS security, so it uses bindery emulation.
- You can access NetWare 3 servers only if Windows Explorer already maps them.
- You must have a connection to the NDS server to access NetWare objects.
- You must have the SNMP daemon service. If you do not have it, CA SRM cannot automatically discover NetWare computers.
- When an entry of the NetWare machine is present in the host's file on the Windows Client machine, the registration wizard discovers the NetWare machine by its machine name. If the entry in the host's file is missing, you need to specify the NetWare machine's IP address because the registration wizard cannot discover the machine by its name.
Select the Operating System

To select the operating system

1. From the Open Systems menu of the CA SRM Windows Client, select Register, Computers and Domains. You can also start the CA SRM Computer Registration Wizard by selecting Configuration, Register from the Computers table.

2. Click Next on the Welcome dialog. The Select Operating System dialog opens:

   ![Select Operating System Dialog]

   Note: CA ARCserve Backup on Netware does not support IPv6 environment because IPv6 support is not available for Netware computers.
3. Select NetWare and click Next. The Security Scheme dialog opens:
Set the Security Scheme

From the Security Scheme dialog, indicate whether the NetWare computers that you want to register belong to a security NDS (Novell Directory Services).

If the computers do not belong to a security NDS, select the Does not belong to a security NDS button and click Next. Go to Setting the Properties for Standalone Computers in this chapter.

If the computers belong to a security NDS, follow these steps:

1. Select the Belongs to a security NDS option button and click Next. The NDS identification dialog opens:

2. Select the NDS to which the computers belong from the drop-down list.

3. Enter the Discovery Context for the selected NDS.

4. Enter the name of a user with access to the selected NDS.

5. Enter the Password for the user.

6. Click Next.
Select the Computers To Be Managed

This step applies only if the computer belongs to a security NDS.

CA SRM’s Discovery feature searches your network for computers in the selected domain running the Windows operating system. When the process completes, CA SRM lists all eligible computers in the Candidates table of the Selecting Computers to be Managed dialog.

**Note:** The Discovery process may take a few moments to complete. How quickly CA SRM detects all computers in the selected domain depends on the size of the domain and the speed of your connection.

To select a computer for registration, highlight the computer in the Candidates table and click the right arrow \(\rightarrow\). The computer moves to the To be Managed table.

To remove computers from the To Be Managed table, highlight the computer in the To be Managed table and click the left arrow \(\leftarrow\).

When you have added all the computers that you want to the To Be Managed table, click Next.

**Note:** If there is a computer that you want to add to the CA SRM database, but which is not listed in the Candidates table, you can add it manually in the next step.
Set the Data Collection Properties

This step applies only if the computer belongs to a security NDS.

On the Setting Data Collection Properties dialog, you can do the following:

- Specify the data collection frequency
- Add a non-published computer to the list of computers to be managed
- Specify a proxy collector

Specify the Data Collection Frequency

By default, CA SRM is set up to perform data collection once each day. To change how often CA SRM collects data for a particular computer, select the value in the Frequency column (Everyday, for example). The Data Collection Frequency dialog opens.

Note: CA SRM does not collect information from Netware servers which are configured in IPv6 environment, but collects data from only IPv4 Netware server.

For more information about using this dialog, see Setting Data Collection Frequency in this chapter.
Add a Non-published Computer

The Discovery feature of the CA SRM Computer Registration Wizard detects only computers with physical IP addresses; therefore, some computers in the selected domain may not appear in the Candidates table.

To manually add a computer that was not detected by the CA SRM Computer Registration Wizard

1. From the Setting Data Collection Properties dialog, click Add Computer. The Non-published Computer dialog opens:

   ![Non-published Computer dialog](image)

   Type the name of the computer you want to add.

   [OK] [Cancel] [Another]

2. Enter the name of the computer you want to add and click OK. CA SRM adds the computer to the To be Managed table.

   To add more computers, click Another. CA SRM adds the computer to the To be Managed table, and the Non-published Computer dialog clears, letting you enter another computer name. When you finish, click OK.

3. Select the To be Managed table in the Setting Data Collection Properties dialog and verify that CA SRM was able to determine the computer's IP address. If CA SRM did not add the IP address, or if the address is incorrect, double-click the cell in the IP Address column and manually enter the computer's IP address.
Specifying a Proxy Collector

To specify a proxy collector, select the value in the Proxy Collector column:

Select the name of the proxy collector from the Proxy Collector drop-down list.

Setting Data Collection Security

This step applies only if the computer belongs to a security NDS.

From the Setting Data Collection Security dialog, enter the user name and password of a user with Administrator privileges on the computers you have selected to be managed. Click Next.

Setting the Properties for Standalone Computers

This step applies only if the computer does not belong to a security NDS.

The Setting properties for standalone computers dialog displays the NetWare computers eligible for management. The dialog is similar to the Setting Data Collection Properties dialog. For information about completing this dialog, see Setting the Data Collection Properties in this chapter.
Manually Adding Computers

If there is a computer that you want to register, but it is not listed in this dialog, you can add it manually.

To add a computer manually

1. Click Add Computers.

   The Add Computer dialog opens.

2. Select the computer you want to register from the Computer drop-down list and enter the IP address.

3. Enter the User Name and Password of a user with Administrator privileges on the target computer.

4. (Optional) Set the frequency at which data you want to collect data on this computer. To do so, click the ellipsis button to open the Data Collection Frequency dialog, which lets you set any data collection frequency you want.

5. Click Another to add another computer or click OK to finish.

Setting Organization and Location

You can add a location, organization or contact to the machine you want to register. All of these settings are optional.

Add a Location

To attach a geographic location to the computer or server, select one from the drop-down list. You can manually add a location by clicking New Location. Type the location information and select a contact in the Create New Location dialog.
Add an Organization

To attach an organization to the computer or server, select one from the drop-down list. You can manually add an organization by clicking New Organization. Type the organization name and select a contact in the Create New Organization dialog.

Add a Contact

Add a contact by clicking New Contact in the Organization or Location dialogs. Type the name, telephone number, and email address of the new contact person in the Create a New Contact dialog. You can access your default address book by clicking the To: button and select the email address from there. Clicking OK returns you to the New Location or New Organization dialog.

Complete the Installation

When you finish setting the properties, click Finish. The Summary dialog opens. Click Install.

Register Indirectly Collected Computers

To register a computer for indirect collection with CA SRM, follow these steps:

1. Specify indirect collection.
2. Identify the computers for indirect collection.
3. Specify proxy collector computers.

These steps are explained in the following sections.
Specify Indirect Collection-DFS

To specify indirect collection

1. From the Open Systems menu of the CA SRM Windows Client, select Register, Network Storage, and then Computers and Domains.
   You can also start the CA SRM Computer Registration Wizard by selecting Configuration, Register from the Computers table.

2. Click Next on the Welcome dialog.
   The Select Operating System dialog opens.

   ![CA SRM Computer Registration Wizard]

   Selecting Operating System
   The wizard will automatically locate computers which you can manage with this product. As the first step, tell us what category of machines you want the wizard to work with.

   - Direct Collection
     - Windows
     - UNIX
     - NetWare
   - Indirect Collection
     - Using NFS server
     - Using DFS server

   [Help] [Cancel] [Back] [Next]
3. Select Indirect Collection, DFS server, and click Next.

The Setting Properties for Indirectly-collected Computer dialog opens.

<table>
<thead>
<tr>
<th>CA SRM Computer Registration Wizard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting Properties for Indirectly-collected Computer</td>
</tr>
<tr>
<td>Type the computer name and IP Address and select Data Collection Frequency. Select a Windows managed computer that will serve as a Proxy Collector.</td>
</tr>
<tr>
<td>Name</td>
</tr>
<tr>
<td>IP Address</td>
</tr>
<tr>
<td>Data Collection Frequency:</td>
</tr>
<tr>
<td>DFS Server</td>
</tr>
</tbody>
</table>

Type:

- **Name**—The name of the computer.
- **IP Address**—The IP address of the computer.
- **Data Collection Frequency**—By default, data gets collected once each day. To change the frequency, click the “…” button to open the Data Collection Frequency dialog.
- **DFS Server**—Select a Windows server from the drop-down list. All managed Windows servers are listed.

**Note:** You can only use one DFS server as a collector and proxy collector.
Specify Indirect Collection-NFS

To specify indirect collection

1. From the Open Systems menu of the CA SRM Windows Client, select Register, Network Storage, and then Computers and Domains.
   You can also start the CA SRM Computer Registration Wizard by selecting Configuration, Register from the Computers table.

2. Click Next on the Welcome dialog.
   The Select Operating System dialog opens.
3. Select Indirect Collection, NFS server, and click Next.

The Setting Properties for Indirectly-collected Computer dialog opens.

Type:

- **Name**—The name of the computer.
- **IP Address**—The IP address of the computer.
- **Data Collection Frequency**—By default, data gets collected once each day. To change the frequency, click the "..." button to open the Data Collection Frequency dialog.

4. Click Next. The Setting Collectors dialog opens.

**Note:** SRM collects volumes from the indirectly-collected computer whose mount points are created from static IPs.
Specify Proxy Collector Computers

You must assign at least one proxy collector to each target computer. Use the Setting Collectors dialog to assign one or more proxy collectors to the target computer.

**Note:** You will see this dialog only if you have selected NFS in the Specify Indirect Collection.

The following shows the Setting Collectors dialog with six candidate collectors listed:

The Candidates table lists all the computers that are eligible to serve as proxy collectors for the target computer. To designate a computer as a proxy collector, highlight the computer in the Candidates table and click the right arrow. The computer moves to the Collectors table.

To remove a computer from the Collectors table, highlight the computer in the Collectors table and click the left arrow.

**Note:** If you chose a Solaris machine as the proxy collector, the volume size data is not available.

More than one managed computer can serve as a collector for the target computer.

When you finish, click Finish.
Define a Query Service

This section describes how to create a query using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the service is ready to use. If you want to tailor a service, use the Query Service Builder Wizard to customize it.

The following example shows you how to query the database each week for the computers with the 15 biggest directories. To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Query, as shown in the following diagram:

   - Open Systems
     - Network Storage
     - Backup/Archive Products
     - Applications
     - Services
       - Classes
       - Service Definitions
         - Automate
         - File Groups
         - Procedures
         - Query
         - Backup
         - TSM Message Scanner
     + Service Results
     + Asset Administration
     + System Activity

   The Query table opens.
2. Click the Configuration menu and then New in the Query table. The Query Service Wizard opens. Expand Network Storage, Managed Computers, select Directories – Biggest, and then click Next:

![Query Service Builder](image1)

3. Enter 15 as the number of directories from which you want to collect data and click Next:

![BrightStar SRM Query Service Builder](image2)
4. Select Computers from the Selection Type drop-down list and check All Objects. Click Next:

5. Select Execute periodically and enter 1 in the Every text box. Select Weeks from the drop-down list. Check the Retain Historical Data check box at the bottom of the dialog so that CA SRM can collect historical data. Select Hold to set the service with the HOLD timing condition.

   **Note:** CA SRM uses historical data to calculate trend information.
6. Select the file source. You can choose to scan the cache of the most recent data collection (usually nightly) or you can choose up to the minute information and scan the file system each time the query is run. Using the existing cache is more efficient. Next, select the cache location:

![Query Service Builder](image)

7. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.
8. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Define an Automate Service

This section describes how to create Automate services using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the automate service is ready to use. If you want to tailor a service, use the Automate Service Builder Wizard to customize it.

The following example shows you how to check all computers each day for volumes that are more than 80 percent full, and send an e-mail notification to your company. To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Automate, as shown in the following diagram:

   ![Open Systems Diagram]

   The Automate table opens. You can also access Automate services from the Open Systems file menu by selecting Create Services and then Automate.
2. Click the Configuration menu and then New in the Automate table. The Automate Service Wizard opens. Expand Network Storage, Managed Computers, and select Full Volumes:

3. Select 80 from the drop-down list:
Define an Automate Service

4. Select Computers from the Selection Type drop-down list and check All Objects:

5. Click the Message tab. There is a default message based on your previous selections. You can add to this by clicking in the Message text box. Enter your email address in the To... text box:
6. Select Execute periodically and enter 1 in the Every text box. Select Days from the drop-down list:

![Automate Service Builder](image)

The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.

7. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:
You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.

**Update the CA SRM Agent**

When you register a managed object, CA SRM automatically installs an agent on the object (unless you register the object for Indirect Collection). If you want to update the agent details on the managed object, you can do this using the CA SRM Computer Software Update Wizard.

**To update the CA SRM Agent software**

1. From the Open Systems menu of the CA SRM Windows Client, select Update Agent Software.
2. Click Next on the Welcome dialog.
   The Select Operating System dialog opens.
3. Select the operating system on which the agent runs.
   If you select Windows, the Selecting a Domain and Defining Security dialog opens. Go to Step 4.

   ![CA SRM Computer Software Update Wizard](image)

   **Selecting a Domain and Defining Security**
   Select the domain in which you want to update computer software. Local administrative rights are needed to update CA SRM software on all computers that you want to update.

   Update computers in domain: WORKGROUP
   Domain Administrative Security
   User Name:
   Password:

4. (Optional) If you selected Windows, select the domain that contains the computer you want to register from the drop-down list. Type the name and password of a user with Administrator privileges on the computer you want to update. Click Next. The Setting Data Collection Properties dialog opens.

   If you select UNIX, the Security Scheme dialog opens. Go to Step 5.
5. (Optional) If you selected UNIX, select whether the computer belongs to a security NIS. Click Next. The Setting Properties for standalone computers opens. Go to Step 7.

6. (Optional) If you selected Windows, select the computer that you want to update. Update the data collection frequency and quota collection fields, if necessary. Click Next. The Summary dialog opens. Go to Step 9.

7. (Optional) If you selected UNIX and you want to modify the properties, click Modify Computer Properties. The Modify Computer Properties dialog opens. Edit the properties, as required.

8. Click OK.

The Summary dialog opens.

9. Click Install, to update the agent software.

10. Click Close to exit the CA SRM Computer Software Update Wizard.

**Fabric Full Path Analysis**

Fabric Full-Path Analysis is a utility that lets you query SAN fabric and obtain information about the connectivity between fabric objects that are registered with CA SRM. Fabric Topology defines how different elements of SAN fabric are connected.

Fabric topology treats the entire fabric as a collection of elements with possible links between some of the elements. Use the Full-Path Analysis utility to query and identify the complete path from a source to a target (or target to a source).
The full path analysis presents the fabric elements and their connectivity information as an undirected Graph $G = <V, E>$, where $V$ = nodes and $E$ = edges. The nodes represent the fabric elements and edges represent the connectivity. An articulation point is a vertex whose removal disconnects the graph.

The full path data analysis helps an administrator to assess the risks that are associated with the data paths and identify their articulation points. The full path data analysis provides fabric connectivity information. An administrator can query the connectivity information to know how specific elements of the fabric are connected. The administrator uses this information to perform following tasks:

- Verify physical connectivity before making logical connections.
- Identify redundant paths.
- Identify articulation points.

Based on these reports, an administrator can improve performance and availability of SAN fabric.

The full path analysis performs a rule-based traversal of the graph and the resulting paths are displayed in an output window.

The following elements are available in a fabric:

**Important!** The indentation specifies a parent-child relationship among the objects of the model.

**Switch Model**
- Switch
- Switch Ports

**Disk Array Model**
- Disk Array
  - Disk Array Ports
- Logical Disks
  - Luns

**Host Model**
- Host
  - Physical Disk
    - Host HBA Ports
    - Volume
Storage Volume Controller Model

- SVC Host
  - SVC Ports
  - SVC MDisk
  - SVC VDisk

Virtual Host Server Model

- VHS Host
  - VMWare
    - Storage Device
    - Host HBA Ports
    - Data Stores
  - Hyper-V
    - Virtual Hard Disks
    - Host HBA Ports

NETAPP Model

- NETAPP Filer
  - Ports

Query Fabric Using Fabric Topology

As a Storage Administrator, your responsibilities include monitoring each storage device to help improve the network and application availability.
The following diagram illustrates how a Storage Administrator queries SAN fabric using fabric topology and how to use the query result to analyze the report and improve performance.

**Query Fabric Topology** (see page 128)

**Export the Output** (see page 132)

### Query Fabric Topology

You can query fabric topology to get the full path data analysis which helps you improve the performance of SAN fabric.

**Follow these steps:**

1. Open the CA SRM Windows Client main window.
   
   The CA SRM Fabric Full path Analysis dialog opens.
3. Select an element type for which you want to see the full path from the Source drop-down list.
   
   The list of elements displays.
4. Select the source object.
5. Select a destination element type from the Destination drop-down list.
   
   The list of elements displays.
6. Select the destination object.
7. (Optional) Select the Exclude Objects check box to exclude a list of objects from the path to display.
   You can exclude the switch ports when you want only the switch names in a path. In such scenarios, you select the exclude objects option.

8. (Optional) Select the Enforce Zoning check box.
   Selecting this option lets you view the physical path that are in an active zones.
   Note: The Enforce Zoning option is applicable only when you select the All Physical Paths option.

9. (Optional) Select the Show Paths Via SVC check box.
   Selecting this option displays the physical paths traversing through SVC.
   Example: If there is a path from Host to Disk Array through SVC, then the paths from Hosts to SVC and paths from SVC to Disk Array are shown disjointly.
   Combining these paths increase in the number of paths.

10. (Optional) Select the All Physical Paths check box.
    Selecting this option displays all the possible physical connections (both active and inactive paths) between selected source and destination objects.
    Note: If you select the Show Paths Via SVC and All Physical Paths check boxes, these paths break up at each SVC to avoid exponential growth of the number of paths.

11. Select the path that you want the query to traverse from the Special Criteria drop-down list.
    Note: You can select one of the three options. You can either select the Longest Path, Shortest Path, or None. The length of the path is the number of elements along the path.

    **Longest Path**
    Defines the path of maximum length in a given graph.

    **Shortest Path**
    Defines the shortest paths between every pair of vertices v, v' in the graph.

    **None**
    Defines all the paths in the graph.

12. Click Query.
    The system displays the query result.

**Example Queries**

Understand the parent-child relationship between elements in SAN fabric to query for analysis. Following examples help you get acquainted with the fabric topology.
**Example: Host to Switch**

A host can be connected to a switch either directly or indirectly through another switch. A path from host to a switch typically looks like:

Host->Physical Disk->Host Port->Switch Port->Switch

If ISLs are involved in the path, the path would look like:

Host->Physical Disk->Host Port->Switch Port->Switch Port->Switch Port->...->Switch

If you select multiple Hosts or Switches, paths are displayed from each source object to each destination object.

**Example: Disk Array to Switch**

A disk array to switch can be either direct or through other intermediate switches. The following example shows the path between a disk array and a switch.

Disk Array->Disk Array Port->Switch Port->Switch

If they are connected through ISLs, those ISLs are also displayed.

**Note:** When you select multiple source objects and multiple destination objects, all paths from each source to each destination are displayed. If you select a Host and its Physical Disk for querying, you can find multiple paths. Some paths pass from the Host and some other paths pass from the Physical Disk, while the Host Paths pass through the Physical Disk.
Understanding Query Results

When you query fabric using fabric topology, you get one of the following paths as output in the query result.

Physical Paths

These represent the physical connectivity amongst the elements. By default, the active physical paths are displayed only when there is a logical connection between the selected source and destination objects.

The paths may display in Green / Black colors. Green paths are physically connected paths that are in the active zone. Even if one of the elements of the path is not in active zone, the path displays in black color.

**Note:**
- If you select the Enforce Zoning option, the black physical paths are not displayed.
- If you select the All Physical Paths option, all the possible physical connections (both active and inactive paths) between the selected source and destination are displayed.
- The Enforce Zoning option is applicable only when you select the All Physical Paths option.

Logical Paths

Logical paths are paths that contain no switch elements in between. In logical paths, the physical disk of the host is connected directly to the logical device on the disk array, without any mention of the intermediate elements. These paths display when the path is from an initiator element to a target or a target to an initiator element.

**Example:** You query for a path from an application (on host, therefore initiator) to a disk array. Another example could be a disk array to a host selection. These are full paths. In such cases, both the physical paths as well as the logical paths are displayed.
Export the Output

You can export the output of the query for further processing. The output can be in CSV or XML formats which can be used as input to other custom programs for further processing. You can analyze these reports and can identify improvements to the performance and availability of fabric.

Follow these steps:

1. Click Export on the output window.
   The Save As dialog opens.
2. Select the format and click Save.
   The output is saved to the selected format (CSV or XML).

A full path connects a source to a target. Full path analysis provides you with varied information to identify and improve the availability of fabric such as, the Luns that can be mapped for better performance of fabric.

The full path analysis helps you assess the risks that are associated with the data paths and identify their articulation points. Based on these reports, you can improve the performance and availability of SAN fabric.
Chapter 4: Managing CA ARCserve Backup

CA SRM provides a licensed option that collects storage usage data from CA ARCserve Backup.

This chapter describes how to use this option. It includes the following topics:

- About CA ARCserve Backup
- CA ARCserve Backup objects
- Registering CA ARCserve Backup servers
- Reporting
- Performing backups from CA SRM
- Defining a Query service
- Defining an Automate service

Note: For information about supported versions of CA ARCserve Backup, see the documentation on the CA SRM software distribution CD-ROM or on the CA web site at ca.com.

This section contains the following topics:

- About CA ARCserve Backup (see page 134)
- CA ARCserve Backup Objects (see page 135)
- Registering CA ARCserve Backup Servers (see page 136)
- Reporting (see page 141)
- Performing Backups from CA SRM (see page 142)
- Defining a Query Service (see page 148)
- Defining an Automate Service (see page 152)
About CA ARCserve Backup

CA ARCserve Backup is a data management and backup program that lets you back up data from your computer or from other computers attached to your network, including a complete system backup of all network computers. Network system information (such as registry information for each computer) is backed up intact, letting you completely restore the computer in the event of system failure.

Each time you run a backup job, CA ARCserve Backup records information in its databases about the computers, directories, and files that have been backed up, and the media used. You can choose to log all information, only job and session information, or to disable database recording entirely. You can view information from the database and generate reports. For example, the jobs processed by CA ARCserve Backup, the media used by CA ARCserve Backup, the devices being used with CA ARCserve Backup, and so on.

CA ARCserve Backup helps you create and maintain media pools for a logical grouping of media. You can assign serial numbers, bar codes, or both to a particular media to help manage your rotations.

CA SRM collects data from the CA ARCserve Backup database according to a user-defined frequency, for example, EVERY DAY. The data collection agent gathers the data and imports it into the CA SRM database. The data collection agent calculates a variety of statistical data, such as totals, averages, severity values, durations, and so on. Following data collection, the standard CA SRM functions are available for all CA ARCserve Backup objects.

You can monitor all pending, completed, and active jobs, and reschedule pending or completed jobs. You can view information about your storage devices and media, change drive compression modes, and perform media maintenance functions such as formatting, erasing, and retention.

CA SRM provides access to the CA ARCserve Backup databases. Using the CA SRM Windows Client, you can do the following:

- Display company-wide views of CA ARCserve Backup objects
- Run extensive reports and queries on the CA ARCserve Backup database
- Monitor CA ARCserve Backup objects

You can display a snapshot of the enterprise backup state in a unified view and do the following:

- List all CA ARCserve Backup servers in a color-coded display that indicates the average status of all executed backups
- List statistical information about each CA ARCserve Backup server
- Display a dynamic report regarding the performance of a problematic server
CA ARCserve Backup Objects

CA SRM collects information about the following CA ARCserve Backup objects:

**Changer Slots**
- Objects containing CA ARCserve Backup changer slots data supplied by the data collection process.

**Changers**
- Objects representing CA ARCserve Backup tape libraries and containing information about physical characteristics of the library, such as cartridge type, number of magazines, and so on.

**Domain**
- CA ARCserve Backup domains.

**Drives**
- Objects representing backup devices and containing information about hardware parameters, cleaning and error statistics, media size and type, and more. Currently there is a limitation on data for the Drive object in CA SRM. Data for fields like Total Bytes Read, Total Bytes Written, and Total Usage Time fields is missing.

**Clients**
- Objects representing host computers backed up by CA ARCserve Backup.

**Job queue**
- Objects representing CA ARCserve Backup jobs residing on CA ARCserve Backup Job Queue Manager.

**Jobs**
- Objects representing all jobs containing job statistics such as job type, status, timing, objects transferred and more.
  - From ARCServe r12.x releases, the jobs object represents all jobs (master jobs and sub jobs) containing job statistics such as job type, status, timing, objects transferred and more. Added a user view named Master Jobs, which has all master jobs. You can find sub jobs from master job zoom options.

**Last backup**
- Objects representing the latest job instances that backed up a given host to a given server.

**Media Locations**
- Objects containing information about media locations other than library slots.

**Media Pools**
- Objects representing CA ARCserve Backup media pools, and containing information about media identification, rotation scheme, and more.
Media

Objects representing backup media elements and containing identification data, formatting, I/O and error statistics, and more.

Owners

Objects representing CA ARCserve Backup session owners.

Servers

Objects representing CA ARCserve Backup servers, and containing statistics for media elements in the changers attached to the servers and backup database statistics.

Sessions

Objects representing CA ARCserve Backup sessions, and containing session statistics such as type, status, timing, location, and transfer details.

Cloud Connection

Objects representing cloud connection containing information about the cloud connection which is configured with ARCserve servers such as cloud name, cloud vendor, cloud URL, cloud user name, and bucket name.

Sources

Objects representing CA ARCserve Backup source objects, such as drive letters, shares, mount points, and more

Note: To help ensure that the Windows Client displays the most recent data collection, refresh open user views.

Registering CA ARCserve Backup Servers

To register an ARCserve backup server with CA SRM, perform the following steps:

- Ensure that iGateway and CA ARCserve Backup iSponsor are installed and are running on the same computer as CA ARCserve Backup. You can find the CA ARCserve Backup iSponsor from the iSponsor folder on DVD media.
- Check the prerequisite notes.
- Register the backup server as a new object in the CA SRM database using the CA SRM Backup Registration Wizard.

Prerequisite Notes

You must add your primary server as a managed computer in the application server, before you register the ARCserve backup server.
Registering CA ARCserve Backup Servers

CA ARCserve Backup lets you perform in depth reporting on CA ARCserve Backup objects, centralize the management of all CA ARCserve Backup servers, generate comprehensive reports on backup media and devices, and produce detailed analysis of data protection strategy. To take a backup of all the servers managed by CA SRM, you must register the ARCserve Backup server.

Follow these steps:

1. Open the CA SRM Windows Client main window.
2. Select Backup/Archive Products, CA ARCServe Backup, Servers in the Object Tree structure.
   The CA SRM Backup Registration Wizard dialog appears.
3. Select CA ARCServe Backup and then select your operating system from the drop-down list.

![Backup Registration Wizard](image)

- **Backup Server Type**
  - Select the type of Backup Server you want to register. For Backup Servers other than TSM select the operating system.

- **Operating System Type**
  - Windows

![Backup Registration Wizard Dialog](image)
4. Click Next.

The Setting Discovery Information dialog appears.

5. Select one of the following discovery modes:

   **Skip discovery and add candidates manually**
   
   Lets you add backup servers and add candidates manually. Go to Step 5.

   **Automatically discover candidates**
   
   Lets you to automatically discover backup servers. You must type the values for the Start IP Address and End IP Address fields. The Selecting Servers and Setting Security dialog appears. Go to Step 20.

   We recommend that you select the skip discovery and add candidates manually.

   **Note:** When you register a CA ARCServe Backup Netware machine using the discovery mode, you must provide the subnet for the CA ARCServe Backup Manager for Windows.

6. Click Next.

   The Selecting Servers and Setting Security dialog appears.

7. Click Add Backup Servers.

   The Add CA ARCServe Backup Windows server dialog appears.
8. Select the check box if the ARCServe Backup server version is v12.0 or later. This action automatically enables the remaining fields on the dialog.

![Add CA ARCserve Backup Windows server dialog]

9. Type the name of the backup server.

10. Select the name of the proxy collector. This proxy collector is a managed computer that has ARCServe Primary Server or Standalone Server installed.

11. Specify how often you want CA SRM to perform data collection. Click the Ellipsis button.
   
   The Data Collection Frequency dialog opens.
   
   Use this dialog to set the data collection frequency you want. The default value for data collection is once every day. Click OK to save the settings and close the dialog.

12. Select the check box adjacent to Trigger if you wish to trigger the events.

13. Select the check box adjacent to Detailed to get detailed information about sessions.
14. Type the user name that has administrator privileges in the Windows Administrator Credentials (equivalent to ARCServe caroot user) section.

15. Type the password associated with the above administrator user name.

16. Type the instance of the database in the ARCServe Database Details section.
   Note: In case of SQL server as the database for ARCServe server, then the database instance name will be the server name in general. If the database is SQL Express, then the database instance name will be \<Server name>\arcserve_db.

17. Select the authentication mode that you want the ARCServe backup to register for. The possible values are SQL and Windows.
   Note: Selecting Windows as authentication mode will set the value of the database user to that of administrator user.

18. Type the database user name.

19. Type the password associated with the database user name.

20. Click OK.
   The Selecting Servers and Setting Security dialog appears with the backup server details populated to the relevant fields.

21. Select the backup servers from the list of candidate servers that you want to register.
   Note: If you are registering a CA ARCServe Backup server on a Netware operating system, you must also enter the name of the Proxy iSponsor.

22. Click Next.
   The Set Organization and Location dialog appears.

23. Edit the fields in this dialog if you want to add a different location, organization, and contact:
   - **Location** - Lets you attach a geographic location to the computer or server. Select a location from the drop-down list. You can also click New Location to add the details of the new location in the Create New Location dialog. Click OK to exit the dialog.
   - **Organization** - Lets you attach organization to the computer or server. Select an organization from the drop-down list. You can also click New Organization to add the details of the new organization in the Create New Organization dialog. Click OK to exit the dialog.
   - **Contact** - Lets you add a contact. Click New Contact to add a contact using the Create New Contact dialog. Enter the name, telephone number, and email address of the new contact. You can access your default address book by clicking the To: Button and select the email address from there.
   
   **Note:** You can also add new contacts by clicking New Contact in the Create New Location dialog or Create New Organization dialog.
24. Click Register to complete the registration.

   The CA SRM Backup Registration Wizard displays the registration complete message.

25. Click Close to exit the wizard.

Reporting

CA SRM provides extensive reporting on many aspects of CA ARCserve Backup activity, devices, and media. You can schedule reports for execution at regular times or on demand. CA SRM produces a variety of report output formats and redirects them for distribution through email.

You can combine CA SRM error reporting for media and backup devices with threshold monitoring for these objects. For example, you can create a report displaying only media elements that have errors above or below a specified threshold.

CA SRM provides several predefined report formats that you can use without modification. Additionally, you can generate custom reports using the Query service, and define the source objects to report on, the information to be included, the format (spreadsheet columns), and the output of the report.
Performing Backups from CA SRM

You can now activate a backup service using a CA ARCserve Backup server from within CA SRM. The CA ARCserve Backup server must be a host managed by CA SRM. CA SRM can only drive backups for CA ARCserve Backup r11.x, r12.x and later.

If the backup drive fails, then you may need to run the backup command manually once for security purposes. To do this:

1. Logon to the CA ARCserve Backup machine with the same user ID used to register the machine in CA SRM.
2. Open the Task Manager, and check if the ca_backup process exists. End the process if it exists.
3. Open the command line and go to the CA ARCserve Backup directory. Run:
   
   ca_backup -source -filesystem c: \\
   
   If this does not work, it is a CA ARCserve Backup security issue.
   
   If it does work, go to step 4.
4. (Optional) Change the CA SRM computer username and password so it is equivalent to caroot. You can make it equivalent by logging on to the CA ARCserve Backup server with the same CA SRM collection user and run the ca_backup command line.
   
   When CA ARCserve Backup asks:
   
   --- Do you want to create equivalence (default : y)?
   
   Type Y and the server will create the equivalent username and password.
5. Re-run the CA SRM backup service.

You can activate backups in either interactive or batch mode.

**Interactive**

Backs up files from a Query Result table or a volume from the Volumes table

**Batch**

Backs up files and volumes as a scheduled or automated service

CA SRM separates the backup policy definition from the actual backup definition and execution. This lets you define a backup and apply a pre-defined policy, or define a new policy. CA SRM stores policy definitions in the CA ARCserve Backup database.

This section describes how to:

- Perform an interactive backup
- Create a new policy definition
- Perform a batch backup
Performing an Interactive Backup

You can perform an interactive backup from a Query Result table or a Volumes table if the field Full Name appears in the table. To perform the backup, select the files or volumes you want to backup and then select Backup from the Action menu. The Backup Server dialog opens:

![Backup Server dialog](image)

This dialog lets you select the server on which you want to perform the backup and the backup policy that you want to apply. You can also create a new policy and save it to the CA ARCserve Backup database. For more information about creating a new policy, see Creating a New Policy Definition in this chapter.
Creating a New Policy Definition

To create a new policy definition, follow these steps:

1. From the Backup Server dialog, click the Create New Policy button. The Create New Policy dialog opens. Enter the name of the policy and the details of the backup destination. For more information about the fields, see the online help.

You have the option to add additional commands to the backup job, check the Additional Ca_Backup Parameters check box and enter the details in the text box:

Note: CA SRM does not verify the text you enter in this text box, so ensure that it is correct because errors can cause the backup to fail.
2. Click the Backup Options tab. Check the check boxes next to the items you want to enable. For more information about the fields, see the online help.

You have the option to add additional commands to the backup job, check the Additional Ca_Backup Parameters check box and enter the details in the text box:

![Backup Options](image)

**Note:** CA SRM does not verify the text you enter in this text box, so ensure that it is correct. Errors can cause the backup to fail.

3. CA SRM displays the details of the new policy:

![Create New Policy](image)
Performing a Batch Backup

The procedure to backup files is similar to the procedure for backing up volumes. The following example shows how you can perform a batch backup of files that are larger than 100 MB on computers more than 80 percent full. To do this, follow these steps:

1. You can access Backup services from the Open Systems menu by selecting Create Services and then Backup. You can also access the service by expanding the CA SRM Object Tree, selecting Open Systems, expanding Services, and then selecting Backup, as shown in the following diagram:

Expand the Templates folder, expand Network Storage, expand Managed Computer and select Files - Big:

![Diagram of Backup Service Builder]

Files that are greater than a user-defined size
2. Enter 100 and select MB from the drop-down list.

3. Select Full Computers from the Selection Type drop-down list and 80 from the Computers more than <percent> full drop-down list:

4. Select the backup server that you want to perform the backup from the drop-down list. Do one of the following:
   - Select the backup policy that you want to apply to the backup.
   - Create a new policy. Click Create New Policy. For more information, see Creating a New Policy Definition in this chapter.
5. Select when you want to perform the backup.

6. If you want to make changes, click the Back button. If there are no changes, click Launch. CA SRM performs the backup.

7. Enter the name of the backup service in the Name field. Optionally, enter a description of the service.

Defining a Query Service

This section describes how to create a query using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the service is ready to use. If you want to tailor a service, use the Query Service Builder Wizard to customize it.

The following example shows you how to query the database each day for CA ARCserve Backup domains. To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Query, as shown in the following diagram:

   - Open Systems
     - Network Storage
     - Backup/Archive Products
     - Applications
     - Services
     - Classes
     - Service Definitions
     - Automate
     - File Groups
     - Procedures
     - Query
     - Backup
     - TSM Message Scanner
     - Service Results
   - Asset Administration
   - System Activity

   The Query table opens.
2. Click the Configuration menu and then New in the Query table. The Query Service Wizard opens. Expand Backup Products, then CA ARCserve Backup, and select Domains:

3. Select Domains from the drop-down list and check All Objects:
4. Select Execute periodically. Enter 1 in the Every text box and select Days from the drop-down list. Check the Retain Historical Data check box so that CA SRM collects historical data:

![Query Service Builder](image)

**Note:** CA SRM uses historical data to calculate trend information.

5. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.
6. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Defining an Automate Service

This section describes how to create Automate services using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the automate service is ready to use. If you want to tailor a service, use the Automate Service Builder Wizard to customize it.

The following example shows you how to search for all backup servers that were less than 70 percent successful and send a message to the Windows event log. To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Automate, as shown in the following diagram:

   ![Open Systems Tree Diagram]

   The Automate table opens. You can also access Automate services from the Open Systems file menu by selecting Create Services and then Automate.

2. Click the Configuration menu and then New in the Automate table. The Automate Service Wizard opens. Expand Backup Products, then Backup Servers, and select Backup Server Success.
3. Select 70 from the drop-down list:

4. Select Backup Servers from the Selection Type drop-down list and check All Objects:
5. Check the Windows Event Log check box:

6. Select the execution frequency. The service can operate:

- **Immediately**—Collection occurs immediately but only once.
- **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
- **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the **Every** box. Enter a number then select the frequency:
  - Hours
  - Days
  - Weeks
  - Months
  - Business Days

If you select Weeks, you can choose a specific day in the **On** box. The **On** box is inactive for the other frequencies.

The Retain Historical Data (Trending) option is only available when you enable periodic execution.

- **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).

If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.
**Hold**—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

7. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.
8. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

![Automate Service Dialog]

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Chapter 5: Disk Arrays in CA Storage Resource Manager

CA SRM provides a licensed option that collects storage usage data from the following disk arrays:

- EMC CLARiiON
- EMC Symmetrix
- Engenio, IBM DS4000, IBM FastT
- Hitachi Data Systems Freedom Storage
- HP StorageWorks and HP VA
- IBM XIV, ESS, DS6000, DS8000
- SUN 6920 and 6130

The disk arrays lets your data to be transparent by enabling you to see which applications are being stored on which disks in your disk array.

You can also unify the views of your various arrays into a single view, letting you see data on all your disk array devices. CA SRM also collects basic hardware information for each disk in your array, including information about physical disks, logical volumes, and so on.

The two-phase data collection of Disk Arrays is done using SMI-S. In two-phase data collection, CA SRM executes the collected raw data on a proxy server without any application server database access, and executes the database update on the application server.

CA SRM 12.7 collects thin provisioning attributes for IBM XIV and Symmetrix VMAX.

For IBM XIV, Hard Size and Soft Size attributes are collected for Disk array, Raid groups, and Logical Disks objects.

For Symmetrix VMAX, isthindevice attribute for logical disks object to differentiate between data and thin device. ParentVol ID attribute to show relationship between the meta device and meta member.

This section contains the following topics:

Manage Disk Arrays to Generate Reports on SAN Storage (see page 158)
Manage Disk Arrays to Generate Reports on SAN Storage

As a Storage Administrator, your responsibilities can include registering and managing disk arrays to generate reports on SAN storage utilization.

The following diagram illustrates how a Storage Administrator collects SMI-S data, registers the disk arrays, manage, and generates report on SAN storage utilization:

More Information:

Configure SMI-S Provider (see page 159)
Register Disk Arrays (see page 161)
Manage and Generate Reports on SAN Storage (see page 163)
Configure SMI-S Provider

An SMI-S provider is a vendor-specific component that is used so that independent management software can manage a vendor device using the Common Information Model (CIM) protocol.

You can collect SMI-S data on certain disk arrays that have in-built SMI-S provider information. Some of the disk array vendors provide the respective SMI-S provider information for the disk arrays. However, install and configure (see page 161) SMI-S providers on such storage devices, which do not have in-built SMI-S provider.

**Note:** Disk array data collection is done using SMI-S. We recommend you to use SMI-S 1.2 and above to collect data for storage performance attributes.

CA SRM Application Server (AS) communicates with the disk arrays through their respective SMI-S providers. When multiple SMI-S providers are installed on the same machine, only one can use the default port number. Configure the other providers during installation or set up to use an alternate port number.
When you add a disk array whose provider is using an alternate port number to the Application Server or Proxy computer, specify the port number. The default port number for the SMI-S provider for the CA SRM is displayed as 5988 regardless of what operating system hosts the SMI-S provider. However, when this SMI-S provider is running on Linux, the default port number is 15988.

The application host is the computer that controls the disk array. The proxy collector is the computer through which CA SRM performs data collection on the disk array. Typically, the application host and the proxy collector reside on the same computer, but they can reside on two separate computers.

Typically, the application host and proxy collector computers have different requirements, though the requirements depend on the manufacturer of the disk array. Also, some types of disk arrays can require additional setup.

### SMI-S Providers

CA SRM supports the following default namespaces for registering the EMC Symmetrix, Hitachi, IBM ESS, IBM XIV, EMC CLARiiON, SUN StorEdge, HP StorageWorks, Engenio, Fujitsu, and DELL disk arrays:

<table>
<thead>
<tr>
<th>SMI-S Provider</th>
<th>Namespace</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMC Symmetrix</td>
<td>root/emc</td>
</tr>
<tr>
<td>Hitachi</td>
<td>root/smis/current</td>
</tr>
<tr>
<td>IBM ESS</td>
<td>■ root/cimv2</td>
</tr>
<tr>
<td></td>
<td>■ root/ibm</td>
</tr>
<tr>
<td>EMC CLARiiON</td>
<td>root/emc</td>
</tr>
<tr>
<td>SUN StorEdge</td>
<td>root/se6920</td>
</tr>
<tr>
<td>HP StorageWorks</td>
<td>root/EVA</td>
</tr>
<tr>
<td>Engenio</td>
<td>root/lsissi11</td>
</tr>
<tr>
<td>Fujitsu</td>
<td>/root/eternus</td>
</tr>
<tr>
<td>IBM XIV</td>
<td>root/ibm</td>
</tr>
<tr>
<td>DELL</td>
<td>root/DCIM/MDStorageArray13=DELL</td>
</tr>
</tbody>
</table>

**Note:** For more information about installing and configuring this software, see the vendor documentation that is provided with your disk array.
Install and Configure SMI-S Providers

Installation and configuration information and requirements for specific SMI-S providers vary by provider and release. You can find the latest and relevant information in the specific vendor Readme file or similar files that ship with the SMI-S provider. Read these files and set up your environment according to the instructions. Ensure that the specified requirements are met, so that CA SRM Application Server can properly manage the disk arrays.

Register Disk Arrays

You can run the CA SRM Disk Array Registration Wizard from any computer on which the Windows Client is installed. You can perform data collection from any managed computer.

Follow these steps:

1. Select Open Systems, Register, Disk Array.
   The CA SRM Disk Array Registration Wizard dialog opens.
2. Click Next on the Welcome dialog.
   The Defining Security and Data Collection dialog opens.
   If you have the disk arrays by different vendors, run the CA SRM Disk Array Registration Wizard for each vendor.
3. Provide the following information:
   Name
   Specifies the name of the application host. The application host is the computer that controls the disk array and on which the disk array management software is installed.
   IP Address
   Specifies the IP address of the application host.
   User Name
   Specifies the username that is used on the disk array management or SMI-S provider software.
   Password
   Specifies the password of the user that is used on the disk array management or SMI-S provider software.
   Port number
   Specifies the port number on which the application host is listening for information.
4. Select the proxy collector from the drop-down list.
   
   The proxy collector is the computer through which CA SRM performs data collection on the disk array.
   
   **Note:** The drop-down lists the proxy computers only if you have registered them with CA SRM.
   
   For more information about registering a computer with CA SRM, see Registering New Objects.
   
5. Specify how often you want CA SRM to perform data collection on the disk array.
   
   The default is to collect data once each day. Use the ellipsis button to open the Data Collection Frequency dialog, which lets you set the data collection frequency that you want.
   
6. Click Next.
   
   The Selecting Database Access Method dialog opens.
   
   **Note:** When the namespace or the family is not resolved with the known namespaces or the known families in the ini file, this dialog appears.
   
7. Select the namespace and corresponding family from the drop-down list and click Next.
   
   The Devices managed by the Disk Array Application dialog opens.
   
8. Select the check box next to the devices that you want to manage and click Next.
   
   The Set Organization and Location dialog opens.
   
9. (Optional) Edit the fields in this dialog if you want to add a different location, organization, and contact:

   - **Location**
     
     Lets you attach a geographic location to the computer or server.
     
     You can add location (see page 163).

   - **Organization**
     
     Lets you attach organization to the computer or server.
     
     You can add organization (see page 163).

   **Note:** You can also add new contacts by clicking New Contact in the Create New Location dialog or Create New Organization dialog.
   
10. Click Register.
    
    The summary of registered disk arrays displays.
    
11. Click Close to exit the CA SRM Disk Array Registration Wizard.
    
You can use these registered disk arrays to manage and generate reports (see page 163) on SAN storage utilization.
Add a Location

You can add a location or can select a location from the drop-down list on the Set Organization and Location dialog.

Follow these steps:

1. Add the details of the new location and click OK.
   The new location is added to the list.
2. (Optional) Click New Contact (see page 163) to add a contact.

Adding an Organization

You can add an organization or can select an organization from the drop-down list on the Set Organization and Location dialog.

Follow these steps:

1. Add the details of the new organization and click OK.
   The new organization is added to the list.
2. (Optional) Click New Contact (see page 163) to add a contact.

Add a Contact

You can add a contact or can select a contact from the drop-down list on the Set Organization and Location dialog.

Follow these steps:

1. Type the name, telephone number, and email address of the new contact.
2. You can access your default address book by clicking the To: Button and selecting the email address from there.
3. Click OK.
   The new contact is added to the list.

Manage and Generate Reports on SAN Storage

Manage your disk arrays by performing the following tasks:

- View the path from a SAN attached physical disk (see page 168)
- Define a query service (see page 169)
- Define an automate service (see page 171)
You can customize and generate various reports on SAN storage utilization using the user views. These reports help you identify the disks in your array that are most vulnerable and which contain the most valuable data.

A sample report (with the graph and trending information) created for each of the disk array objects (see page 166) are provided from the object tree.

Follow these steps:
1. Click the Object Tree icon on the Windows Client interface.
2. Expand Network Storage, Disk Arrays, and Disk Array object.
   
   The grid opens on the right pane.
3. Select the graph icon on the bottom of the right pane.
4. Select the X-axis Source icon and select the Family checkbox.
5. Select the Y-axis Source icon and select the Allocated and Assigned checkboxes.

The graph displays the allocated and assigned utilization of registered disk arrays.

Follow these steps:

1. Click the Object Tree icon on the Windows Client interface.
2. Expand Network Storage, Disk Arrays, and Disk Array object.
   
   The grid opens on the right pane.
3. Select the trend icon on the bottom of the right pane.
4. Select the Trend Trace Source icon and select the Name checkbox.
5. Select the Trend Data Source icon and select the % Allocated and Size checkboxes. The trend provides the total size and the allocated size of registered disk arrays over a time.

You can export these reports to Excel, HTML, PDF, TXT, .MDB, and Web Document formats. Thus, you can customize and generate SAN reports. These reports help you in identifying the disks in your array that are at risk and contains the most valuable data.

**Available Objects to Generate Reports**

When you register the disk arrays in the CA SRM, the following objects display in the object tree view. CA SRM collects information about these objects. You can generate reports on SAN storage utilization, which is based on these objects.

**Applications**

Objects representing the applications of your disk array. For example, type, domain, and port. The object is created when you register the disk array. The data collection does not update the application object.
Disk Arrays

Objects representing the disk arrays. CA SRM can report the number of spare disks in the array, the make and model of the array, and detailed information about the free and available space in the array.

Note:
- Mainframe Storage is one of the disk arrays attributes representing the logical units in the array that have paths that are assigned and configured on Mainframe. CA SRM can provide information about the sum of all LUNs.
- % Mfstorage is one of the disk arrays attributes representing the percent of assigned logical disks on Mainframe. CA SRM collects information about the percentage of allocated storage.

Logical Disks

Objects representing the logical disks of your disk array. CA SRM can provide information about the array to which a logical disk belongs; the type, state, data type, and status of the disk; and the amount of free and occupied space on the disk.

Physical Extents

Objects representing the physical extents. CA SRM can report collect information about the status of the extent, the size of the partition, and whether the extent is a data or a parity extent.

RAID Groups

Objects representing the RAID groups. CA SRM can report on the total usable size of the RAID group, how much free and allocated space is in the group, and information about the individual disks in the group.

RAID Disks

Objects representing the RAID disks in use at your site. CA SRM can collect information about the amount of free, occupied, and partitioned space on the disk; the disks physical location (row and column) in its enclosure; and the make, name, and type of the disk.

Enclosures

Objects representing the enclosures at your site. CA SRM can collect information about the number of disks in the enclosure, the controllers in the enclosure, and the IDs of the RAID arrays in the enclosure.

RDF Link

Objects representing the Resource Description Framework (RDF) links in your disk array. CA SRM can report on such things as link status, state modes, and configurations.

LUNs

Objects representing the paths. CA SRM reports the name of the path, and the logical and physical disk that the path points to.
Storage Processors

Objects representing the storage controllers. CA SRM can report the storage processor status, manufacturer, and performance characteristics.

Storage Performance

Objects representing the storage performance of the CA SRM objects. Storage performance attributes are reported for disk arrays, logical disks, physical extents, raid disks, storage processors, and disk array ports.

Note: To ensure that the Windows Client displays the most recent data collection, refresh open user views.

View the Path from a SAN-Attached Physical Disk to a Logical Disk

CA SRM allows you to view the mappings between SAN-attached physical disks and the logical disks on the disk arrays to which they belong and generate the report.

Follow these steps:

1. Register the disk array using the Disk Array Registration Wizard.
2. Register the application host as a managed computer.
3. In the Object Tree, expand Network Storage, expand Physical Disks, and select the SAN Attached Disks node.

The SAN Attached Disks table opens.
4. Select a disk from the table, click the Open Zoom button from the toolbar, and select Disk Array Logical Disk.

The table zooms to the logical disk on the disk array that the physical disk belongs to.

**Defining a Query Service**

You can create a query using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After you complete the configuration steps, the service is ready to use. If you want to tailor a service, use the Query Service Builder Wizard to customize it.

The following example shows you how to query the database immediately for all EMC Symmetrix disk arrays.

**Follow these steps:**

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Query.

   The Query table opens.

2. Select Configuration, and then New in the right pane.

   The Query Service Builder dialog opens.

3. Expand Network Storage, then Disk Arrays, and select Disk Arrays from the Template screen and click Next.

4. Select Disk Array Applications from the Selection Type drop-down list and select an application from the Select one or more disk array applications from the list and click Next.

   **Note:** If you defined classes that are based on disk arrays, the first choice in this dialog is Classes. You can use one of these classes in the query.

5. Select one of the following options for frequency execution and click Next.

   **Immediately**

   Defines the collection occurs immediately, but only once.

   **Execute once**

   Defines the collection occurs at a future date, but only once. Click the drop-down list to enter the date in the calendar.
Execute periodically

Defines the collection occurs at regular intervals. Designate the interval in the Every box. Type a number and select one of the frequency options:

- Hours
- Days
- Weeks
- Months
- Business Days

If you select Weeks, you can choose a specific day in the On box.

**Note:** The On box is inactive for the other frequencies.

The Retain Historical Data (Trending) option is only available when you enable periodic execution.

Specific Time

Defines the collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, it collects as soon as it can that day (before midnight).

If you want to collect at a specific time, check this box. This only works with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.

Hold

Defines the service as available but the service does not run. The service remains on hold until you change the option to one of the frequencies listed. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command-line option. The Hold option is not available for every service.

The Summary dialog displays the parameters for the service that you have defined.

6. Select one of the following on the Summary dialog.

- Click Save to save the service without executing it.
  CA SRM runs the service according to the configuration shown in this dialog.
  **Note:** If you change the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.

- Click Launch to name the execute the service.
7. Type a name and description for the service in the dialog and click OK.
   The service executes or saves depending on what you selected in the previous
dialog.
   You can use the CA SRM Activity Monitor to check the progress of any service that
you create.

You can export the report from the Query Results under the Service Results in the
Object Tree.

**Defining an Automate Service**

You can create Automate services using the Service Builder Wizard. The Service Builder
Wizard contains predefined sets of sample services. After you complete the
configuration steps, the automate service is ready to use. If you want to tailor a service,
use the Automate Service Builder Wizard to customize it.

The following example shows you how to perform the listed items:
- Scan all RAID disk arrays once a week.
- Send an email notification, when any of the disks size is greater than 70 percent full.

**Follow these steps:**

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and
   then select Automate.
   The Automate table opens.
   **Note:** You can also access Automate services from the Open Systems file menu by
   selecting Create Services and then Automate.

2. Click the Configuration menu and New in the Automate table.
   The Automate Service Builder dialog opens.

3. Expand Network Storage, Disk Arrays, and select Full RAID Disks in the Template
   screen and click Next.

4. Select 70 from the % Occupied drop-down list in the Condition screen and click
   Next.

5. Select Disk Array RAID Disks from the Selection Type drop-down list and select the
   All Objects check box in the Select one or more disk array raid disks from the list
   box and click Next.

6. Click the Message tab in the Automate Action screen.

7. Type your email address in the To text box and the message in the Message box
   that you want to send when the condition is met and click Next.
8. Select Execute periodically and type 1 in the Every text box, and select Weeks from the drop-down list, and then select the day in the Execution Frequency screen.

   The Summary dialog displays the parameters for the service that you have defined.
   - Click Save to save the service without executing it.
     CA SRM runs the service according to the configuration shown in this dialog.

   **Note:** If you change the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.

   - Click Launch to name and execute the service.

9. Type a name and description for the service in the dialog and click OK.

   The service executes or saves depending on what you selected in the previous dialog.

   You can use the CA SRM Activity Monitor to check the progress of any service that you create.
Chapter 6: EMC Data Domain Deduplication in CA SRM

EMC Data Domain deduplication storage systems drastically reduce the amount of disk storage to retain and protect enterprise data enabled by Data Domain. By identifying redundant data, Data Domain devices provide a storage footprint that is five to 30 times smaller, than the original data set, making disk a cost-effective over a tape.

The following list provides the benefits of the Data Domain deduplication:

- Ensures data integrity and provides multiple levels of data compression, reliable restorations and multipath configurations.
- Protects multiple terabytes of logical capacity in a single system to retain data online and onsite for longer retention periods and provides faster and more reliable restores.
- Integrates easily into existing environments and are qualified with enterprise backup software and archiving applications.

EMC Data Domain is an SRM agent that collects information about the EMC Data Domain Dedupe device using the Simple Network Management Protocol (SNMP) and Command Line Interface (CLI).

CA SRM collects data and populates the details of the EMC Data Domain device in the SRM database. The zooms in CA SRM lets you follow the logical relation between the dedupe objects and external relation to other models (disk arrays) in SRM.

You can generate reports on precompression and postcompression of backed up data and can analyze the compression ratio.

This section contains the following topics:

Generate Backup Compression Reports Using EDD Deduplication (see page 174)
Generate Backup Compression Reports Using EDD Deduplication

As a Storage Administrator, your responsibilities include registering EDD device with valid credentials of Telnet/SSH and SNMP to enable SRM to collect EDD data.

The following diagram illustrates how a Storage Administrator generates reports on precompression and postcompression of backed up data and can analyze the compression ratio.
Register EMC Data Domain Device

Register the EMC data domain device using the CA SRM DeDupe Registration Wizard.

**Follow these steps:**

1. Open the CA SRM Windows Client.
2. Select Open Systems, Register, Network Storage, Dedupe Devices.
   The CA SRM DeDupe Registration Wizard Welcome dialog opens.
3. Click Next.
   The Setting Properties for DeDupe Devices dialog opens.
4. Select one of the options on the dialog:
   - **Add**
     Adds the EMC data domain devices.
     The Add DeDupe Device dialog opens.
   - **Remove**
     Removes the selected data domain devices.
5. Click Next to continue the registration process.
   The Set Organization and Location dialog opens.
6. (Optional) Edit the fields if you want to add a different location, organization, or contact.
   - **Location**
     Select a location from the drop-down list.
     You can also click [New Location](#) (see page 163) to add the details of the new location.
   - **Organization**
     Select an organization from the drop-down list.
     You can also click [New Organization](#) (see page 163) to add the details of the new organization.
7. Click Register.
   The Completed the CA SRM DeDupe Device Registration Wizard dialog displays the summary.
8. Click Close to close the wizard.

CA SRM invokes data collection and populates the registered EDD data in the Object Tree.
Add EMC Data Domain Devices

Provide the relevant information about the Telnet/SSH and SNMP credentials, and proxy collector in the following fields on the Add DeDupe Device dialog.

Follow these steps:

1. Specify the name / IP address of the Data Domain device in the Name/IP box.
2. Select either the SSH (secure shell) or Telnet protocols that you want to apply.
   
   **Note:** The SSH is selected by default.
3. Provide the name of the user and password credentials in the Telnet/SSH section.
4. Provide the following SNMP details in the SNMP Credentials section.

**Version**

Specifies the version of the SNMP.

If you select the SNMP V3 version, the user name, security level, authentication protocol, authentication key, privacy protocol, and privacy key fields are displayed.

If you select the SNMP V1 or SNMP V2 versions, the community string field only is displayed.

**Community String**

Specifies the default community string as public.

**Note:** This field is applicable only if you select V1 and V2 versions.

**Security Level**

Specifies the security level of the SNMP. The three options available for security level are:

- **noAuthNoPriv**
  
  If you select this option, all the other following fields are greyed out.

  **Note:** This security level option is selected by default.

- **authNoPriv**
  
  If you select this option, the Authentication Protocol and Authentication Key are enabled.

- **authPriv**
  
  If you select this option, all the options are enabled.

**Authentication Protocol**

Specifies the authentication protocol of the SNMP. The available authentication algorithms are MD5 and SHA.
Authentication Key

Specifies the authentication key of the SNMP. The authentication key is the password for the selected authentication protocol.

Privacy Protocol

Specifies the privacy protocol of the SNMP. The available privacy algorithms are AES and DES.

Privacy Key

Specifies the privacy key of the SNMP. The privacy key is the password for the selected privacy protocol.

5. Select the computer through which CA SRM performs data collection of the data domain device from the Proxy Collector drop-down.

**Note:** If you want to use a computer as a proxy collector, register the computer with CA SRM. For more information about registering a computer with CA SRM, see the Register Windows Computers section in the SRM User Guide.

6. Select how often you want CA SRM to perform data collection on the data domain and click the Ellipsis button for the Data Collection Frequency.

The Data Collection Frequency (see page 331) dialog opens.

7. Click OK.

The Setting Properties for DeDupe Devices dialog populates the added device details.

**Define Data Collection Frequency**

You can set the interval at which you want to perform data collection.

**Follow these steps:**

1. Complete the fields in this dialog to set your desired data collection frequency.

   The default value for data collection is once every day.

2. Click OK to save the settings and close the dialog.

Click Next, when you have finished setting these options.
Add a Location

You can add a location or can select a location from the drop-down list on the Set Organization and Location dialog.

Follow these steps:
1. Add the details of the new location and click OK.
   The new location is added to the list.
2. (Optional) Click New Contact (see page 163) to add a contact.

Add an Organization

You can add an organization or can select an organization from the drop-down list on the Set Organization and Location dialog.

Follow these steps:
1. Add the details of the new organization and click OK.
   The new organization is added to the list.
2. (Optional) Click New Contact (see page 163) to add a contact.

Add a Contact

You can add a contact or can select a contact from the drop-down list on the Set Organization and Location dialog.

Follow these steps:
1. Type the name, telephone number, and email address of the new contact.
2. You can access your default address book by clicking the To: Button and selecting the email address from there.
3. Click OK.
   The new contact is added to the list.
Generate Reports on Backup Compression

You can generate reports on precompression and postcompression of backed up data and can analyze the compression ratio. You can customize and generate various reports on backup compression using the user views and by customizing the query and automate services.

Using the DeDupe device objects from the object tree, you can create a sample report with the graph:

Follow these steps:
1. Click the Object Tree icon on the Windows Client interface.
2. Expand Network Storage, De-Dupe Devices, EMC Data Domain, Data Domains object.
   The grid opens on the right pane.
3. Select the Switch to Graph Pane icon on the bottom of the right pane.
4. Select the X-axis Source icon and select the Name option.
5. Select the Y-axis Source icon and select the Pre Compression and Post Compression checkboxes.
   The graph displays the storage utilization of pre and post compression on backup.
Using the DeDupe device objects from the object tree, you can create a sample report with the trending information:

**Follow these steps:**

1. Click the Object Tree icon on the Windows Client interface.
2. Expand Network Storage, De-Dupe Devices, EMC Data Domain, Data Domain objects.
   The grid opens on the right pane.
3. Select the Switch to Trend Pane icon on the bottom of the right pane.
4. Select the Trend Trace Source icon and select the Name option.
5. Select the Trend Data Source icon and select the Pre Compression and Post Compression checkboxes.
   The trend provides the storage utilization of pre and post compression on backup.

![Graph showing storage utilization](image)

You can export these reports to Excel, HTML, PDF, TXT, .MDB, and Web Document formats. Thus, you can customize and generate backup compression reports.
Available Objects to Generate Reports

When you register the EMC Data DeDupe devices in the CA SRM, the following objects display in the object tree view. CA SRM collects information about these objects. Based on these objects, you can generate reports on backup compression.

Data Domains

Objects representing the EMC Data Domain that is used as the virtual tape library (VTL) for backup servers and performs data de-duplication over the data that is received from backup servers.

File Systems

Objects representing the different file system exist on the device such as metadata, index, and actual data.

Snapshots

Objects representing the read-only copy of the data domain file system from the top directory. Snapshots are useful for avoiding version skew when backing up volatile data sets, such as tables in a busy database. Snapshots are useful for retrieving earlier versions of a directory or file that was deleted.

Enclosures

Objects representing a chassis which contains fan modules, power supply module, temperature sensors, and so on.

Storage Disks

Objects representing a storage unit where actual data is stored. The disk can be a local disk or a remote disk from the disk array.

Virtual Tape Libraries

Objects representing the data domain virtual tape libraries that allow backup applications to connect and manage a data domain system. These VTL makes the data domains systems represent as a stand-alone tape library.

VTL Tapes

Objects representing the virtual tapes, which appear as physical tape to the backup software.

VTL Drives

Objects representing the virtual tape drives that are accessible to backup software similar to as physical tape devices.
VTL Access Groups

Objects representing a collection of initiator WWPNs or aliases and the devices they are allowed to access.

The Data Domain VTL Access Groups allow you to access only selected LUNs (devices, which are media changers or virtual tape drives) on a Data Domain System.

VTL Pools

Objects representing the data domain pool for VTL that allows replication by groups of the virtual tapes. The virtual pools allow the replication of virtual tapes from multiple replication originators to a single replication destination.

VTL HBA Ports

Objects representing the fiber channel ports, which are connected to backup servers through fiber channel topology.

VTL Initiators

Objects representing any data domain system clients' HBA World-Wide Port Name (WWPN). An initiator-name is an alias that maps to a clients' world-wide port name.

VTL LUNs

Objects representing the LUNs (devices, which are media changers or virtual tape drives) assigned to client through initiators WWNS.

Mtrees

Objects representing a unit of storage that allows finer management of space usage, snapshots, and retention locking. The set of files in an Mtree is a directory structure, and the files can span the active and archive tiers in a Data Domain Archiver system.

CIFS Shares

Objects representing the Common Internet File System (CIFS) clients that have access to the system directories on the Data Domain system. The /data/col1 directory is the destination directory for compressed backup server data. The /ddvar directory contains Data Domain system core and log files.

NFS Shares

Objects representing the Network File System (NFS) clients that have access to the system directories or Mtrees on the Data Domain system.

- The /backup MTree is the default destination for compressed backup server data.
- The /data/col1/ path is the root destination when using Mtrees for compressed backup server data.
- The /ddvar directory contains Data Domain system core and log files.
Note: To verify that the Windows Client displays the most recent data collection, refresh open user views.

Customize Reports Using Query Service

You can create a query using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After you complete the configuration steps, the service is ready to use. If you want to tailor a service, use the Query Service Builder Wizard to customize it. The following example shows you how to query the VTL drives status for all EMC DeDupe devices that are registered in the CA SRM.

Follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Query. The Query table opens.
2. Click the Configuration menu and then New in the Query table. The Query Service Builder Wizard opens.
3. Expand Network Storage, De-Dupe Devices, EMC Data Domain, select VTL Drives, and then click Next.
4. Select VTL Drive Status from the Selection Type drop-down list and select Online from the Select a VTL Drive status from the list, and then click Next.
5. Select one of the following options for frequency execution and click Next.

   Immediately
   Defines the collection occurs immediately, but only once.

   Execute once
   Defines the collection occurs at a future date, but only once. Click the drop-down list to enter the date in the calendar.
Execute periodically

Defines the collection occurs at regular intervals. Designate the interval in the Every box. Type a number and select one of the frequency options:

- Hours
- Days
- Weeks
- Months
- Business Days

If you select Weeks, you can choose a specific day in the On box.

**Note:** The On box is inactive for the other frequencies.

The Retain Historical Data (Trending) option is only available when you enable periodic execution.

Specific Time

Defines the collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, it collects as soon as it can that day (before midnight).

If you want to collect at a specific time check this box. This only works with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.

Hold

Defines the service as available but the service does not run. It remains on hold until you change the option to one of the frequencies listed. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command-line option. The Hold option is not available for every service.

The Summary dialog displays the parameters for the service that you have defined.

6. Select one of the following on the Summary dialog.

- Click Save to save the service without executing it.
  
  CA SRM runs the service according to the configuration shown in this dialog.

  **Note:** If you change the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.

- Click Launch to name the execute the service.
7. Type a name and description for the service in the dialog and click OK.
   The service executes or saves depending on what you selected in the previous
dialog.
   You can use the CA SRM Activity Monitor to check the progress of any service that
you create.
   You can export the report from the Query Results under the Service Results in the
Object Tree.

Customize Reports Using Automate Service

You can create automate services using the Service Builder Wizard. The Service Builder
Wizard contains predefined sets of sample services. After you complete the
configuration steps, the automate service is ready to use. If you want to tailor a service,
use the Automate Service Builder Wizard to customize it.

The following example shows you how to perform the listed items:

- Scan all data domain devices.
- Send an email notification, when any of them are greater than 70 percent full.

Follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and
then select Automate.
   The Automate table opens.
   **Note:** You can also access Automate services from the Open Systems file menu by
selecting Create Services and then Automate.

2. Click the Configuration menu and New in the Automate table.
   The Automate Service Wizard opens.

3. Expand Network Storage, De-Dupe Devices, EMC Data Domain, and select Data
Domains used percent, and then click Next.

4. Select 70 from the % Occupied drop-down list and click Next.

5. Select Data Domain from the Selection Type drop-down list and select All Objects
check box in the Select one or more Data Domain from the list box and click Next.

6. Click the Message tab.

7. Type your email address in the To text box and the message in the Message box
that you want to send when the condition is met and click Next.
8. Select Execute periodically and type 1 in the Every text box, and select Weeks from the drop-down list, and then select the day in the Execution Frequency screen.

The Summary dialog displays the parameters for the service that you have defined.

- Click Save to save the service without executing it.

CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you change the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.

- Click Launch to name and execute the service.

9. Type a name and description for the service in the dialog and click OK.

The service executes or saves depending on what you selected in the previous dialog.

You can use the CA SRM Activity Monitor to check the progress of any service that you create.
Chapter 7: Managing Defined Applications

CA SRM provides a feature that collects storage usage data from unsupported applications that you manually register.

This chapter describes how to use this option. It includes the following topics:

- Defined Application support
- Defined Application objects
- Using the Defined Application Registration Wizard
- Defining a Query service
- Defining an Automate service

This section contains the following topics:

- Defined Application Support (see page 187)
- Defined Application Objects (see page 188)
- Registering Defined Applications (see page 188)
- Defining a Query Service (see page 192)
- Defining an Automate Service (see page 196)

Defined Application Support

Use the Defined Application Wizard to manage resources for applications that are not currently supported by CA SRM. This includes purchased software or software created by your company.

The application needs to reside on a managed computer in order for CA SRM to collect data on it. The data is from the file-system only. It does not cover storage inside raw partitions or databases.

You cannot report on different instances of the same application running on the same machine. You can, however, define one application for each instance and then use the same application signature to consolidate the data.
Defined Application Objects

CA SRM reports on the following Defined Application object:

**Defined Applications**

The applications that you defined templates and signatures for so that CA SRM can collect data on it.

**Note:** To help ensure that the Windows Client displays the most recent data collection, refresh open user views.

Registering Defined Applications

If you want to start collecting storage information about a currently unsupported application, follow these steps:

1. Register the computer where the application resides. You need to select Managed computers in the Selecting a Domain and Defining Security dialog.
2. Run the Defined Application Registration Wizard.
Using the Defined Application Registration Wizard

You can run the CA SRM Defined Application Registration Wizard from any computer on which the Windows Client is installed. You can collect data from any managed computer that has one of your modeled applications installed.

To run the Wizard, follow these steps:

1. From the Open Systems menu of the Windows Client, select Register, Defined Application. You can also start the Wizard by selecting Configuration, Register from the Defined Applications table.

2. Enter a name for the application and its type. By default, the Type field populates using the same value as you entered in the Name field. The type is the application’s signature. It is a set of rules that identify storage consumption within the file-systems that belong to the defined application. To use a defined type, select it from the Load Template drop-down list.

   To create a new type:
   
   a. Build the signature from these characteristics. Each of the characteristics is optional:
      
      ■ **Case sensitive**—Check this if you want the search for the selected directories and extensions to be case sensitive.
      
      ■ **Directories**—Sub-trees to include (for example, “\program files\app1\#” or “\data\app1\#”).
      
      ■ **Extensions**—Files extensions to include/exclude (for example, bmp, jpeg, or mp3).
      
      You can use wildcards when defining characteristics.

   b. Click Save as template when finished.

   To modify an existing type, select it from the Load Template drop-down list and make your changes to the signatures. Click Save as template to update the type. If you want to save your changes but you do not want to overwrite the existing type, enter a new name in the Type field and then click Save as template.
3. Select the scope. Use this dialog to define the application's volumes or computers that you want to monitor and include in the data collection. To set the scope:
   a. Select either Computers or Volumes from the drop-down list.
   b. Select All to use all of the volumes or computers
      or
      Select Scope List to narrow the scope.
   c. (Optional) Select the volumes or computers from the list. You can filter this list by operating system, organization, and location. After you select your filters, click Refresh the list to execute the filter on the list.
   d. (Optional) Use the text box below the list to select computers or volumes by name. Type all or part of the computer or volume name in the box including wildcards. If you enter more than one name, use commas (,) as delimiters. Do not use the format: \vol*. You only need to type the computer name or volume name. Use the format: vol*. The object type you enter here (computer or volume) needs to match the Scope Type drop-down list.
4. Edit the fields in this dialog if you want to add a different location, organization, and contact:

- **Location**-Lets you attach a geographic location to the computer or server. Select a location from the drop-down list. You can also click New Location to add the details of the new location in the Create New Location dialog. Click OK to exit the dialog.

- **Organization**- Lets you attach organization to the computer or server. Select an organization from the drop-down list. You can also click New Organization to add the details of the new organization in the Create New Organization dialog. Click OK to exit the dialog.

- **Contact**- Lets you add a contact. Click New Contact to add a contact using the Create New Contact dialog. Enter the name, telephone number, and email address of the new contact. You can access your default address book by clicking the To: Button and select the email address from there.

**Note:** You can also add new contacts by clicking New Contact in the Create New Location dialog or Create New Organization dialog.

Click Register to complete the registration.
Defining a Query Service

This section describes how to create a query using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the service is ready to use. If you want to tailor a service, use the Query Service Builder Wizard to customize it.

The following example shows you how to query defined applications of a certain size.

To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Query, as shown in the following diagram:

   - Open Systems
   - Network Storage
   - Backup/Archive Products
   - Applications
   - Services
     - Classes
     - Service Definitions
       - Automate
       - File Groups
       - Procedures
       - Query
       - Backup
       - TSM Message Scanner
   - Service Results
   - Asset Administration
   - System Activity

   The Query table opens.
2. Click the Configuration menu and then New in the Query table. The Query Service Wizard opens. From the Query table main menu, select Configuration, New. The Template dialog opens. Expand Applications, Defined Applications, and then select Defined Applications:

![Query Service Builder](image1)

3. Define the scope of your query by selecting Defined Application Total Size from the drop-down list. Enter a total size. In this example the application needs to be less than 300 MB:

![Query Service Builder](image2)
4. Select the execution frequency. The service can operate:

- **Immediately**—Collection occurs immediately but only once.
- **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
- **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:
  - Hours
  - Days
  - Weeks
  - Months
  - Business Days

If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies. The Retain Historical Data (Trending) option is only available when you enable periodic execution.

- **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).

If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.

- **Hold**—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

5. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.
6. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Defining an Automate Service

This section describes how to create Automate services using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the automate service is ready to use. If you want to tailor a service, use the Automate Service Builder Wizard to customize it.

The following example shows you how to check large footprint defined applications and send a message to the Windows Event Log.

To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Automate, as shown in the following diagram:

   - Open Systems
     - Network Storage
     - Backup/Archive Products
     - Applications
     - Services
       - Classes
         - Service Definitions
           - Automate
           - File Groups
           - Procedures
           - Query
           - Backup
           - TSM Message Scanner
         - Service Results
         - Asset Administration
         - System Activity

The Automate table opens. You can also access Automate services from the Open Systems file menu by selecting Create Services and then Automate.
2. Click the Configuration menu and then New in the Automate table. The Automate Service Wizard opens. From the Automate table main menu, select Configuration, and New. In the Template dialog expand Applications, Defined Applications, and then select High Footprint (defined) Applications:

3. Select the condition that triggers the message. In this example when the defined application’s footprint exceeds 70% a the service sends the message:
Defining an Automate Service

4. Select the objects you want to include in this service. In the Selection Type drop-down list select Defined Applications. Select the specific applications in the selection box:

5. Click the Message tab and select Windows Event Log. This means after the threshold is reached the service will send a message to the Windows Event Log:

6. Select the execution frequency. The service can operate:
   
   - **Immediately**—Collection occurs immediately but only once.
   - **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
■ **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:
  - Hours
  - Days
  - Weeks
  - Months
  - Business Days

If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies.

The Retain Historical Data (Trending) option is only available when you enable periodic execution.

■ **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).

If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.

■ **Hold**—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

7. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.
8. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Chapter 8: Managing IBM DB2 Databases

CA SRM provides a licensed option that collects storage usage data from DB2 databases.

This chapter describes how to use this option. It includes the following topics:

- DB2 support
- DB2 objects
- Registering DB2 databases
- Defining a Query service
- Defining an Automate service

This section contains the following topics:

- IBM DB2 Support (see page 201)
- IBM DB2 Objects (see page 202)
- Registering IBM DB2 Databases (see page 204)
- Defining a Query Service (see page 214)
- Defining an Automate Service (see page 218)

IBM DB2 Support

CA SRM assembles and presents the information you need to manage your database storage more efficiently. CA SRM collects a variety of data to assist you in such tasks as tuning your system, setting alerts, planning capacity, reporting on raw devices, and so on. You can display unified views of data collected from multiple database instances running on different platforms. CA SRM logs on to all the databases automatically at scheduled times.

You can use CA SRM to perform the following tasks:

- Present complete logical volume information by combining data reported by the DB2 server with raw device data collected by the CA SRM Agent
- Monitor size, free space, and occupied space information for servers, databases, indices, tables, and long table
- Analyze trends for servers, databases, tables, and long tables
- Set alerts when certain conditions are met
Data Collection

The DB2 Storage Management GUI displays the size and capacity values of the database in megabytes. It only displays these values as whole numbers. CA SRM manages these values in bytes and then displays them as megabytes. As a result, you might see a difference in the values between the two interfaces.

Note: To help ensure that the Windows Client displays the most recent data collection, refresh open user views.

IBM DB2 Objects

Information about database objects is collected from DB2 machines and stored as CA SRM objects. You can filter, sort, and query these objects, represent them graphically, and customize the presentation in other ways.

CA SRM reports on the following DB2 objects:

Instances

The instance, database manager, is at the top of the DB2 hierarchy. An instance is a complete environment for hosting databases. It has a range of memory and CPU management policies as well as network port numbers for communication. It contains all of the database partitions defined for a given parallel database system. DB2 instances manage data. They control what can be done to the data, and also manage the system resources assigned to it.

Partitions

A database partition is part of a database that consists of its own data, indexes, configuration files, and transaction logs. A partitioned database is a database with two or more partitions. In this type of database, data is hashed for storage. A database partition is sometimes called a node or a database node.

Databases

A database is a collection of relational data in tables, along with the associated indices, triggers, and stored procedures. The tables can be related and queried together. A database can be backed up and restored as a whole. DB2 supports multiple databases within a single instance.

Partition Groups

A database partition group, or nodegroup, is a set of one or more database partitions. Tablespaces are assigned to nodegroups. Any given nodegroup can have multiple tablespaces assigned to it.
Tablespaces

A database is organized into parts called tablespaces. Tablespaces store tables and also contain indices and catalogs. Tablespaces are named areas where data is located logically.

Containers

A container is a physical storage device. It can be identified by a directory name, a device name, or a file name. A container is assigned to a tablespace. A single tablespace can span many containers, but each container can belong to only one tablespace. You can create multiple containers (from one or more tablespaces) on the same physical disk.

The following container limitations apply to partitioned databases:

- FULL_PATH and Volume information are not available.
- Partition information is not available.
- Zooms from container to volume are not available.
- Queries might return partial results. DB2 does not return complete information about the containers of a partitioned database.

Tables

A relational database represents data as a collection of tables. A table consists of data logically arranged in rows and columns. All of the database and table data are assigned to tablespaces. The data in a table is logically related, and relationships are defined between tables. Data can be viewed and manipulated based on relations.

Users

The DB2 Users table lists the DB2 users found in the CA SRM database. The data displayed in the table is collected by the data collection service. This table contains information about only those users who actually occupy storage on the database.
Registering IBM DB2 Databases

To register an IBM DB2 database, you need to follow these steps:

1. Register the DB2 server as a managed computer in CA SRM.
2. Install the DB2 client and the DB2 ODBC driver on the proxy collector.
3. Define a user with SYSMON or SYSMAINT authority on the DB2 database.
4. Grant database privileges to the CA SRM user.
5. For DB2 instances on UNIX, set the library path variable.
6. For DB2 instances on UNIX, verify that the necessary GCC libraries are present.
7. Catalog (configure) the database on the proxy collector. Cataloging can be done before or during registration.
8. Run the DB2 Registration Wizard.

   **Important!** If you have just installed the DB2 server on the proxy collector, you must restart the computer before running the registration wizard. Otherwise, the wizard will fail to start.

**Note:** To collect data from a 64-bit DB2 server running on a 64-bit operating system, you must use a 32-bit proxy collector for data collection.

For information about supported versions of this application, see the README. The latest version is posted on supportconnect.ca.com.

Register the DB2 Server

The CA SRM Agent must be installed on all DB2 servers from which you want to collect data. You install the agent by registering the server.

To register a DB2 server, see the topic Registering New Objects (see page 70) and follow the instructions for the DB2 server's operating system.
Install the DB2 Client and ODBC Driver on the Proxy Collector

To collect data from a DB2 database, the proxy collector must have the DB2 client software and the DB2 ODBC driver installed.

To install the DB2 client and ODBC driver

1. Install the DB2 client software on the proxy collector. The ODBC driver is automatically installed when you install the DB2 client software using the default options.

   Note: It is possible to opt out of installing the ODBC driver when you install the DB2 client software. If you use the custom option to install the client, please make sure that you also install the ODBC driver.

   The DB2 client can be found on the DB2 product CDs. Please refer to the IBM DB2 documentation for instructions on how to install the client.

2. From the Object Tree, expand the Network Storage folder and select the Computers node.
   The Computers table opens.

3. In the Computer table, right-click the proxy collector and select Collect Now.
   CA SRM queries the proxy collector and detects the presence of the DB2 ODBC driver. This ensures that you can use the DB2 Registration Wizard to designate the computer as the proxy collector.
Define a User with SYSMON or SYSMAINT Authority

To collect data from an IBM DB2 database, the user that you supply to the DB2 Registration Wizard must have SYSMON (DB2 version 8.2 and higher) or SYSMAINT (DB2 version 8.1) authority on the database. This authority is defined on the instance level using operating system user groups.

To grant SYSMON or SYSMAINT authority to a user:

1. Create a user group on the operating system where the DB2 server is installed (for example, "DB2Users").
2. Create a user on the operating system (for example, "BrightStorSRM") and add this user to the group you just defined.
3. Open a DB2 command window and issue one of the following commands.

   **For DB2 8.1**
   ```bash
   db2 update dbm cfg using sysmaint_group <os_group>
   ```

   **For DB2 8.2 or higher**
   ```bash
   db2 update dbm cfg using sysmon_group <os_group>
   ```

   For example:
   ```bash
   db2 update dbm cfg using sysmon_group DB2Users
   ```

   The users in the specified group are granted the proper authority to perform data collection.
Grant Database Privileges to the CA SRM User

to successfully collect data from DB2 databases, the CA SRM user performing the collection needs to have certain privileges on the DB2 databases. A script is provided with CA SRM to grant these privileges automatically.

To grant the privileges on a database using the script
1. Connect to the DB2 database as a user that has SYSADM or BDADM privileges.
2. Locate the script. By default, the script is installed to the following location:
   C:\BrightStor SRM Data\Database\Configuration\GrantPrivilegeDB2User.sql
3. (Optional) By default, the script grants privileges to the user "BrightStorSRM". If you want to grant privileges to a different user, change all instances of "BrightStorSRM" to the name of the user.
4. Execute the script.
   The necessary privileges are granted to the specified user.
   Note: If you run this script against DB2 UDB v8.1, it is normal to receive the following error for a few of the commands:
   GRANT OR REVOKE is not defined for system objects
5. Repeat this procedure for each DB2 database from which you want to collect data.

Set the UNIX Library Path Variable

To perform data collection on a DB2 database on UNIX, you must set the library path variable in the profile of the user who performs the data collection.

Depending on the operating system on which the database is installed, set the following environment variable to point to the "sqllib/lib" folder under the HOME directory of the user who installed DB2.

Solaris and Linux
   LD_LIBRARY_PATH
HP-UX
   SHLIB_PATH
AIX
   LIBPATH
Ensure Presence of UNIX gcc Libraries

To register a DB2 database on a UNIX machine, certain gcc libraries must be present on the system where the CA SRM agent for UNIX is installed. These libraries can be freely downloaded from the following location:

http://gcc.gnu.org/

Make sure that the following libraries exist in the specified locations for your operating system.

**AIX**

/usr/lib/libstdc++.a
/usr/lib/libgcc_s.a

**HP-UX 11i**

/usr/local/lib/gcc-lib/hppa1.1-hp-hpux11.00/3.1.1/../..../libgcc_s.sl

**LINUX**

/usr/lib/libstdc++.so.6
/usr/lib/libgcc_s.so.1

**Solaris**

/usr/lib/libstdc++.so.4
/usr/lib/libgcc_s.so.1

Cataloging the Database on the Proxy Collector

To collect data from a DB2 database, the proxy collector needs to be able to connect to the DB2 server. The process of setting up a connection to a DB2 server is called "cataloging".

For each DB2 database you want to catalog, you need to follow these steps:

1. Add the DB2 server as a new system.
2. Catalog the instance to which the database belongs.
3. Catalog the database.
Add the DB2 Server as a New System

The first step in cataloging a DB2 database is adding the DB2 server as a new system on the proxy machine.

**Note:** You must have the DB2 client software installed on the proxy machine to perform this procedure.

**To add a DB2 server as a new system**

1. Open the DB2 Control Center Application.
2. Right-click the All Systems node (DB2 8.2 or higher) or the Systems node (DB2 8.1) in the Object Tree and click Add.
   
   The Add System dialog opens.
3. Enter the following information:
   
   **System Name**
   
   The name of the host where the DB2 server is installed

   **Node Name**
   
   Enter a name for the node (8 characters or less).

4. Click OK.

   The DB2 server is added as a new system.

Catalog the Instance

The second step in cataloging a DB2 database is cataloging the DB2 instance to which the database belongs.

**To catalog a DB2 instance**

1. Expand the Host node for the DB2 server, right-click the Instance node, and click Add.

   The Add Instance dialog opens.
2. Click Discover to discover the instances running on the system, then select the one that you want to catalog.
3. Enter a name in the Instance Node Name field and click OK.

   The DB2 instance is cataloged.
Catalog the Database

The final step in cataloging a DB2 database is to discover and catalog the database.

To catalog the database
1. Expand the Host node for the DB2 server, expand the Instance node, right-click the Database node, and click Add.
   The Add Database dialog opens.
2. Click Discover to discover the databases in the instance.
3. Select the database that you want to catalog, enter an alias for the database, and click OK.
   The database is cataloged.
Run the DB2 Registration Wizard

You can run the CA SRM DB2 Registration Wizard from any computer on which the CA SRM Windows Client is installed. You can collect data from any managed computer that has the IBM DB2 client software and the IBM DB2 ODBC driver installed, and on which the DB2 instance is cataloged.

To register a DB2 server using the DB2 Registration Wizard

1. From the Open Systems menu of the CA SRM Windows Client, select Register, Applications, and then DB2.
   The DB2 Registration Wizard opens.
   **Important!** If you have just installed the DB2 server on the proxy collector, you must restart the computer before running the registration wizard. Otherwise, the wizard will fail to start.

2. Select a computer to serve as the proxy collector. The wizard creates this list by searching the Computers table for machines that have the DB2 client software and the DB2 ODBC driver installed.
3. Select the instance you want to register from the list, and enter the user name and password for the user under whom the collection should be performed.

**CA SRM DB2 Registration Wizard**

**Select a DB2 Instance**

Select the DB2 instance (host) with its related instance name, and define access security. Make sure the given user has the needed privileges (press Help for details) to collect all information from the DB2 database.

<table>
<thead>
<tr>
<th>DB2 Instances</th>
<th>Host Name</th>
<th>Instance</th>
<th>Port</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB2a1</td>
<td>a1</td>
<td>1234</td>
<td></td>
<td>DB2a1</td>
</tr>
<tr>
<td>DB2a2</td>
<td>a2</td>
<td>1234</td>
<td></td>
<td>DB2a2</td>
</tr>
<tr>
<td>DB2b2</td>
<td>b2</td>
<td>1234</td>
<td></td>
<td>DB2b2</td>
</tr>
</tbody>
</table>

**Security**

User Name: [ ]

Password: [ ]

Note: If you do not see any instances, it is because the DB2 instance has not been cataloged on the proxy collector; the DB2 server has not been registered as a managed computer; or both. Make sure the proxy collector has the DB2 instance cataloged (see page 208) and that the DB2 server is a managed computer.

If you have not cataloged the instance, but the DB2 server has been registered as a managed computer, you can catalog the instance directly from the wizard by clicking Catalog new Instance. For more information about using this feature, click Help.
4. Choose the frequency with which you want to update the DB2 data. Select the Detailed check box if you want to collect detailed data.

   **CA SRM DB2 Registration Wizard**

   **Set Collection Properties**
   
   Check 'Detailed' check box if you want to collect detailed information. (Press 'Help' for more information)

   | Detailed (Check to collect Detailed Information) |  ✔  |
   | Data Collection Frequency | Every Day |

   **Note:** Collecting detailed information increases the time required by the data collection service.

5. Edit the fields in this dialog if you want to add a different location, organization, and contact:

   - **Location**- Lets you attach a geographic location to the computer or server. Select a location from the drop-down list. You can also click New Location to add the details of the new location in the Create New Location dialog. Click OK to exit the dialog.

   - **Organization**- Lets you attach organization to the computer or server. Select an organization from the drop-down list. You can also click New Organization to add the details of the new organization in the Create New Organization dialog. Click OK to exit the dialog.

   - **Contact**- Lets you add a contact. Click New Contact to add a contact using the Create New Contact dialog. Enter the name, telephone number, and email address of the new contact. You can access your default address book by clicking the To: Button and select the email address from there.

   **Note:** You can also add new contacts by clicking New Contact in the Create New Location dialog or Create New Organization dialog.

   Click Register.

   CA SRM registers the DB2 server.
Defining a Query Service

This section describes how to create a query using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the service is ready to use. If you want to tailor a service, use the Query Service Builder Wizard to customize it.

The following example shows you how to query DB2 partition group names. To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Query, as shown in the following diagram:

The Query table opens.
2. Click the Configuration menu and then New in the Query table. The Query Service Wizard opens. From the Query table main menu, select Configuration, New. The Template dialog opens. Expand Applications, DB2, and then select DB2 Partition Groups:

3. Narrow the scope of the query by selecting the type from the drop-down list and then check the specific objects you want queried by the service:

4. Select the execution frequency. The service can operate:
   - **Immediately**—Collection occurs immediately but only once.
   - **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
Defining a Query Service

- **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:
  - Hours
  - Days
  - Weeks
  - Months
  - Business Days
  
  If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies.
  
  The Retain Historical Data (Trending) option is only available when you enable periodic execution.

- **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).
  
  If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.

- **Hold**—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

5. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.
6. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Defining an Automate Service

This section describes how to create Automate services using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the automate service is ready to use. If you want to tailor a service, use the Automate Service Builder Wizard to customize it.

The following example shows you how to send an automated email when a DB2 instance is almost full.

To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Automate, as shown in the following diagram:

   ![Diagram]

   The Automate table opens. You can also access Automate services from the Open Systems file menu by selecting Create Services and then Automate.
2. Click the Configuration menu and then New in the Automate table. The Automate Service Wizard opens. From the Automate table main menu, select Configuration, and New. In the Template dialog expand Applications, DB2, and then select Low Resources DB2 Databases:

3. Select the condition the service must meet before it generates an action. In this example select 200 MB:
4. Select the scope for the action by choosing DB2 Databases from the drop-down list and then select whether you want all of the databases or individual databases:

5. Click the Message tab. Enter the email addresses of the people who need to receive this message. You can edit the message in the text box:

6. Select the execution frequency. The service can operate:

- **Immediately**—Collection occurs immediately but only once.
- **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
Defining an Automate Service

Chapter 8: Managing IBM DB2 Databases

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■ **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:
  
  – Hours
  
  – Days
  
  – Weeks
  
  – Months
  
  – Business Days

  If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies.

  The Retain Historical Data (Trending) option is only available when you enable periodic execution.

■ **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).

  If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.

■ **Hold**—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

7. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

  **Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.
8. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

![Automate Service Dialog]

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Chapter 9: Managing IBM Tivoli Storage Manager

CA SRM provides a licensed option that collects storage usage data from IBM Tivoli Storage Manager (TSM).

Note: For information about supported versions of TSM, see the documentation on the CA SRM software distribution CD-ROM or on the CA web site at ca.com.

This section contains the following topics:

- **TSM Support** (see page 223)
- **TSM Objects** (see page 227)
- **Managing TSM** (see page 229)
- **Registering TSM Servers** (see page 231)
- **Solving Problems** (see page 235)
- **Defining a TSM Message Scanner Service** (see page 240)
- **Defining a Query Service** (see page 250)
- **Defining an Automate Service** (see page 253)

**TSM Support**

CA SRM backup support for TSM helps the TSM administrator obtain information quickly about all TSM activity on the network, regardless of network size and complexity, and to take immediate action when necessary.
The CA SRM Application Server communicates with the TSM Server and collects from the TSM server information about TSM nodes, sessions, schedules, processes, and storage pools. The following diagram illustrates this:
CA SRM stores the information in objects, which you can view, analyze, and summarize using extensive reporting tools.

CA SRM bases most viewing and reporting functions of the TSM option on data retrieved from the TSM Server. CA SRM organizes this data into objects to which you can apply a set of query, analysis, and presentation tools.

The architecture of CA SRM is similar to that of TSM in that a dedicated server acts as a hub for a group of clients from which it collects data and for which it performs a set of storage management operations. The CA SRM server is called the Application Server. CA SRM manages its client computers. Each client computer has a CA SRM agent installed on it to collect data. The following diagram illustrates this:
When you combine CA SRM and TSM models, servers targeted by both systems become clients of the TSM server and the CA SRM Application Server. The following diagram illustrates this:
TSM Objects

CA SRM collects information about the following TSM objects:

**Nodes**
Lists the TSM nodes found in the CA SRM database.

**Servers**
Lists the TSM servers configured under a CA SRM Application Server. Its Application Server ID and its name uniquely identify each TSM server.

You add servers to the database individually. CA SRM lists each server under the Name, in the left column of the TSM Servers table. The data displayed in the table consists of the configuration information entered when the TSM server was added and statistical information collected periodically by the TSM data collection service.

**Sessions**
Presents a tabular view of the summary information recorded in the Activity Log file at the end of each TSM session. CA SRM identifies each session uniquely by its TSM Node ID and start date/time of the session. You can have multiple sessions per node.

**Accounting Sessions**
Objects representing the summary information recorded in the Accounting Log file at the end of each TSM session.

**Schedules**
Lists the schedules defined for TSM servers known to CA SRM.

In addition to schedule timing and its associated action, the table also lists the details of the last instance when CA SRM executed the action.

CA SRM obtains the planning data in the TSM Schedules table from the TSM server through TSM ODBC. The actual data is collected periodically from the session information by the TSM data collection service.

**Storage Pools**
Lists the storage pools defined for TSM servers known to CA SRM. A storage pool is a collection of volumes used by the TSM server to store backups.

The periodic TSM data collection service maintains the data in the Storage Pool table.

**Processes**
Lists the main processes running on the TSM server, such as migration, reclamation, inventory expiration, and so on. This information helps you evaluate the behavior of the TSM system, troubleshoot problems, and plan for future capacity.

The periodic data collection service maintains the data in the Processes table. This service scans the messages that each process writes to the Activity Log. A summary of this information appears in the TSM Servers table.
Volumes

Lists volumes used for TSM backups. The Volume Properties dialog displays a summary of detailed information about the selected volume.

Libraries

Lists the TSM libraries (tape robots) configured into the CA SRM database. The Library Properties dialog displays a summary of detailed information about the selected library.

Drives

Lists all the TSM backup tape drives configured into the CA SRM database. The Drive Properties dialog displays a summary of detailed information about the selected drive.

Events

Lists all the TSM events (including their status) in the CA SRM database.

Filespaces

Lists all the TSM filesystems in the CA SRM database. From the filesystem table, you can zoom to the TSM node connected to each filesystem and, if CA SRM manages the TSM node, to the computer object itself. By examining this table, you can determine if there are any volumes that are not being backed up by TSM.

Path

Lists the TSM paths. Before you can use a device with a TSM server, you must define a path between the device and the server or the device and the data mover responsible for outboard data movement. You can use the following path relationships with TSM servers:

- Between a server and a drive or a library
- Between a storage agent and a drive
- Between a data mover and a drive or a library

Activity Logs

This table contains a copy of the TSM Activity Log database table. The Message Scanning Services fill this table with their result files.

Note: To help ensure that the Windows Client displays the most recent data collection, refresh open user views.
Managing TSM

CA SRM integrates the following functions to manage TSM:

**Data collection**

CA SRM, using an ODBC driver supplied by IBM, communicates with the TSM Server to obtain information about TSM nodes, sessions, schedules, storage pools, drives, libraries, volumes, and server processes, and scans the log files on all TSM servers. The CA SRM TSM Registration Wizard lets you specify how often you want the data collection service to be run. You can modify this by accessing the Object Tree and navigating to the following location:

Open Systems/Backup Products/TSM/Servers/Configuration/Modify

The TSM data collection agent now operates under the BOS/AGE framework which is product and platform agnostic. The improved porting of the TSM agent provides this additional registration wizard functionality:

- Discovery of TSM servers based on existing data sources targeted to TSM servers.
- Definition of new data sources for TSM servers.
- Validation of the user provided TSM access parameters.

**Data filtering, analysis, and calculation**

CA SRM can perform extensive statistical operations on the data extracted from logs.

**Viewing and reporting**

CA SRM’s flexible presentation facilities let you display information-rich summaries on screen, output them as printed reports, or export them for post-processing.

**Performance monitoring and capacity planning**

CA SRM lets you use query and reporting facilities to obtain performance information about TSM nodes and to plan future capacity based on an analysis of current trends.

**The TSM Messages Scanner Service**

CA SRM scans TSM servers for client and server-related messages. The TSM Messages Scanner Service can turn your display into a TSM command and control center that shows you all conditions of interest, with the organization and color alerts you specify. A single installation of CA SRM can handle several TSM servers. The system also addresses errors and conditions to which you want to respond with automatic actions.

The service collects client- and server-related messages in the following manner:

- **Client Messages**—CA SRM scans TSM logs for ANE-style messages and displays the information according to user-defined criteria. The service scans the Activity Log table of a TSM server database within a requested time range and creates a Result file when attention is selected.
You can also use the CA SRM attentions mechanism to propagate the scanning results.

CA SRM stores the resulting data in several objects, each one subject to its own filtering and post-processing:

- **The Result file** contains log records that match user-defined criteria.
- **The Attentions section** defines attentions, which CA SRM creates and issues during processing. CA SRM issues attentions automatically when it tests user-defined conditions in log records and finds them to be true.
- **The Messages section** defines patterns to which users have assigned severity levels. CA SRM tabulates these by severity.

- **Server Messages**—CA SRM scans the Activity log of the TSM servers for ANR-style messages and accumulates event information in Result files. The service can also generate attentions to notify users about potential problems on the TSM server, and set severity indicators on the TSM server object.

  **Note:** When you select Scan Events by List in the Server Messages Scanner service and enter a message number for an Informational Message, or select 'Information and Higher' from the Severity list, you must also have a corresponding statement in the [Activity Log Patterns] section of the Server-Pattern File to collect Informational Messages.

CA SRM also supports the following TSM functions:

**Retrieving data from the TSM Server**

You can use CA SRM tables to browse information retrieved from the TSM Server and organized into CA SRM objects.

**Viewing, extracting, and processing information from the TSM log files**

You can perform the following using a single CA SRM command:

- Retrieve all the lines that TSM has added to the Activity Log file since the previous midnight.
- Extract lines for selected time periods from the Activity Log file and save the extracted lines in a file, which you can then use for viewing or post-processing.
- Scan the Activity Log file automatically and issue attentions when it encounters certain text patterns.

You can form a TSM console by combining CA SRM data calculation, presentation, and messaging facilities, with the information collected from the TSM Server and log files. This reveals at a glance the events that require operator attention. Use the CA SRM analysis tools to process that same data to monitor performance and obtain capacity planning information.
Registering TSM Servers

To register and collect data from TSM servers, follow these steps:

1. Install the DB2 ODBC Driver on one or more managed computers or on the application server. These computers are tagged as Proxy Collectors in CA SRM. For more information about installing DB2, see Installing the DB2 Client and ODBC Driver (see page 231).

2. Set up a DB2 Data Source Name (DSN) on any of the Proxy Collector computers. You need one DSN for each DB2 server you want to register. For more information about setting up a DB2 DSN, see Setting Up a DB2 Data Source Name (see page 232).

3. Register the TSM server using the CA SRM TSM Registration Wizard. For more information about registering TSM servers, see Registering TSM Servers Using the Wizard (see page 232).

Installing the DB2 Client and ODBC Driver on the Proxy Collector

To collect data from a DB2 database, the proxy collector must have the DB2 client software and the DB2 ODBC driver installed.

Follow these steps:

1. Install the DB2 client software on the proxy collector. The ODBC driver is automatically installed when you install the DB2 client software using the default options.

   The DB2 client can be found on the DB2 product CDs. See the IBM DB2 documentation for instructions on how to install the client.

2. From the Object Tree, expand the Network Storage folder and select the Computers node.

   The Computers table opens.

3. Right-click the proxy collector, and select Collect Now.

   CA SRM queries the proxy collector and detects the presence of the DB2 ODBC driver. This detection helps ensure that you can use the TSM Registration Wizard to designate the computer as the proxy collector.
Setting up a DB2 Data Source Name

CA SRM requires a system Data Source Name (DSN) to access the TSM DB2 server. This DSN can be defined on any of the Proxy Collector computers where the IBM DB2 ODBC driver is installed.

Follow these steps:
1. Run the CA SRM TSM Registration Wizard in the CA SRM Windows Client.
2. Click Create New DSN on the Select a TSM Server dialog.

For more information about registering TSM, see Registering TSM Servers Using the Wizard (see page 232).

Registering TSM Servers Using the Wizard

You can run the CA SRM TSM Registration Wizard from any CA SRM client computer.

Follow these steps:
1. Select Open Systems, Register, Backup Servers.
   The Backup Registration Wizard opens.
2. Click Next.
   The Backup Server Type screen appears.
3. Select Tivoli Storage Manager from the Backup Server Type list and click Next.
   The Select the TSM Version and a Proxy Collector screen appears.
4. Select the TSM version and the proxy collector you want to use for data collection and click Next.
   The list of proxy collectors is based on computers where the TSM ODBC driver or IBM DB2 ODBC driver for TSM 5.5 or 6.x is already installed.
   The Select a TSM Server dialog appears.
5. All defined DSNs available on the collector you selected in the previous dialog are listed here. Select a DSN from the list. In the Security section of the dialog, type the user name and password of a user with Analyst access rights on the TSM DB2 server.
   Note: Contact your TSM administrator if you do not have this information.
6. (Optional) Click New DSN to create DSN.
   The Create New DSN dialog appears.
Provide the following information:

**Host Name**
Specifies the name of the host where the TSM DB2 server is running.

**Port**
Specifies the port used by the target instance on this server.

**DSN**
Specifies the Data Source Name using which you connect to the database. When creating the DSN using the TSM Registration Wizard, the name cannot exceed 32 characters.

**DBAlias**
Specifies the alias name for the database from that you want to collect data.

**DB Name**
Specifies the database from that you want to connect and collect data.

**Description**
Specifies the description of the connection.

7. Select the objects about which you want to collect information from the TSM server. Designate the data collection frequency. Select a language and set the retention period by days (this impacts Sessions, Accounting Sessions, Processes, and Events).

**Note:** The default is 180.
Registering TSM Servers

8. (Optional) Add a location, organization, or contact to the server.

To attach a geographic location to the computer or server, select one from the drop-down list. You can manually add a location by clicking New Location. Type the location information and select a contact in the Create New Location dialog.

To attach an organization to the computer or server, select one from the drop-down list. You can manually add an organization by clicking New Organization. Type the organization name and select a contact in the Create New Organization dialog.

Add a contact by clicking New Contact in the Organization or Location dialogs. Type the name, telephone number, and email address of the new contact person in the Create a New Contact dialog. You can access your default address book by clicking the To: button and select the email address from there. Clicking OK returns you to the New Location or New Organization dialog.

9. Click Register.

You have successfully registered TSM server.

Configuring TSM DB2 Server

Establish the communication between SRM and TSM DB2 server by configuring TSM DB2 server. Follow the steps to set the communication protocol to be used on the target computer—TSM DB2 Server.

Follow these steps:

1. Type the following DB2 command from the DB2 command line (db2cmd).
   
   `Db2set DB2COMM=TCPIP`

2. Type the following DB2 command to verify
   
   `db2set --all`

3. Set the SVCENAME parameter and TCP port number by providing the following command.
   
   `DB2 update dbm cfg using svcename <service name>`

4. Update the `%SYSTEMROOT%\system32\drivers\etc\services` file with the service name and the port number to configure TCP port
   
   `<service name> 50000/tcp`

5. Stop and start the DB2 using db2stop and db2start to make the changes active.
TSM Server Post-Upgrade

After the successful upgrade from TSM 5.x to TSM 6.x version, follow these steps:

1. Configure TSM DB2 Server configuration. For more information about configuring DB2 server, see TSM DB2 Server Configuration (see page 234).
2. Delete the TSM 5.x Server from the SRM, if it is already registered.
3. Do a fresh TSM Registration for the upgraded TSM 6.x.

Important! If you perform ad-hoc collection without deleting the existing TSM, the data collection fails.

Solving Problems

This section describes some CA SRM functions that you can use with TSM to solve some of your storage management problems.

Filtering and Calculations

CA SRM reduces and summarizes TSM log data according to user specifications. Data reduction and post-processing are different for each object created from the TSM logs. The following list describes the differences:

- CA SRM filters the Extract and Result files at the time of collection according to user-defined patterns.
- CA SRM generates attentions according to user-defined conditions that CA SRM tests at the time of data collection. Conditions generally involve counting the number of occurrences of given messages and comparing the result with a test value.
- CA SRM identifies severity levels during data collection by comparing user-assigned severity values against individual messages. You can further tabulate and use the results to test conditions.
- CA SRM subjects the accumulated summary data of the various TSM sessions (the session data) to extensive post-processing and statistical analysis. The periodic TSM data collection service scans the session data, organizes it by TSM nodes, and totals and averages session statistics by node. CA SRM then adds this calculated information to the TSM node object. Similarly, the service totals and averages the node statistics by server. CA SRM adds this calculated information to the TSM server object.
Viewing and Reporting

CA SRM offers a rich selection of data viewing and reporting facilities. CA SRM stores each object (TSM servers, TSM nodes, and TSM sessions) in a table that users can subject to extensive manipulation. Some operations, such as Color Condition, require the definition and testing of their own set of conditions.

Examples of Problem Solving

This section provides step-by-step instructions for some of the most common procedures you can use to solve problems with CA SRM.

Notifying Operator of Failed Backup Operations

To periodically scan the TSM logs for backup failures, follow these steps:

1. From the Services folder of the CA SRM object tree, select TSM Message Scanner, as shown in the following diagram:
The TSM Message Scanner table opens.

2. From the TSM Message Scanner table main menu, select Configuration, New. The Template dialog of the TSM Message Scanner Server Builder Wizard opens. Expand TSM Message Scanning and select Scan Client Logs:

3. Select TSM Nodes from the Selection Type drop-down list and check the boxes next to the objects that you want to scan for failures:
4. Enter the e-mail address that you want the attention sent to in the To... text box. Check the Create Extract File box to save log entries that contain the lines that are not excluded by matching patterns:

![TSM Message Scanner Service Builder](image)

**Note:** You can edit the patterns file directly by clicking [edit button].

5. Define when or how often you want to execute this service:

![TSM Message Scanner Service Builder](image)
6. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.

7. In the TSM Client Messages Scanning dialog enter a service name in the Name field. Optionally, enter a description of the service. Click OK.

**Investigating the Cause of Failed Backup Operation**

The following example shows you how to discover the reason for backup failures by locating the lines in the log that have triggered the severity condition.

To locate the lines in the log, follow these steps:

1. Open the TSM Nodes table.
2. Select a node with a Fatal severity level. It is easier to make the selection if you have assigned colors to severity levels.
3. To examine the entries in the log file that triggered this level, click the Result File button.
4. When the Result file appears in the editor, the cursor points to the string pattern that triggered the severity. Below the string pattern, the editor lists all the log lines that contain the pattern.
5. Address the fault situation, then close the editor.
6. To reset the Severity level of the TSM node, click the Reset Severity button. This sets the severity level of the node to Harmless.
7. Repeat Steps 2-6 for all TSM nodes that show a severity other than Harmless, until you complete investigating the causes for backup failures on all TSM nodes.
Rerunning Backup of Skipped Files

The following example shows you how to periodically scan the TSM logs for backup failures and reactivate the backup on failed nodes. It also shows you how to configure CA SRM to send attentions by email with failed nodes and file names listed.

To scan the TSM logs periodically for backup failures, follow these steps:
1. Create a class, TSM_NODES, containing the TSM nodes you want to monitor.
2. Create a class, EXTRACT_FILES, containing the extract files from TSM log files you want to scan.
3. Define a TSM Client Message Scanner Service to scan the TSM logs on nodes belonging to TSM_NODES. Extract the lines that contain “backup failure” and send an email attention for each failed node.
4. Define an Automate service that checks for files in the EXTRACT_FILES class and restarts the TSM backup on nodes on which a file exists with a size greater than zero.
   Note: You can incorporate the service definitions into a single procedure.

Defining a TSM Message Scanner Service

You can use the TSM Message Scanner service to scan the TSM servers for client and server-related messages:

- **Scan Client Logs**—CA SRM scans the Activity log for ANS-type client entries. The service can generate attentions to notify users about potential problems on TSM clients, and set severity indicators on the TSM client object.
- **Scan Server Logs**—CA SRM scans the TSM server database for ANR-type messages. The service can generate attentions to notify users about potential problems on the TSM server, and set severity indicators on the TSM server object.
The registration wizard automatically creates an extra DSN for each registered TSM server for use with these services.

After you define the period during which you want the scanning service to scan the logs, you can:

- Extract all of the lines within a defined period to a file specified in the TSM node configuration (the Extract file). You can also specify any lines not to be included in the Extract file.
- Scan all lines within a defined period and issue alerts when one or more of the following criteria are met:
  - Number of times a string appears in log lines
  - Number of times an error message appears in log lines
- Scan all the lines within a defined period and collect those containing defined substrings to a file specified in the TSM node configuration (the Results file).
- Assign severity levels to specified messages.

The conditions that control the operation of the scanning service are defined in the Pattern file.

The two services place their results in the TSM Activity Log table. This new table is purged based on the data retention parameter.

**Note:** When defining TSM services, ensure that there is adequate free space on the TSM servers to be scanned. The temporary tables created by the services require additional space.
Creating a Server Scan

This section describes how to create a TSM Message Scanner server service. To do this, follow these steps:

1. You can access this service from the Open Systems menu by selecting Create Services, and TSM Message Scanning. You can also access the service by expanding the CA SRM Object Tree, selecting Open Systems, Services, and then Service Definitions, as shown in the following diagram:
2. Select the data you want to scan in this service. Select the data type from the Selection Type drop-down list:

- Servers
- Classes

Select the objects from the object list. This list varies depending on whether you selected servers or classes in the previous step. If you select classes, then all of the records from the Class table display. If you select servers, then all of the TSM servers registered in the CA SRM database display:
3. Select a pattern file and event categories. In the Patterns field, enter the path name of the file containing the text patterns for which you want to search the log file. You can use the Edit icon to modify it. See Working with the Pattern File (see page 249).

In the event categories section you can select one of the following options:

- **All**—Scan all of the events.
- **Category**—Select one or more predefined categories from the list.
- **List**—Enter the actual message number or the range of message numbers that you want to scan. You can only use numbers and dashes in this box.

After you select an option you can designate the severity from the drop-down list. Select the lowest severity level that you want to include in the scan. The service scans messages with the selected severity level and higher:
4. Select one of the following:

- **Since Last Scan**—Scans from the last scan. The first scan is done by default 7 days after the current date. This 7 days time interval is fixed. You cannot alter it. After the initial scan, the subsequent scans (depends on execution frequency) occur from the last scan date to the current date.

  If you change the proxy collector machine, the scan interval is once again 7 days after the current date.

- **Interval**—Scans at a time interval that you define. Enter a range of dates in the From and To fields. You need to enter the time in the format `<date>` or `<date>` at `<time>` (1/1/2006, or 1/1/2006 at 12:30 PM). You can also use keywords TODAY (representing 12 AM) and NOW (the present time), together with offsets in days and hours (for example, TODAY+8 hours refers to 8 AM).

  If the From and To fields are left empty, the service assumes From to be TODAY-1 DAY (12 AM of the previous day) and To to be NOW:
5. (Optional) Select attention messages. The messages contain the Attention text (as defined in the Pattern file). Select one or more of the following:

- Activity Monitor
- SNMP
- Windows Event Log
- E-Mail Address

If you select email, the recipient receives the Attention text in the body of the email and all of the Result files in an attachment:

6. Select the execution frequency. The service can operate:

- **Immediately**—Collection occurs immediately but only once.
- **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
■ **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:
  - Hours
  - Days
  - Weeks
  - Months
  - Business Days

  If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies.

  The Retain Historical Data (Trending) option is only available when you enable periodic execution.

■ **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).

  If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.
Hold—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

7. Keep the service or the changes you made by clicking:
   - **Save**—To save the service without it executing immediately.
   - **Launch**—To save your changes and execute the service immediately.

The Summary dialog provides a detailed description of the service you created or modified. If you do not want to keep the service or the changes you made, click Cancel to close the wizard. You can use the Back button to go back to a specific dialog and make any corrections necessary.
Working with the Pattern File

CA SRM provides a factory-defined Pattern file, called samplepattern.pat that you can use as a model to run the service. This is just a sample file that is replaced during upgrades. You need to create your own file to run the service.

The Pattern file contains the information the service uses to filter the records of the TSM Server Activity log files. You can customize the factory-defined file to suit your needs. The Pattern file is located in the \DATABASE\ADSM subdirectory of the CA SRM directory on the Application Server machine.

The Pattern file contains one section, [Activity Log Patterns], which defines a condition for generating attentions and the information included in the attention message, specifies the pattern that is the basis for the inclusion of log file records in the Result file, and sets the severity level displayed in the TSM servers table.

The command syntax is the following:

<pattern>; [<status>] [,<attention>]

where:

<pattern> has the following format: <event> [<condition> <counter>]

where:

<event> is the severity code embedded in the TSM log entry (I, W, E, or S)

or a list of message numbers or message number ranges

or a list of keywords.

<condition> can be =, !=, >, >=, <, <=.

<counter> is a natural, positive number (optional, default is >0).

<status> sets the severity level displayed in the TSM Servers table. It can be:

SEVERITY_FATAL, SEVERITY_CRITICAL, SEVERITY_WARNING, or SEVERITY_HARMLESS.

<attention> has the following format: ATTENTION [:“attention string”]

The attention string is the text included in the attention message when the condition is met.

S>2; SEVERITY_FATAL, ATTENTION: “Contact TSM Administrator.”

In the above example, if the event “S” is encountered more than twice, server severity is set to FATAL and the “Contact TSM Administrator” attention is issued.
Defining a Query Service

This section describes how to create a query using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the service is ready to use. If you want to tailor a service, use the Query Service Builder Wizard to customize it.

The following example shows you how to query the database each day for TSM servers.

To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Query, as shown in the following diagram:

   The Query table opens.
2. Click the Configuration menu and then New in the Query table. The Query Service Wizard opens. From the Query table main menu, select Configuration, and New. Expand Backup Products, then Tivoli Storage Manager, and select Servers.

3. Select TSM Servers from the drop-down list and check All Objects:

4. Select the execution frequency. The service can operate:

   - **Immediately**—Collection occurs immediately but only once.
   - **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
   - **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:
     - Hours
     - Days
     - Weeks
     - Months
     - Business Days

   If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies.

   The Retain Historical Data (Trending) option is only available when you enable periodic execution.
Defining a Query Service

- **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).

  If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.

- **Hold**—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

  **Note:** CA SRM uses historical data to calculate trend information.

5. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

  **Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.

6. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

```plaintext
Query

Name: TSM_SERVER_REPORT

Description:

Servers

Owner: ADMIN

Created: 12/6/2004 8:40AM

Modified: 12/6/2004 8:40AM

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
```
Defining an Automate Service

This section describes how to create Automate services using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the automate service is ready to use. If you want to tailor a service, use the Automate Service Builder Wizard to customize it.

The following example shows you how scan TSM backup servers and send a message to the Windows event log reporting on the state of TSM sessions.

To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Automate, as shown in the following diagram:

   ![Open Systems Diagram]

   The Automate table opens. You can also access Automate services from the Open Systems file menu by selecting Create Services and then Automate.

2. Click the Configuration menu and then New in the Automate table. The Automate Service Wizard opens. From the Automate table main menu, select Configuration, and New. Expand Backup Products, then Tivoli Storage Manager, and select Session State.
3. **Select FAILED as session state condition:**

4. **Select TSM Sessions from the drop-down list and check All Objects:**
5. Enter the message that you want to send when the conditions have been met in the Message text box. Check the Windows Event Log check box:

6. Select the execution frequency. The service can operate:

   ■ **Immediately**—Collection occurs immediately but only once.

   ■ **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.

   ■ **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:
     - Hours
     - Days
     - Weeks
     - Months
     - Business Days

   If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies.

   The Retain Historical Data (Trending) option is only available when you enable periodic execution.

   ■ **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).

   If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.
■ **Hold**—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

7. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

   **Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.

8. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
CA SRM provides a licensed option that collects storage usage data from Legato NetWorker.

This chapter describes how to use this option. It includes the following topics:

- Legato NetWorker objects
- Registering Legato NetWorker servers
- Reporting
- Defining a Query service
- Defining an Automate service

**Note:** For information about supported versions of Legato NetWorker, see the documentation on the CA SRM software distribution CD-ROM or on the CA web site at ca.com.

This section contains the following topics:

- [Legato NetWorker Objects](#) (see page 258)
- [Registering Legato NetWorker Servers](#) (see page 259)
- [Reporting](#) (see page 262)
- [Defining a Query Service](#) (see page 262)
- [Defining an Automate Service](#) (see page 266)
Legato NetWorker Objects

CA SRM collects information about the following Legato NetWorker objects:

Servers
Object representing the server that controls the backup procedure. Only one server exists per Legato Network server.

Clients
Describes files to be saved, the schedule to use, the directive to exclude files, which policy to apply, and who is permitted to backup, browse, and recover this client’s files.

Jukeboxes
Represents any library.

Devices
Represents the local connected device, or the device connected to a storage node.

Schedules
Schedules that can be assigned to a client or group.

Label templates
Rules used to create volume labels. Each pool has a unique label.

Pools
Collection of volumes and criteria backup data must comply with to use this pool, for example, offsite, full, archive.

Policies
Data lifecycle policy, for example, year, week, month, quarter.

Nodes
Lists the Legato NetWorker nodes in the CA SRM database.

Media
Objects representing distributed servers that handle media procedures such as read, write, import, export, and mount.

Groups
Collection of client resources. There may be different backup schedules in a group, but all clients in the group start at the same time.

Directives
File processing activity, for example, include and exclude list.

Savesets
The data to be backed up.
Saveset Spans

Reports about a particular saveset. If a saveset spreads across multiple volumes, then a saveset span table contains multiple entries for that particular saveset. There is one entry for each volume on which the part of saveset contains.

Note: To help ensure that the Windows Client displays the most recent data collection, refresh open user views.

Registering Legato NetWorker Servers

To register and collect data from Legato NetWorker servers, follow these steps:

1. Ensure that iGateway is installed and running on the same computer as Legato NetWorker.
2. Install LNWiSponsor on the same computer as Legato NetWorker. You can find the LNWiSponsor from the iSponsor folder on DVD media.
3. Register the Legato NetWorker server using the CA SRM Backup Registration Wizard. For more information, see Using the CA SRM Backup Registration Wizard in this chapter.
Using the CA SRM Backup Registration Wizard

You can initiate data collection only from the Application Server.

To register a Legato NetWorker server using the CA SRM Backup Registration Wizard, follow these steps:

1. From the Open Systems menu, select Register, Backup Servers.
2. Click Next on the Welcome dialog. Select Legato NetWorker and select the operating system type from the drop-down list.
3. In the Setting Discovery information dialog select one of the following:
   - To add backup servers manually, select Skip discovery and add candidates manually. Go to Step 4.
   - To automatically discover backup servers, select Automatically discover candidates and enter the Subnet Name and Subnet Mask. Go to Step 6.
5. In the Add server dialog:
   - Enter the name of the backup server.
   - Select the proxy collector from the drop-down list.
   - Select the data collection frequency.
   - Check the Trigger events box to receive information about events that were generated on the Legato NetWorker server. These events are specified to Legato while installing the LNWiSponsor.
   - Enter the user name and password necessary to allow the trigger event:

![Add Legato NetWorker Windows server](image)

Clicking OK returns you to the Selecting Servers and Setting Security.
6. Select the backup servers from the list of candidate servers that you want to register. You can change the proxy collectors, data collection frequencies, and trigger events for each server by clicking in the corresponding boxes. When finished, click Register:

7. (Optional) You can add a location, organization or contact to the machine you want to register.

To attach a geographic location to the computer or server, select one from the drop-down list. You can manually add a location by clicking New Location. Type the location information and select a contact in the Create New Location dialog.

To attach an organization to the computer or server, select one from the drop-down list. You can manually add an organization by clicking New Organization. Type the organization name and select a contact in the Create New Organization dialog.

Add a contact by clicking New Contact in the Organization or Location dialogs. Type the name, telephone number, and email address of the new contact person in the Create a New Contact dialog. You can access your default address book by clicking the To: button and select the email address from there. Clicking OK returns you to the New Location or New Organization dialog.
Reporting

CA SRM provides extensive reporting on many aspects of Legato NetWorker activity, devices, and media. You can schedule reports for execution at regular times or on demand. CA SRM produces a variety of report output formats and redirects them for distribution through email.

CA SRM provides several predefined report formats that you can use without modification. Additionally, you can generate custom reports using the Query service, and define the source objects to report on, the information to be included, the format (spreadsheet columns), and the output of the report.

Defining a Query Service

This section describes how to create a query using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the service is ready to use. If you want to tailor a service, use the Query Service Builder Wizard to customize it.

The following example shows you how to query the database immediately for backup nodes.

To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Query, as shown in the following diagram:

   The Query table opens.
2. Click the Configuration menu and then New in the Query table. The Query Service Wizard opens. Expand Backup Products, then Backup Servers, and select Backup Nodes in the Template dialog:

3. Select Backup Server Nodes from the drop-down and then select the Legato nodes in the list:

4. Select the execution frequency. The service can operate:
   - **Immediately**—Collection occurs immediately but only once.
   - **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
Defining a Query Service

- **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:
  - Hours
  - Days
  - Weeks
  - Months
  - Business Days

  If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies.

  The Retain Historical Data (Trending) option is only available when you enable periodic execution.

- **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).

  If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.

- **Hold**—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

5. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.
6. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

![Query dialog]

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Defining an Automate Service

This section describes how to create Automate services using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the automate service is ready to use. If you want to tailor a service, use the Automate Service Builder Wizard to customize it.

The following example shows you how to check the status of Legato NetWorker media and send a message to the Windows event log if it is more than 70 percent full. To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Automate, as shown in the following diagram:

   ![Open Systems Diagram]

   The Automate table opens. You can also access Automate services from the Open Systems file menu by selecting Create Services and then Automate.
2. Click the Configuration menu and then New in the Automate table. The Automate Service Wizard opens. From the Automate table main menu, select Configuration, and New. In the Template dialog expand Backup Products, then Legato NetWorker, and select NetWorker Media Used.

3. Select 70 from the drop-down list:

4. Select NetWorker Media from the drop-down list and check All Objects:
5. Enter the message you want to send in the Message text box. Check the Windows Event Log check box:

![Automate Service Builder](image)


7. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.

8. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

![Automate](image)
You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Chapter 11: Managing Lightweight Directory Access Protocol Servers

CA SRM provides a licensed option that collects storage usage data from Lightweight Directory Access Protocol (LDAP) servers.

This chapter describes how to use this option. It includes the following topics:

- LDAP support
- LDAP objects
- Registering LDAP servers

This section contains the following topics:

LDAP Support (see page 271)
LDAP Object (see page 272)
Registering an LDAP Server (see page 272)

LDAP Support

CA SRM assembles and presents information about:

- **Organizations**—Contains data for organizational entities in the enterprise, physical locations, and responsibility entities.

- **Locations**—Contains data like street, city, and country.

- **Contacts**—This is a designation you create. It reflects the person or group who manages the computer.

The LDAP agent automatically creates the link between the computers and the above organizational entities.
**LDAP Object**

Information about this object is collected from LDAP machines and stored as a CA SRM object. You can filter, sort, and query the object, represent it graphically, and customize the presentation in other ways.

The LDAP Servers table lists the LDAP servers found in the CA SRM database. This table contains the data for those servers.

**Note:** To help ensure that the Windows Client displays the most recent data collection, refresh open user views.

**Registering an LDAP Server**

Prior to LDAP registration for Novell servers, you need to export or install the Novell Directory Services (NDS) Server Certificate on the Application Server machine. There are three ways to do this:

- Write a program. You can find the instructions for this at the Novell developer site.
- Use the iManager (a Novell component). Consult your Novell documentation for instructions.
- Use Open Console One:
  1. Install Novell Client and NICI Client on a Windows machine.
  2. Open Console One, browse to the certificate object in the tree.
  3. Select Certificates/Trusted Root tab on the Property page.
  4. Click the Export button. For the **Do you want to export the private key with the certificate** option, click No and then click Next. You can rename the file to a shorter name if you want. Click Next and then Finish.
  5. Copy the file to the machine where you need to install it.
  6. Double-click the copied file in the Windows explorer to open the certificate viewer.
  7. Choose the option to install certificate. Make sure that you install this certificate into the “Trusted Root Certification Authorities” Store.
Using the LDAP Registration Wizard

To register an LDAP server follow these steps:

1. Specify the servers that you want to register. Enter:
   - LDAP server name.
   - LDAP port.
   - Root Directory. The default choice is the domain’s distinguished name used to authenticate the client by the server. The directory root is where the search starts.

   Click Get Root Directory to retrieve all root directories from the LDAP server and populate it as a drop-down list. Selecting * indicates the data collection from all LDAP directories.

   Then select either an Anonymous or Secured connection.

   If you select Anonymous, CA SRM only collects information (location, organization, and contact) from computers that you configured to be collected by the anonymous user in the LDAP Server.

   If you select Secured, then enter the user name and password. The user name needs to be a distinguished name with this format:

   `cn=user, ou=people, o=country`

   If you do not have sufficient privileges to collect data for the root directory selected, you cannot collect any information from LDAP:

![CA SRM LDAP Registration Wizard](image-url)
2. Select a vendor:
   - Active Directory (Microsoft)
   - Domino (Lotus)
   - NDS (Novell)

Choose the frequency with which you want to update the LDAP data:

3. Click Register to finish the registration.

   **Note:** In order to collect location and organization information from the LDAP server itself, the server must be registered as a managed computer. CA SRM only collects location and organization information from managed computers.
Chapter 12: Managing Lotus Domino

CA SRM provides a licensed option that collects storage usage data from Lotus Domino servers.

This chapter describes how to use this option. It includes the following topics:

- Lotus Domino support
- Lotus Domino objects
- Registering Lotus Domino servers
- Defining a Query service
- Defining an Automate service

Note: For information about supported versions of Lotus Domino, see the Readme file on the CA SRM software distribution CD-ROM or on the CA web site at ca.com.

This section contains the following topics:

Lotus Domino Support (see page 275)
Lotus Domino Objects (see page 277)
Registering Lotus Domino Servers (see page 277)
Defining a Query Service (see page 283)
Defining an Automate Service (see page 287)

Lotus Domino Support

CA SRM enables you to efficiently manage your Lotus Domino servers. The data collection service collects information about the size of mail for servers, private folders, and mailboxes.

You can use CA SRM to perform the following tasks:

- Monitor size, free space, and occupied space information
- Analyze trends
- Set alerts when certain conditions are met

CA SRM collects and stores information from Lotus servers as CA SRM objects. You can filter, sort, and query these objects, represent them graphically, and customize the presentation in other ways.

Note: To minimize the impact of data collection on system performance, limit the scope of information you want to collect and specify the computers from which you want this information collected.
Data Collection

CA SRM allows users to register Domino servers because it verifies that the user belongs to the "LocalDomainServer" group. By default, users that belong to this group have permission to all of the databases. The database administrator, however, can remove permissions for any specific database for this user or group.

If the data collection user does not have privileges for certain databases on the Domino server, the LNO agent is unable to retrieve storage details for those specific databases. The data collection summary report contains a list of databases CA SRM did not collect data about due to access privilege problems.

For one specific system database, dbdirman.nsf (Domino Directory database), administrators cannot add access privileges. If the data collection user does not have privileges for this database, CA SRM does not collect details for it.

Note: To help ensure that the Windows Client displays the most recent data collection, refresh open user views.

Events

To see the events generated by the Lotus Domino Server inside CA SRM, you need to perform the following tasks:

1. Install the Lotus SNMP agent (lnsnmp.exe) in the Domino server program directory. The Lotus SNMP agent setup is available in this directory.

2. Configure the SNMP agent on the Domino server to send the SNMP traps (trap destination) to the Application Server machine. When you configure the agent, use "public" as the community name for the traps.

   Note: The SNMP trap configuration differs depending on the operating system that the Domino server is installed on. See the Lotus Domino documentation for this.

3. Install the SNMP service on the Application Server machine.

4. Open the Control Panel, Administrative Tools, and Services on the Application Server machine. Start CA SRM Trap Service to receive the traps.
Lotus Domino Objects

CA SRM captures information about the following Lotus Domino objects:

**Domains**
- Consists of more than one server sharing the same directory.

**Clusters**
- A cluster is a collection of Lotus Domino servers and replication servers.

**Servers**
- This table lists the Lotus Domino servers found in the CA SRM database.

**Database Stores**
- A physical location for the databases of a particular Lotus Domino instance.

**Mailbox Stores**
- A particular type of database store that contains only mailbox databases.

**Databases**
- Databases house all of the application data like logs, mailboxes, and discussion libraries.

**Mailboxes**
- A type of database that holds mail for a particular user.

**Private Folders**
- A private folder is defined in the context of a mailbox. A user can define several private folders for mail purposes.

**Events**
- Events are generated by the success or failure of different actions. The server categorizes these actions into several classes.

Registering Lotus Domino Servers

To register a Lotus Domino server with CA SRM, perform the following steps:

1. Register a computer that has Lotus installed on it as a managed computer.
2. Register the Lotus instance using the CA SRM Lotus Registration Wizard.

The following section describes the registration.
Using the Lotus Registration Wizard

To register Lotus Domino servers with CA SRM, follow these steps:

1. From the Open Systems menu of the CA SRM Windows Client, select Register, Applications, and then Lotus.

2. Select a proxy collector from the drop-down list. The wizard creates this list by searching the Computers table for machines that have the Lotus Domino client already installed:

   ![CA SRM Lotus Registration Wizard](image)

   - **Select a Proxy Collector**
     - Select a Windows machine from the list. This machine will be used as a Proxy Collector to interrogate the target Lotus Server.

   - Proxy Collector: `LOTUS_PROXY01`
3. Select the server you want to manage. To do this:

1. Select a NOTES.INI file. These files reside on the Lotus clients (proxy servers) with each file containing the information necessary to connect to a specific Lotus server.

2. Enter the user name and password for the selected Lotus server:
4. (Optional) If you want to create a new NOTES.INI file, click Create New Instance. Enter the following information:

- **User ID File**—Enter User ID file. This is an encrypted certificate for any user. It is a file generated by the Domino Server per user. You can keep the file anywhere and its path is stored in the notes.ini file. Enter the full path of the file.

- **Mail Server**—Enter the Lotus Domino server.

- **Network Type**—Select the type TCP, NETBIOS, or NWSPX.

- **Organization**—Enter the Lotus Domino organization.

![Create new Instance dialog box](image)

5. Select a Lotus server. This list is comprised of servers that you can connect to from the selected NOTE.INI file:

![Select Lotus Server dialog box](image)
6. Select how detailed and how often you want to collect data:

- **Detailed**—Check this box to collect detailed information the Lotus Domino servers. CA SRM collects basic information automatically. Collecting this information increases the overall time required by the data collection service.

- **Data Collection Frequency**—Indicates how often you want the data collection service to be activated:
7. (Optional) You can add a location or organization to the Lotus server that you want to register. You can create locations and organizations, select existing ones, or select them from Lotus:

To attach a geographic location to the computer or server, select one from the drop-down list. You can manually add a location by clicking New Location. Type the location information and select a contact in the Create New Location dialog.

To attach an organization to the computer or server, select one from the drop-down list. You can manually add an organization by clicking New Organization. Type the organization name and select a contact in the Create New Organization dialog.

Add a contact by clicking New Contact in the Organization or Location dialogs. Type the name, telephone number, and email address of the new contact person in the Create a New Contact dialog. You can access your default address book by clicking the To: button and select the email address from there. Clicking OK returns you to the New Location or New Organization dialog.

Click Register when finished.
Defining a Query Service

This section describes how to create a query using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the service is ready to use. If you want to tailor a service, use the Query Service Builder Wizard to customize it.

The following example shows you how to query the quota amount of Domino mailboxes. To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Query, as shown in the following diagram:

The Query table opens.
2. Click the Configuration menu and then New in the Query table. The Query Service Wizard opens. Expand Templates, Applications, Lotus Domino, and then select Domino Mailboxes:

3. Select Domino Mailbox Percent Disk Quota Used and then designate the percent of the quota:

4. Select the execution frequency. The service can operate:
   - **Immediately**—Collection occurs immediately but only once.
   - **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
- **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:
  - Hours
  - Days
  - Weeks
  - Months
  - Business Days

If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies.

The Retain Historical Data (Trending) option is only available when you enable periodic execution.

- **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).

If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.

- **Hold**—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kick off this service from outside of CA SRM using the command line option. Hold is not available for every service.

5. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.
6. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

![Query Dialog](image)

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Defining an Automate Service

This section describes how to create Automate services using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the automate service is ready to use. If you want to tailor a service, use the Automate Service Builder Wizard to customize it.

The following example shows you how to query critical Lotus events and then send an e-mail to the Lotus administrator. To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Automate, as shown in the following diagram:

   ![Open Systems](image)

   The Automate table opens. You can also access Automate services from the Open Systems file menu by selecting Create Services and then Automate.
2. Click the Configuration menu and then New in the Automate table. The Automate Service Wizard opens. Expand Applications, Lotus Domino, and then select Domino Events - High Severity:

3. Select Domino Event Severity form the Selection Type drop-down list and then select the severity level:
4. Click the Message tab. Enter the e-mail addresses of the people who need to receive this message. If a Domino event has a severity level of critical, then CA SRM automatically generates a message and sends it to the people listed here:

![Automate Service Builder](image)

5. Select the execution frequency. The service can operate:

- **Immediately**—Collection occurs immediately but only once.
- **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
- **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:
  - Hours
  - Days
  - Weeks
  - Months
  - Business Days

If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies.

The Retain Historical Data (Trending) option is only available when you enable periodic execution.

- **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).

If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.
Defining an Automate Service

- **Hold**—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

6. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

   **Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.

7. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

   ![Automate Dialog](image)

   You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Chapter 13: Managing Microsoft Exchange

CA SRM provides a licensed option that collects storage usage data from Microsoft Exchange servers.

This chapter describes how to use this option. It includes the following topics:

- Microsoft Exchange support
- Microsoft Exchange objects
- Data collection
- Access Rights
- Registering Microsoft Exchange servers
- Defining a Query service
- Defining an Automate service

Note: For information about supported versions of Microsoft Exchange, see the documentation on the CA SRM software distribution CD-ROM or on the CA web site at ca.com.

This section contains the following topics:

- Microsoft Exchange Support (see page 291)
- Microsoft Exchange Objects (see page 292)
- Data Collection (see page 293)
- Access Rights (see page 296)
- Registering Microsoft Exchange Servers (see page 297)
- Defining a Query Service (see page 303)
- Defining an Automate Service (see page 306)

Microsoft Exchange Support

CA SRM enables you to efficiently manage your Microsoft Exchange servers. The data collection service collects information about the age and size of mail for servers, public folders, and mailboxes. CA SRM lets you manage your data, create customized reports, view trend activity, and be notified when preset thresholds are exceeded.
Microsoft Exchange Objects

CA SRM captures information about the following Microsoft Exchange objects:

**Organizations**
Objects representing organizations in a Microsoft Exchange Server directory.

**Servers**
Objects representing servers in a Microsoft Exchange Server directory.

**Storage Groups**
Objects representing storage groups in a Microsoft Exchange Server directory.

**Database Availability Groups (DAG)**
Objects representing the base component of the high availability and site resilience framework that is built in the Microsoft Exchange Server 2010 directory.

**Mailbox Database / Mailbox Store**
Objects representing mailbox store / mailbox database in a Microsoft Exchange Server directory.

**Mailbox Database Copies**
Objects representing the replicated copies of all the Mailbox Databases across the DAG in a Microsoft Exchange 2010 Server directory.

**Mailboxes**
Objects representing mailboxes in a Microsoft Exchange Server directory.

**Mailbox Folders / Private Folders**
Objects representing mailbox folders / private folders in a Microsoft Exchange Server directory.

**Public Folder Database / Public Stores**
Objects representing public folder database / public stores in a Microsoft Exchange Server directory.

**Public Folders**
Objects representing public folders in a Microsoft Exchange Server directory.

**Attachments**
Objects representing attachments in a Microsoft Exchange Server directory.

**Note:** To help ensure that the Windows Client displays the most recent data collection, refresh open user views.
Data Collection

CA SRM lets you collect the following types of data:

Basic

CA SRM collects basic information by default. However, the basic collection does not show the following details:

- Attachments
- Public folders
- Bucket details as shown in the following table are not collected for any of the exchange objects.

<table>
<thead>
<tr>
<th>Display Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mailboxes less than 1 day</td>
<td>Size of mailboxes that are 1 day old at the most</td>
</tr>
<tr>
<td>Mailboxes less than 1 week</td>
<td>Size of mailboxes that are 1 week old at the most</td>
</tr>
<tr>
<td>Mailboxes less than 2 weeks</td>
<td>Size of mailboxes that are 2 weeks old at the most</td>
</tr>
<tr>
<td>Mailboxes less than 1 month</td>
<td>Size of mailboxes that are 1 month old at the most</td>
</tr>
<tr>
<td>Mailboxes less than 3 months</td>
<td>Size of mailboxes that are 3 months old at the most</td>
</tr>
<tr>
<td>Mailboxes less than 6 months</td>
<td>Size of mailboxes that are 6 months old at the most</td>
</tr>
<tr>
<td>Mailboxes less than 1 year</td>
<td>Size of mailboxes that are 1 year old at the most</td>
</tr>
<tr>
<td>Mailboxes more than 1 year</td>
<td>Size of mailboxes that are more than 1 year old</td>
</tr>
<tr>
<td>Mailbox messages less than 10 KB</td>
<td>Number of mailbox messages that their size is 10 KB at the most</td>
</tr>
<tr>
<td>Mailbox messages less than 100 KB</td>
<td>Number of mailbox messages that their size is 100 KB at the most</td>
</tr>
<tr>
<td>Mailbox messages less than 1 MB</td>
<td>Number of mailbox messages that their size is 1 MB at the most</td>
</tr>
<tr>
<td>Mailbox messages less than 5 MB</td>
<td>Number of mailbox messages that their size is 5 MB at the most</td>
</tr>
<tr>
<td>Mailbox messages less than 10 MB</td>
<td>Number of mailbox messages that their size is 10 MB at the most</td>
</tr>
<tr>
<td>Mailbox messages greater than 4 GB</td>
<td>Number of mailbox messages that their size is more than 4 GB</td>
</tr>
<tr>
<td>Public folders less than 1 day</td>
<td>Size of public folders messages that are 1 day old at the most</td>
</tr>
<tr>
<td>Public folders less than 1 week</td>
<td>Size of public folders messages that are 1 week old at the most</td>
</tr>
<tr>
<td>Public folders less than 2 weeks</td>
<td>Size of public folders messages that are 2 weeks old at the most</td>
</tr>
<tr>
<td>Public folders less than 1 month</td>
<td>Size of public folders messages that are 1 month old at the most</td>
</tr>
<tr>
<td>Public folders less than 3 months</td>
<td>Size of public folders messages that are 3 months old at the most</td>
</tr>
<tr>
<td>Public folders less than 6 months</td>
<td>Size of public folders messages that are 6 months old at the most</td>
</tr>
<tr>
<td>Public folders less than 1 year</td>
<td>Size of public folders messages that are 1 year old at the most</td>
</tr>
<tr>
<td>Public folders more than 1 year</td>
<td>Size of public folders messages that are more than 1 year old</td>
</tr>
<tr>
<td>Public folders less than 1 MB</td>
<td>Number of public folders messages that their size is 1 MB at the most</td>
</tr>
<tr>
<td>Public folders less than 10 MB</td>
<td>Number of public folders messages that their size is 10 MB at the most</td>
</tr>
<tr>
<td>Public folders more than 10 MB</td>
<td>Number of public folders messages that their size is more than 10 MB</td>
</tr>
<tr>
<td>Public folders less than 512 MB</td>
<td>Number of public folders messages that their size is 512 MB at the most</td>
</tr>
<tr>
<td>Public folders less than 1 MB</td>
<td>Number of public folders messages that their size is 1 MB at the most</td>
</tr>
<tr>
<td>Public folders less than 2 MB</td>
<td>Number of public folders messages that their size is 2 MB at the most</td>
</tr>
<tr>
<td>Public folders less than 4 MB</td>
<td>Number of public folders messages that their size is 4 MB at the most</td>
</tr>
<tr>
<td>Public folders greater than 4 MB</td>
<td>Number of public folders messages that their size is more than 4 MB</td>
</tr>
</tbody>
</table>

Detailed

Collects information about all objects. Collecting this information increases the overall time required by the data collection service. However, the detailed collection collects all the details along with the above mentioned bucket details.

You can choose which method of data collection you want to use when you register the Microsoft Exchange server.

CA SRM collects data from Microsoft Exchange 2010 servers using the following protocols:

WebDAV
Data Collection

Allows remote access to Microsoft Exchange 2010 servers

**OLEDB**

Allows local access to Microsoft Exchange 2010 servers.

**Note:** The larger the configuration, the longer data collection takes. To improve data collection time, we recommend that you collect data locally.

Before invoking the exchange Data collection, if the exchange server email domain name is different from the default domain name, then we need to edit the BOS.ini file under `\BrightStor SRM\Database` and add the following section:

```
[EXCH]
EmailDomainName=<email_domain_name>
```

These changes need to be done on the proxy collector host.

**Data Collection under FBA**

To enable data collection from Exchange servers that have Form Based Authentication (FBA) enabled, add the following parameter to the [EXCH] section of the BOS.ini file. 

FBA=1

**Note:** If the [EXCH] section does not exist, create it at the end of the file.

If the proxy collector machine only has the CA SRM Agent installed, the BOS.ini file is located in the following directory:

```
..\BrightStor SRM Data\Configuration
```

If the proxy collector machine has the Application Server installed, the BOS.ini file is located in the following directory:

```
..\BrightStor SRM Data\Database\Configuration
```
Data Collection over SSL

To enable data collection from Exchange servers that have Secured Socket Layer (SSL) enabled, add the following parameter to the [EXCH] section of the BOS.ini file:

\nOWASSL=1

**Note:** If the [EXCH] section does not exist, create it at the end of the file.

If the proxy collector machine only has the CA SRM Agent installed, the BOS.ini file is located in the following directory:

\..\BrightStor SRM Data\Configuration

If the proxy collector machine has the Application Server installed, the BOS.ini file is located in the following directory:

\..\BrightStor SRM Data\Database\Configuration

Software Requirements

The following software must be installed on the proxy collector to enable local and remote collection of Microsoft Exchange data:

- Microsoft XML (MSXML) 4.0 SP2
- MDAC 2.6 SP2 or higher

See the Microsoft web site for more information about downloading these components.

**Note:** For Exchange Server 2007 data collection, MSXML 4.0 SP2 must also be installed on the Exchange server.

Exchange 2010 and 2013

Install the following corresponding software on the proxy collector to enable remote collection of Microsoft Exchange data.

- Exchange Management tools
  
  After installing the corresponding exchange management tools, ensure that the Power shell and Exchange Snapin are present in that machine.

**Note:** In Exchange Server, the above mentioned software are installed with the Exchange installation. Hence, we recommend you to use the Exchange Server as a proxy collector.

If you want to use another Windows machine as a proxy collector in the same domain, install the above mentioned software in that machine.
Access Rights

The user who performs the data collection requires access to all of the mailboxes in the Microsoft Exchange Server. Microsoft suggests doing this by adding a non-administrator user to Microsoft Exchange Services or Microsoft Exchange Domain Servers groups. The Microsoft Exchange Services group may not exist if you have never deployed the Active Directory Connector in your organization.

By default, the Exchange Domain Servers group is granted access to all Exchange public folders and mailbox stores. This group contains the computer accounts for each Exchange server within a given domain.

In some companies, however, administrators may restrict access to mailbox stores to only the local server that hosts the stores. In this situation, you need to look at the security settings for each individual Exchange Server and manually grant the data collector user the same permissions as the Exchange Domain Servers group.

If the collection process ends with an error:

Logon failure: the user has not been granted the requested logon type at this computer.

Verify that the domain user stored in CA SRM for the proxy server has all the privileges to login to the domain.

**Note:** Adding the data collection user to other administrative groups, such as domain administrators or enterprise administrators, does not help because these groups often which are explicit Deny access in Exchange Server.


For Exchange Server 2007, 2010, and 2013, Exchange server administration can be performed by running simple scripts from Exchange Management Shell. To grant a user access to all the mailboxes in your organization, run the following script in the Exchange Management Shell:

```bash
```


To grant a user access to all the public folders in your organization, run the following script in the Exchange Management Shell for Exchange Server 2013:

```bash
```
File Access and Event Log

To obtain the file size of Exchange Database files and Log files (*.Edb, *.Stm, *.Log), CA SRM accesses the Administrative Share (C$, or D$) on the Exchange Server. This means the data collection user must belong to the local administrators group. If the user does not, the size of the mailbox stores and the public stores displays as a zero.

If the Exchange Server is the Domain Controller, then you need to add the data collection user as a domain administrator. This enables the data collection user to acquire access to the administrative shares on the Exchange Server. This administrative share access then prevents the user from accessing the mailbox data in the Exchange Server. Subsequently, the user cannot collect both sets of data at the same time.

CA SRM queries the Application Event log in the Exchange Server to get the free space data on public stores and mailbox stores. CA SRM then divides this number by the size of the database (database size comes from the Exchange Server’s Administrative Share file access) to obtain the percentage of free space. The data collection user who belongs to the Exchange Domain Servers group should already have the permission to access the Application Event log.

If the total size is missing (zero), even though the free space from the Application Event log is available, the “% Free” displays as N/A (cannot divide by zero).

When the name of a public store or a mailbox store changes, it takes a while for the information to update in the Application Event log. After a name change and prior to log update, the free space for the public store or mailbox store is unavailable.

Registering Microsoft Exchange Servers

To register Microsoft Exchange servers with CA SRM, follow these steps:

1. Do one of the following:
   - If you are using Microsoft Exchange 2000, add your account to the Exchange Services or Exchange Domain Servers group.
   - Grant your account full explicit permissions to specific STORES, including Receive As and Send As permissions.
2. Register the domain on which the Microsoft Exchange server is installed using the CA SRM Computer Registration Wizard. For more information, see the chapter “Managing Network Storage Objects.”
3. Register the Microsoft Exchange server using the CA SRM Exchange Registration Wizard. For more information, see Using the CA SRM Exchange Registration Wizard in this chapter.
Registering Exchange Clusters

The requirements for registering a clustered Exchange server depend on the kind of cluster setup you are running.

- For an Active/Active Exchange server cluster, register both instances using the Exchange Registration Wizard.
- For an Active/Passive SQL Server cluster, register the active instance using the Exchange Registration Wizard.

Aside from these requirements, there are no differences between registering a clustered Exchange server and registering a regular Exchange server.
Security and Registry Settings

With the updates included in MSXML 4.0 SP2, the ServerXMLHTTP object now checks the Internet Explorer security policy setting for submitting non-encrypted form data. If you set the Submit nonencrypted form data option to Disable or Prompt, an Access Denied error message occurs when you attempt to post form data using the ServerXMLHTTP object. To resolve this issue:

1. Click the Start menu, select Run, type mmc, and then press Enter.
2. Select Add/Remove Snap-in from the File menu.
3. Click Add in the Add/Remove Snap-in dialog.
4. Add the Group Policy snap-in to the Console Root.
6. Click Security Zones and Content Ratings.
7. In Security Zones and Privacy select the Import option button and click Modify Settings.
8. To resolve the issue for submitting non-encrypted form data, select the Local Intranet web content zone.
9. Set the Submit nonencrypted form data option to Enable.

If you are unable to modify the settings like this, the msxml4-adapt.reg file can alter your registry settings. It is located in the \Program Files\CA\CA SRM\UT directory on the Application Server machine. This file sets the following values in the registry to allow you to post non-encrypted data:

HKEY_LOCAL_MACHINE\Software\Policies\Microsoft\Windows\CurrentVersion\Internet Settings\Security_HKLM_only (Dword value) = 1

HKEY_LOCAL_MACHINE\Software\Microsoft\Windows\CurrentVersion\Internet Settings\Zones\3\1601 (Dword value) = 0

You may need to create the CurrentVersion and Internet Settings folders for this to work.

Note: This file works for Windows 2000, Windows XP, and Windows 2003 only.

Using the CA SRM Exchange Registration Wizard

To run the CA SRM Exchange Registration Wizard, follow these steps:

1. From the Open Systems menu of the CA SRM Windows Client, select Register, Applications, and Exchange.
2. Select the domain from the drop-down list and then select the Exchange server.


If no Exchange servers appear in the Computers list for a given domain, but you know that there are Exchange servers in the domain, enter your Active Directory credentials in the Username and Password text boxes and click Retry with Credentials.

Note: You only need to enter your Active Directory credentials if you are unable to discover any servers.
3. If you are registering an Exchange 2000, 2003, 2007, 2010, or 2013 computer, the following dialog opens:

![CA SRM Exchange Registration Wizard](image)

Enter:

- The name of the user used to access the Exchange server.
- The password (if the profile is password-protected).
- The data collection frequency.
- The collection threshold in megabytes. When storage for a mailbox exceeds the collection threshold, the data collection service collects detailed information about the mailbox folders.
- Check the Detailed check box if you want the server to collect detailed data.

CA SRM collects basic information automatically. Collecting detailed information increases the time required by the data collection service.

**Note:** The user must have administrator rights on the Exchange server, defined using the Microsoft Exchange Administrator utility.
4. In the Proxy Collectors dialog, select a collector and click Register:

   ![Proxy Collectors dialog]

5. (Optional) You can add a location, organization or contact to the machine you want to register.

   To attach a geographic location to the computer or server, select one from the drop-down list. You can manually add a location by clicking New Location. Type the location information and select a contact in the Create New Location dialog.

   To attach an organization to the computer or server, select one from the drop-down list. You can manually add an organization by clicking New Organization. Type the organization name and select a contact in the Create New Organization dialog.

   Add a contact by clicking New Contact in the Organization or Location dialogs. Type the name, telephone number, and email address of the new contact person in the Create a New Contact dialog. You can access your default address book by clicking the To: button and select the email address from there. Clicking OK returns you to the New Location or New Organization dialog.

   When finished, click Register.
Defining a Query Service

This section describes how to create a query using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the service is ready to use. If you want to tailor a service, use the Query Service Builder Wizard to customize it.

The following example shows you how to query Exchange public folders each week.

To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Query, as shown in the following diagram:

   The Query table opens.
2. Click the Configuration menu and then New in the Query table. The Query Service Wizard opens. Expand Templates, Applications, Exchange, and select Public Folders.

3. Select Exchange Servers from the drop-down list and check All Objects:

4. Select Execute periodically, enter 1 in the Every text box, and select Weeks from the drop-down list. Check the Retain Historical Data check box:

**Note:** CA SRM collects historical data to calculate trend information.
5. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.

6. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

![Query Dialog](image)

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Defining an Automate Service

This section describes how to create Automate services using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the automate service is ready to use. If you want to tailor a service, use the Automate Service Builder Wizard to customize it.

The following example explains how to send an e-mail message to yourself listing all Microsoft Exchange servers that have not been updated in the last 24 hours:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Automate, as shown in the following diagram:

The Automate table opens. You can also access Automate services from the Open Systems file menu by selecting Create Services and then Automate.
2. Click the Configuration menu and then New in the Automate table. The Automate Service Wizard opens. Expand Templates, Applications, Exchange, and select Servers not Updated opens:

3. Enter 24 in the text box:

4. Select Exchange Servers from the drop-down list and check All Objects:
5. Enter the message that you want to be sent when the conditions have been met in the Message text box. Enter your email address in the To... text box:

6. Select the execution frequency. The service can operate:

- **Immediately**—Collection occurs immediately but only once.
- **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
- **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:
  - Hours
  - Days
  - Weeks
  - Months
  - Business Days

If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies.

The Retain Historical Data (Trending) option is only available when you enable periodic execution.

- **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).

If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.
■ Hold—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

7. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.

8. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Chapter 14: Managing Microsoft SQL Servers

CA SRM provides a licensed option that collects storage usage data from Microsoft SQL server databases.

This chapter describes how to use this option. It includes the following topics:

- Microsoft SQL server support
- Microsoft SQL server objects
- Registering Microsoft SQL servers
- Reporting
- Defining a Query service
- Defining an Automate service

Note: For information about supported versions of Microsoft SQL servers, see the documentation on the CA SRM software distribution CD-ROM or on the CA web site at ca.com.

This section contains the following topics:

Microsoft SQL Server Support (see page 312)
Microsoft SQL Server Objects (see page 313)
Registering Microsoft SQL Servers (see page 314)
Defining a Query Service (see page 319)
Defining an Automate Service (see page 322)
CA SRM assembles and presents the information you need to manage your database storage more efficiently. CA SRM collects a variety of data to assist you in such tasks as tuning your system, setting alerts, planning capacity, reporting on raw devices, and so on. You can display unified views of data collected from multiple database instances running on different platforms. CA SRM logs on to all the databases automatically at scheduled times.

You can use CA SRM to perform the following tasks:

- Present complete logical volume information by combining data reported by Microsoft SQL server with raw device data collected by the CA SRM Agent
- Monitor size, free space, and occupied space information for servers, databases, file groups, tables, and datafiles (freespace and occupied space may be rounded)
- Analyze trends for servers, databases, file groups, tables, and datafiles
- Set alerts when certain conditions are met

**Note:** CA SRM cannot collect SQL Volume details for raw partitions.

CA SRM collects and stores information from Microsoft SQL servers as CA SRM objects. You can filter, sort, and query these objects, represent them graphically, and customize the presentation in other ways. CA SRM enables you to easily understand a server’s internal storage structure and needs, and correlates it to logical volumes, thus ensuring that the server does not stop working due to insufficient disk space.

**Note:** To minimize the impact of data collection on system performance, limit the scope of information you want to collect and specify only the computers from which you want this information collected.
Microsoft SQL Server Objects

CA SRM captures information about the following Microsoft SQL server objects:

**Servers**
Statistics for free and occupied space and size, data space usage, index space usage, and date of last data collection

**Databases**
Statistics for free and occupied space and size, data space usage, transaction log usage, data files usage, files usage, and date of last data collection

**File Groups**
Statistics for free and occupied space and size, table usage, and date of last data collection

**Tables**
Statistics for free and occupied space and size, data space usage, index space usage, rows, system table, and date of last data collection

**Data Files**
Statistics for free and occupied space and size, file growth, location, and date of last data collection

**Log Files**
Statistics for file size and growth, and date of last data collection

**Note:** To help ensure that the Windows Client displays the most recent data collection, refresh open user views.
Registering Microsoft SQL Servers

To register a Microsoft SQL server, follow these steps:

1. Install Microsoft Data Access Components (MDAC) 2.8.
2. Register the Windows domain in which the Microsoft SQL server belongs using the CA SRM Computer Registration Wizard. For more information, see the chapter “Managing Network Storage Objects.”
3. Register the Microsoft SQL server using the CA SRM SQL Registration Wizard. For more information, see Using the CA SRM SQL Registration Wizard in this chapter.

If you want to register Microsoft SQL Server 2005, you need to install the Microsoft SQL 2005 client software on the proxy collector. You also need to use the Windows authentication method during this collection.

To assure that SQL discovery finds all of the SQL servers in the domain, make sure that the domain proxy machine has the Microsoft SQL 2005 client installed.

Registering SQL Server Clusters

The requirements for registering a clustered SQL Server depend on the kind of cluster setup you are running.

- For an Active/Active SQL Server cluster, register both instances using the SQL Registration Wizard.
- For an Active/Passive SQL Server cluster, register the active instance using the SQL Registration Wizard.

Aside from these requirements, there are no differences between registering a clustered SQL Server instance and registering a regular SQL Server instance.
Using the CA SRM SQL Registration Wizard

You can run the CA SRM SQL Registration Wizard from any computer on which the CA SRM Windows Client is installed. You can collect data from any managed computer that has Microsoft SQL server client software installed and that belongs to the same domain as the machine on which the SQL server is installed.

To run the CA SRM SQL Registration Wizard, follow these steps:

1. From the Open Systems menu of the CA SRM Windows Client, select Register, SQL Servers. You can also start the CA SRM SQL Registration Wizard by selecting Configuration, Register from the SQL Servers table.

2. Select the name of the domain in which the Microsoft SQL server is located. If you want to skip the discovery process and manually add SQL servers, check the Skip discovery box:
In the Setting properties for the servers that will be configured dialog, do one of the following:

■ Check the Register boxes next to the servers that you want to register. The Add SQL Server dialog opens. Go to Step 4:
Click Add to add a Microsoft SQL server manually. The Add SQL Server dialog opens. Enter the name of the server you want to add. Go to Step 4.
3. In the Add SQL Server dialog do the following:

- Select the connection type:
  
  **Windows Authentication**—The data collection uses the access parameters defined for the domain on which the SQL server is running.

  **SQL Server Authentication**—Enter the User Name and Password of the user with administrator privileges to the Microsoft SQL server.

- Select the managed server that you want to use as the proxy collector. The proxy collector must be a member of the same domain as the Microsoft SQL server and it must be a managed computer in CA SRM. If the Microsoft SQL server is on a managed computer, it is the default selection.

- Click the browse button and select the data collection frequency. Check the Detailed check box if you want to collect detailed data.

- If you want to apply these definitions to all of the servers you selected in Step 3, click Use these definitions for all SQL Servers.

  Click OK. The Setting properties for the servers that will be configured dialog reappears. Click Register.

4. (Optional) You can add a location, organization or contact to the machine you want to register.

- To attach a geographic location to the computer or server, select one from the drop-down list. You can manually add a location by clicking New Location. This opens the Create New Location dialog. Enter the location information and select a contact. You can add a contact by clicking New Contact. This opens the Create New Contact dialog. Enter the name, phone number and email address of the new contact person. Clicking OK returns you to the New Location dialog.

- To attach an organization to the computer or server, select one from the drop-down list. You can manually add an organization by clicking New Organization. This opens the Create New Organization dialog. Enter the organization name and select a contact.

- Add a contact by clicking New Contact in the Organization or Location dialogs. This opens the Create a New Contact dialog. Enter the name, phone number and email address of the new contact person. You can access your default address book by clicking the To: button and select the email address from there. Clicking OK returns you to the New Location or New Organization dialog.

5. When finished, click Register.
Defining a Query Service

This section describes how to create a query using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the service is ready to use. If you want to tailor a service, use the Query Service Builder Wizard to customize it.

The following example shows you how to list all SQL data files. To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Query, as shown in the following diagram:

   ![Diagram showing the CA SRM Object Tree with Open Systems, Services, and Service Definitions selected]

   The Query table opens.
2. Click the Configuration menu and then New in the Query table. The Query Service Wizard opens. Expand Templates, Applications, SQL, and select SQL Data Files:

3. Select SQL Data Files from the drop-down list and check All Objects:

4. Select the execution frequency. The service can operate:
   - **Immediately**—Collection occurs immediately but only once.
   - **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
   - **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:
     - Hours
     - Days
     - Weeks
     - Months
     - Business Days

   If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies.

   The Retain Historical Data (Trending) option is only available when you enable periodic execution.
Defining a Query Service

Chapter 14: Managing Microsoft SQL Servers

- **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).
  
  If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.

- **Hold**—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

5. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.

6. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

![Query Dialog](image)

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Defining an Automate Service

This section describes how to create Automate services using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the automate service is ready to use. If you want to tailor a service, use the Automate Service Builder Wizard to customize it.

The following example shows you how to notify yourself by e-mail when SQL data files are more than 70 percent occupied. To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Automate, as shown in the following diagram:

   The Automate table opens. You can also access Automate services from the Open Systems file menu by selecting Create Services and then Automate.
2. Click the Configuration menu and then New in the Automate table. The Automate Service Wizard opens. Expand Templates, Applications, SQL Server, and select SQL Data File Occupied:

3. Select 70 from the drop-down list:

4. Select SQL Data Files from the drop-down list and check All Objects:
5. Enter the message that you want to be sent when the conditions have been met in the Message text box. Enter your e-mail address in the To... text box:

6. Select the execution frequency. The service can operate:
   - **Immediately**—Collection occurs immediately but only once.
   - **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
   - **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:
     - Hours
     - Days
     - Weeks
     - Months
     - Business Days
   If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies.

   The Retain Historical Data (Trending) option is only available when you enable periodic execution.

   - **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).

   If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.
■ **Hold**—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

7. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.

8. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Chapter 15: Network Attached Storage (NAS) Devices in CA SRM

CA SRM manages many types of network storage objects, and keeps information about the attributes of the objects and the relationships between the objects. It also provides a licensed Network Attached Storage (NAS) option that collects storage usage data from Network Appliance (NetApp) filer and EMC Celerra devices using SMI-S agent.

A NAS device is a dedicated, high-performance server that is optimized for shared access to large file systems. A NAS server typically offers centralized administration from any client on the network or from anywhere on the Internet. Access is based on a standard protocol: Network File System (NFS), or CIFS.

The NAS option supports the following tasks:

- Discovery of NAS objects.
- Collects data from NAS device storage information (physical devices, logical volumes and shares-mapping to RAID groups, and physical disks connection to RAID groups).
- Collects ordinary file and directory information from these objects.

Note: For existing registered NetApp devices, CA SRM supports the data collection from existing API/protocols such as ONTAPI/SSH/telnet/SNMP/RSH.

This section contains the following topics:

Manage NAS Devices to Generate NAS Storage Reports (see page 328)
Manage NAS Devices to Generate NAS Storage Reports

As a Storage Administrator, your responsibilities include registering NAS devices with valid credentials of SMI-S to enable SRM data collection. CA SRM lets you generate storage reports on NAS utilization.

The following diagram illustrates how a Storage Administrator generates customized reports on NAS storage utilization.
Configure SMI-S Provider

An SMI-S provider is a vendor-specific component that lets autonomous management software manage a vendor device using the Common Information Model (CIM) protocol.

Configure an external SMI-S provider (see page 329) for all NetApp devices and configure the SMI-S provider that is built in with the EMC Celerra devices.

Note: We recommend you to use the latest SMI-S, provided by the vendor.

The application host is the computer that controls the NAS device. The proxy collector is the computer through which CA SRM performs data collection on the NAS device. The application host and the proxy collector can reside on the same computer, or they can reside on two separate computers.

The application host and proxy collector computers have different requirements, though the requirements depend on the manufacturer of the NAS device.

Install and Configure SMI-S Providers

Installation and configuration information, and requirements for specific SMI-S providers vary by vendor.

Follow these steps:

1. Locate the latest and relevant information in the Readme file of the specific vendor or similar files that ship with the SMI-S provider.
2. Read these files and set up your environment according to the instructions.
3. Ensure that the specified requirements are met, so that Application Server can manage the NAS devices.

Register NAS Devices and Collect Data Using SMI-S Agent

When you register a NAS device in CA SRM as a new object, the wizard creates a computer object. If the volumes of this computer are accessible from proxy collector, file scanning is possible. The CA SRM data collection creates these volumes that are based on the volume definition of the NetApp filer and EMC Celerra devices.

You can run the CA SRM NAS Registration Wizard from any Windows Client and can collect data.

Follow these steps:

1. Open the CA SRM Windows Client.
2. Select Open Systems, Register, Network Storage, and NAS Device.

The CA SRM NAS Filer Registration Wizard dialog opens.
3. Click Next.
   The Setting Provider Credentials dialog opens.

4. Provide the following information:
   ■ Name and IP address of the application host.
   ■ User name and password of a user that is used on the SMI-S provider software.
   ■ Port number on which the application host is listening for information.
   ■ Select the Secure Connection check box to establish a secured connection. Use
     5989 port for a secured connection.
   ■ Specify how often you want CA SRM to perform data collection on the NAS
     device.
     Note: By default, CA SRM collects data once a day. Use the ellipsis button to
     open the Data Collection Frequency (see page 331) dialog that lets you set the
     data collection frequency.
   ■ Select the proxy collector from the drop-down list.
     Note: If you want to use a computer as a proxy collector, register the computer
     with CA SRM. For more information about registering a computer with CA SRM,
     see the Registering New Objects.
     Important! If a proxy collector (other than Application Server) manages an
     already registered NetApp device, update the agent software on the proxy
     collector to r12.7 or later.

5. Click Next.
   The Devices Managed by the NAS Application dialog populates all NAS devices that
   are managed by the SMI-S provider.

6. Select how you want CA SRM to handle mixed volumes (either Windows or UNIX)
   from the drop-down list.

7. Select the Fast Scan check box, if you want the file storage analysis on NetApp
   volumes.
   Note: You can alter / disable / enable the file storage analysis flags from the
   Windows Client view by right-clicking the NetApp filer and selecting the File &
   Storage Analysis option.

8. Select the NAS devices that you want to register.
   Note: For NetApp devices, select filers that you want to register. For EMC Celerra,
   select control stations that you want to register.

9. Click Next to continue the registration process.
   The Set Organization and Location dialog opens.
10. (Optional) Edit the fields if you want to add a different location, organization, or contact.

   **Location**
   Select a location from the drop-down list.
   You can also click [New Location](see page 163) to add the details of the new location.

   **Organization**
   Select an organization from the drop-down list.
   You can also click [New Organization](see page 163) to add the details of the new organization.

11. Click Next.
   The Summary dialog displays the number of available licenses you have.

12. Click Register.

13. Click Close to close the wizard.
   CA SRM populates the registered NetApp and EMC Celerra devices data in the Object Tree.

**Note:**
- SMI-S collects data *only* for the Filers that have a valid license.
- You can collect the storage performance statistics for already registered NetApp device using the API/protocols such as ONTAPI/SSH/telnet/SNMP/RSH.

**Define Data Collection Frequency**

You can set the interval at which you want to perform data collection.

**Follow these steps:**
1. Complete the fields in this dialog to set your desired data collection frequency.
   The default value for data collection is once every day.
2. Click OK to save the settings and close the dialog.
3. Click Next, when you have finished setting these options.
Add a Contact

You can add a contact or can select a contact from the drop-down list on the Set Organization and Location dialog.

Follow these steps:
1. Type the name, telephone number, and email address of the new contact.
2. You can access your default address book by clicking the To: Button and selecting the email address from there.
3. Click OK.
   The new contact is added to the list.

Add a Location

You can add a location or can select a location from the drop-down list on the Set Organization and Location dialog.

Follow these steps:
1. Add the details of the new location and click OK.
   The new location is added to the list.
2. (Optional) Click New Contact (see page 163) to add a contact.

Adding an Organization

You can add an organization or can select an organization from the drop-down list on the Set Organization and Location dialog.

Follow these steps:
1. Add the details of the new organization and click OK.
   The new organization is added to the list.
2. (Optional) Click New Contact (see page 163) to add a contact.
Generate Reports on NAS Storage

You can customize and generate various reports on NAS storage utilization using the user views and by customizing the query and automate services.

Using the NAS device objects from the object tree, you can create a sample report with the graph for each of the NAS device:

Follow these steps:
1. Click the Object Tree icon on the Windows Client interface.
2. Expand Network Storage, NAS Devices, EMC Celerra, and then Storage Volumes object.
   The grid opens on the right pane.
3. Select the Switch to Graph Pane icon on the bottom of the right pane.
4. Select the X-axis Source icon and select the Name option.
5. Select the Y-axis Source icon and select the Free Space and Occupied Space checkboxes.
   The graph displays the free and occupied space utilization of registered NAS storage volumes.
Using the NAS device objects from the object tree, you can create a sample report with the trending information for each of the NAS device:

**Follow these steps:**

1. Click the Object Tree icon on the Windows Client interface.
2. Expand Network Storage, NAS Devices, NetApp, and then Storage Performance object.
   
The grid opens on the right pane.
3. Select the Switch to Trend Pane icon on the bottom of the right pane.
4. Select the Trend Trace Source icon and select the Name option.
5. Select the Trend Data Source icon and select the Total Write IOs checkbox.
   
The trend provides the total write IOs for the registered NetApp devices over a time.

You can export these reports to Excel, HTML, PDF, TXT, .MDB, and Web Document formats. Thus, you can customize and generate NAS reports. These reports help you to identify the devices in your NAS filers that are most vulnerable and contain the most valuable data.
More Information:

Customize Reports Using Query Service (see page 336)
Customize Reports Using Automate Service (see page 337)
Available Objects to Generate Reports (see page 335)

Available Objects to Generate Reports

When you register the NAS devices in the CA SRM, the following objects display in the object tree view. CA SRM collects information about these objects. Based on these objects, you can generate reports on NAS storage utilization.

NAS Devices:

- Applications
- Aggregates
- Filers
- Volumes
- NetApp Objects
  - VFilers
  - Resources
  - Raid Groups
  - Raid Disks
  - QTrees
  - Quotas
  - Snapshot Definitions
  - Snapshots
  - Volume Quota
  - FC Ports
  - LUNs
  - Storage Performance
- EMC Celerra
  - Control Station
  - Storage Volumes
  - File Servers
Customize Reports Using Query Service

You can create a query using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After you complete the configuration steps, the service is ready to use. If you want to tailor a service, use the Query Service Builder Wizard to customize it. The following example shows you how to query the database for all NAS volumes.

Follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Query.
   The Query table opens.
2. Click the Configuration menu, and then New in the Query table.
   The Query Service Builder Wizard opens.
3. Expand Network Storage, NAS Devices folder, select Volumes, and then click Next.
4. Select NetApp Volumes from the Selection Type drop-down list, select All Objects from the Select one or more NetApp volumes from the list drop-down list and click Next.
5. Select one of the following options for frequency execution and click Next.
   - **Immediately**
     Defines the collection occurs immediately, but only once.
   - **Execute once**
     Defines the collection occurs at a future date, but only once. Click the drop-down list to enter the date in the calendar.
   - **Execute periodically**
     Defines the collection occurs at regular intervals. Designate the interval in the Every box. Type a number and select one of the frequency options:
     - Hours
     - Days
     - Weeks
     - Months
     - Business Days
     If you select Weeks, you can click a specific day in the On box.
   **Note:** The On box is inactive for the other frequencies.
   The Retain Historical Data (Trending) option is only available when you enable periodic execution.
Specific Time

Defines the collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, it collects as soon as it can that day (before midnight).

If you want to collect at a specific time, select this box. This only works with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.

Hold

Defines the service as available but the service does not run. The service remains on hold until you change the option to one of the frequencies listed. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option.

Note: The Hold option is not available for every service.

The Summary dialog displays the parameters that you defined for the service.

6. Select one of the following on the Summary dialog.
   ■ Click Save to save the service without executing it.
     CA SRM runs the service according to the configuration shown in this dialog.
     Note: If you change the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.
   ■ Click Launch to name and then execute the service.

7. Type a name and description for the service in the dialog and click OK.
   The service executes or saves depending on your selection in the previous dialog.
   You can use the CA SRM Activity Monitor to verify the progress of any service that you create.

   You can export the report from the Query Results under the Service Results in the Object Tree.

Customize Reports Using Automate Service

You can create automate services using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After you complete the configuration steps, the automate service is ready to use. If you want to tailor a service, use the Automate Service Builder Wizard to customize it.

The following example shows you how to perform the listed items:
   ■ Search all Filer devices.
   ■ Send an email notification, if less than five spare disks are available.
Follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Automate.
   The Automate table opens.
   **Note:** You can also access Automate services from the Open Systems file menu by selecting Create Services and then Automate.

2. Click the Configuration menu and New in the Automate table.
   The Automate Service Wizard opens.

3. Expand Network Storage, NAS Devices folder, select Filer—Spare Disks, and then click Next.

4. Enter 5 in the Less than <value> spare disks available text box and click Next.

5. Select NetApp Filers from the Selection Type drop-down list, select All Objects from the Select one or more NetApp filers from the list drop-down list, and then click Next.

6. Provide the following information in the Message tab and click Next.
   - Type the message in the Message text box that you want to send when less than five spare disks are available.
   - Enter your email address in the To box.

7. Select one of the following options for frequency execution and click Next.
   - **Immediately**
     Defines the collection occurs immediately, but only once.
   - **Execute once**
     Defines the collection occurs at a future date, but only once. Click the drop-down list to enter the date in the calendar.
   - **Execute periodically**
     Defines the collection occurs at regular intervals. Designate the interval in the Every box. Type a number and select one of the frequency options:
     - Hours
     - Days
     - Weeks
■ Months

■ Business Days

If you select Weeks, you can click a specific day in the On box.

**Note:** The On box is inactive for the other frequencies.

The Retain Historical Data (Trending) option is only available when you enable periodic execution.

**Specific Time**

Defines the collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, it collects as soon as it can that day (before midnight).

If you want to collect at a specific time, select this box. This only works with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.

**Hold**

Defines the service as available but the service does not run. The service remains on hold until you change the option to one of the frequencies listed. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option.

**Note:** The Hold option is not available for every service.

The Summary dialog displays the parameters for the service that you have defined.

8. Select one of the following options on the Summary dialog.

■ Click Save to save the service without executing it.

CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you change the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.

■ Click Launch to name and then execute the service.

9. Type a name and description for the service in the dialog and click OK.

The service executes or saves depending on your selection in the previous dialog.

You can use the CA SRM Activity Monitor to verify the progress of any service that you create.
Chapter 16: Managing Oracle Databases

CA SRM provides a licensed option that collects storage usage data from Oracle databases.

This chapter describes how to use this option. It includes the following topics:

- Oracle support
- Oracle objects
- Registering Oracle databases
- Reporting
- Defining a Query service
- Defining an Automate service

Note: For information about supported versions of Oracle, see the documentation on the CA SRM software distribution CD-ROM or on the CA web site at ca.com.

This section contains the following topics:

Oracle Support (see page 342)
Oracle Objects (see page 343)
Registering Oracle Databases (see page 344)
Reporting (see page 353)
Defining a Query Service (see page 354)
Defining an Automate Service (see page 358)
Oracle Support

CA SRM assembles and presents the information to manage your database storage more efficiently. CA SRM collects a variety of data to assist you in such tasks as tuning your system, setting alerts, planning capacity, reporting on raw devices, and so on. You can display unified views of data collected from multiple database instances running on different platforms. CA SRM logs on to all the databases automatically at scheduled times.

You can use CA SRM to perform the following tasks:

- Present complete logical volume information by combining data reported by Oracle with raw device data collected by the CA SRM Agent
- Monitor size, free space, and occupied space information for database instances, tablespaces, users, and data files
- Analyze trends for database instances, tablespaces, data files, segments, extents, users, and redo logs
- Monitor redo log switching frequency
- Set an alert to notify you when a database instance is down
- Set an alert to notify you if a data file is in the backup state
- Assemble I/O statistics and use them to tune your I/O performance

CA SRM collects and stores information from Oracle computers as CA SRM objects. You can filter, sort, and query these objects, represent them graphically, and customize the presentation in other ways.

**Note:** To minimize the impact of data collection on system performance, limit the scope of information you want to collect and specify the computers from which you want this information collected.

CA SRM does not support the scenario of changing the instance that is pointed to by an already used Oracle service.
Oracle Objects

CA SRM captures information about the following Oracle objects:

**Instances**
- Statistics for free and occupied space and size, block size, I/O activity (blocks read and written), number of redo log groups, sizes of online and archived redo logs, redo log switches

**Tablespaces**
- Statistics for free and occupied space and size, extent-related settings, expansion regime, and I/O activity

**Datafiles**
- Statistics for free and occupied space and size, increments, backup status, location, and I/O activity

**Segments**
- Statistics for free and occupied space, extent statistics, segment type and owner information

**Extents**
- Extent ID and statistics

**Users**
- Storage related information about the amount of disk space consumed by each Oracle user

**Important!** If you delete an Oracle object, you also delete all its dependent objects. However, if you delete a computer, you also delete the relationship between the dependent Oracle datafile objects and the volume but not the dependent Oracle objects.

**Note:** To help ensure that the Windows Client displays the most recent data collection, refresh open user views.
Registering Oracle Databases

To register and collect data from Oracle databases, follow these steps:

1. You need at least one Windows managed computer with the Oracle ODBC driver and the Oracle client installed. CA SRM uses this computer as a Proxy Collector for Oracle. You need to select the Runtime option during the Oracle Client installation on the proxy machine.

   After you install the ODBC on the proxy machine, you need to reboot and then perform a Collect Now on that machine. This informs CA SRM that the ODBC is installed.

2. You need an Oracle user for each managed instance that has enough privileges to retrieve the data collected by CA SRM. You can create this user by using the Registration wizard or you can manually execute the SQL script file located in the following directory of each Proxy Collector computer:

   `X:\CA SRM Data\database\configuration\CreateOracleUser.sql`

   Where `X:\` CA SRM Data specifies the location where you choose to put the configuration data.

3. Make sure you have the appropriate privileges for your users. See the Oracle User Privileges section.

4. Register the Oracle database using the CA SRM Oracle Registration Wizard. For information about registering the Oracle database, see Using the CA SRM Oracle Registration Wizard in this chapter.

   For a list of supported versions see the latest Readme file on supportconnect.com

**Note:** If you want to cross-reference data between the Oracle data files and their related volumes in the file-system make sure you also have the Oracle server computer registered as a managed computer.
Oracle User Privileges

If you want to use the Oracle Registration Wizard to create users, you need to create a special Oracle user (login) to allow CA SRM access to the database instance information. To help with this, you can find a sample script, CreateOracleUser.sql, under the CA SRM Data\Database\Configuration directory. Install the CreateOracleUser.sql script file on each managed object that you want to create users for with the wizard.

The following provides version information necessary to remotely create users while running the Oracle Registration Wizard:

- When the user has the Oracle 9.0.1 client, the Oracle ODBC driver version needs to be 9.0.1.3 or higher in order to connect to the Oracle server version 9i or higher.
- When the user has the Oracle 9.2 client, the Oracle ODBC driver version should be 9.2.0.2.0 or higher in order to connect to the Oracle server version 9i or higher.
- You cannot remotely create a user with the wizard when using the 8i client with Oracle 9i database (or above). This is a limitation of the Oracle ODBC driver.

Note: These ODBC driver versions are required only if you want to create a user with the wizard. For data collection these versions are not required.

In order to collect data from the Oracle database, the user needs the following privileges. If you create a user in the Oracle Registration Wizard, these privileges and synonyms are automatically created:

- Connect permission to connect to Oracle
- Create procedure and create table permissions
- Create synonym privilege for CA SRM user
- Unlimited tablespace
- Permission for analyzing any object
- Permission to execute on sys.dbms_space
- Select permission on the following tables:
  - sys.dba_data_files.
  - sys.dba_extents
  - sys.dba_free_space.
  - v_$version.
  - v_$filestat.
  - v_$parameter.
  - v_$log.
  - v_$log_history.
  - v_$logfile.
Without these privileges, the data collection cannot be done successfully.

In addition, create the following synonyms for the user:

- \texttt{v\_version} for \texttt{sys.v\_version};
- \texttt{v\_filestat} for \texttt{sys.v\_filestat};
- \texttt{v\_parameter} for \texttt{sys.v\_parameter};
- \texttt{v\_log} for \texttt{sys.v\_log};
- \texttt{v\_log\_history} for \texttt{sys.v\_log\_history};
- \texttt{v\_logfile} for \texttt{sys.v\_logfile};
- \texttt{v\_archived\_log} for \texttt{sys.v\_archived\_log};
- \texttt{v\_backup} for \texttt{sys.v\_backup};
- \texttt{dba\_data\_files} for \texttt{sys.dba\_data\_files};
- \texttt{dba\_extents} for \texttt{sys.dba\_extents};
- \texttt{dba\_free\_space} for \texttt{sys.dba\_free\_space};
- \texttt{dba\_tablespaces} for \texttt{sys.dba\_tablespaces};
- \texttt{dba\_all\_tables} for \texttt{sys.dba\_all\_tables};
- \texttt{dba\_clusters} for \texttt{sys.dba\_clusters}. 
- `dba_indexes` for `sys.dba_indexes`.
- `dba_tab_partitions` for `sys.dba_tab_partitions`.
- `dba_ind_partitions` for `sys.dba_ind_partitions`.
- `dba_segments` for `sys.dba_segments`.
- `dba_tables` for `sys.dba_tables`.
- `dba_users` for `sys.dba_users`.
- `dba_temp_files` for `sys.dba_temp_files`.
- `v$tempstat` for `sys.v_$tempstat`.
- `v$temp_space_header` for `sys.v_$temp_space_header`.
- `dba_tab_privs` for `sys.dba_tab_privs`.

### Oracle User Privileges for CA SRM Upgrades

For clients running earlier versions of CA SRM and then upgrade to r11.5 or r11.6, the Oracle user needs the following privilege in order to successfully complete the data collection (substitute `<BSRM username>` with actual user name):

- Grant select on `sys.dba_users` to `<BSRM username>`
- Grant select on `sys.dba_temp_files` to `<BSRM username>`
- Grant select on `sys.v_$tempstat` to `<BSRM username>`
- Grant select on `sys.V_$temp_space_header` to `<BSRM username>`
- Grant create synonym to `<BSRM username>`

After granting these privileges, connect as `<BSRM username>` and create the following synonyms for the `<BSRM username>`:

- Create synonym `dba_users` for `sys.dba_users`
- Create synonym `dba_temp_files` for `sys.dba_temp_files`
- Create synonym `v$tempstat` for `sys.v_$tempstat`
- Create synonym `v$temp_space_header` for `sys.v_$temp_space_header`
Oracle Multiple Home Path Discovery

The Oracle ODBC driver does not recognize any Oracle service that is not defined in the home in which it is installed. For example, if the Oracle home is installed on C:\Oracle\Orahome1 then the ODBC driver recognizes only the services defined in the C:\Oracle\Orahome1\network\admin\tnsnames.ora file. Since the Oracle agent uses the ODBC driver, the agent can only use those services defined in the driver installation path for data collection.

The ODBC driver automatically points to the home path installed first. If you have multiple homes, the Oracle agent usually does not read the services defined in the last home. To make sure the agent reads the services you create with the Oracle Registration Wizard, the wizard calls the Oracle agent to create the service. The agent then creates the service in the tnsnames.ora file that is present in the path where ODBC driver is installed.

**Note:** In some configurations the last created home can have the same path as the driver. For example, if you have Oracle 8i installed and later install 9i, the agent will read the driver installed in the 9i home.

Multiple ODBC Drivers

When you have Oracle 8i and Oracle 9i installed on a system, the Oracle agent reads Oracle 9i only. The Oracle agent discovers the services defined in the installation folder of the Oracle 9i ODBC driver. If there are any other Oracle homes on the system other than the one with the Oracle 9i ODBC installation, the Oracle agent does not discover the services defined in them. When a service is created using the Oracle Registration Wizard, the service definition will be written to only the tnsnames.ora file that is accessible using the Oracle 9i ODBC driver.

When you have multiple Oracle 10g server installations on multiple homes, the discovery is done on the home whose entry is the first key present in the registry under HKEY_LOCAL_MACHINE\SOFTWARE\ORACLE (this represents the Oracle home). The service definitions are read from the tnsnames.ora file pointed to by the first key representing the Oracle home. Any new service that the Oracle agent creates (through the registration wizard) will be created in this tnsnames.ora file present in the home pointed to by this registry key.

When the proxy collector machine has both the Oracle9i and Oracle10g client installed, there is only one Oracle ODBC driver available on that system. Under these circumstances the available ODBC driver is the Oracle9i. For successful connection to the Oracle database using the ODBC driver, the system path variable must have the path to the Oracle 9i client before the path to the Oracle 10g client.
**Note:** CA SRM might fail to collect data successfully from an Oracle 10g server in the following scenario. There are multiple homes of Oracle 10g present on the server machine and the proxy collector that was selected for data collection is the Oracle server itself. To avoid potential failure in such a case, select a different proxy collector machine.

### Using the CA SRM Oracle Registration Wizard

To run the Oracle Registration Wizard, follow these steps:

1. Select Configuration and then Register from the Oracle Instance table. You can also start the Oracle Registration Wizard by from the Open Systems menu of the Windows Client, select Register, Applications, and then Oracle.

2. Select the name of the proxy collector from the drop-down list:

   ![CA SRM Oracle Registration Wizard](image)

   The list of proxy collectors is based on machines where the Oracle client is already installed.
3. Select an Oracle instance. Type the user name and password that corresponds with the instance you selected. All defined services available on the collector you selected in the previous dialog are listed here:

**CA SRM Oracle Registration Wizard**

**Select an Oracle Instance**
Select the Oracle instance (host) with its related service name, and define access security. Make sure the given user has the needed privileges (press 'Help' for details) to collect all information from the Oracle database. You may use the 'Create New User' Button to create this user.

<table>
<thead>
<tr>
<th>Host Name</th>
<th>Database Service Name</th>
<th>Client Service Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORACLE22</td>
<td>ORASRM</td>
<td>INST2_HTTP.COM</td>
</tr>
<tr>
<td>ORACLE23</td>
<td>ORASRM</td>
<td>INST1_HTTP.COM</td>
</tr>
</tbody>
</table>

Create New Service

**Note:** If your Application Server is on a Windows 2003 Server machine and the Oracle server is on a Sun Solaris machine, you need to register the Oracle server as a managed computer to view raw partitions.

4. (Optional) Click Create New Service to define a new Oracle service. Enter:

- **Client Service Name**—The service name that is defined on the proxy collector to connect to this specified instance.
- **Host Name**—The name of the host where the Oracle server is running.
- **Port**—The port used by this specified instance (the default is 1521).
- **Database Service Name**—The service name defined on the server side that identifies a particular instance.
5. (Optional) Click Create a New User button to create a user in the Oracle database. Enter the system security user name and password. You also need to provide the database user name and password, and the default tablespace and temp tablespace:

![Create New User dialog]

**Note:** If you are using the Oracle 9.1 client to connect to an Oracle server, the Oracle ODBC driver version 9.0.1.3 is required for creating a user during registration. If you are using the Oracle 9.2 client to connect to an Oracle server, the Oracle ODBC driver version should be 9.2.0.2.0 or higher for creating a user during registration.

6. In the Setting Properties dialog:
   - Choose the frequency with which you want to update the Oracle Instance data.
   - Check the Detailed box if you want to collect detailed data.
   - Select the log switch period the default is 0.
7. Edit the fields in this dialog if you want to add a different location, organization, and contact:

- **Location** - Lets you attach a geographic location to the computer or server. Select a location from the drop-down list. You can also click New Location to add the details of the new location in the Create New Location dialog. Click OK to exit the dialog.

- **Organization** - Lets you attach organization to the computer or server. Select an organization from the drop-down list. You can also click New Organization to add the details of the new organization in the Create New Organization dialog. Click OK to exit the dialog.

- **Contact** - Lets you add a contact. Click New Contact to add a contact using the Create New Contact dialog. Enter the name, telephone number, and email address of the new contact. You can access your default address book by clicking the To: Button and select the email address from there.

**Note:** You can also add new contacts by clicking New Contact in the Create New Location dialog or Create New Organization dialog.

8. Click Register when finished.
CA SRM produces the following reports:

- Oracle Instances Summary
- Oracle Tablespaces Summary
- Oracle Datafiles Summary
- Oracle Segments Summary
- Oracle Extents Summary

For more information about available Oracle reports and the data included in each report, see the online help.

You can use CA SRM to enhance the performance of your Oracle system and solve Oracle-related problems.

Typically, backups are scheduled to run (and terminate) at known times; therefore, you can define an Automate service to alert you that a database instance or a data file are in the backup state after the expected termination time. A data file that is still in the backup state after it should have terminated may indicate a problem that occurred during the backup and that the backup data may be inconsistent.

You can monitor the frequency of redo log switching. When the number of redo log switches exceeds the limit for the time interval that you defined, CA SRM can issue an alert. This condition may indicate a problem that occurred during the backup of a redo switch log or of an unusually high transaction activity.

You can produce reports of the I/O activity for selected database instances and data files. You can use the information to tune your database and improve performance. For example, you can do the following:

- Identify segments with the highest I/O activity and place them in separate data files to improve access times.
- Identify the data files that grow in size and define an appropriate growth plan for them.
- Group all the files with the lowest I/O. You can then determine which files you want to backup regularly, semi-regularly, or never. This lets you lower network traffic and free backup media.

**Note:** Objects COMPUTER and SERVER are equivalent and can be used interchangeably.
Data Collection

The Oracle data collection agent now operates under the BOS/AGE framework which is product and platform agnostic. The improved agent enables you to maximize storage while minimizing the impact on your resources.

The improved porting of the Oracle agent provides this additional registration wizard functionality:

- Discovery of Oracle databases based on existing data sources targeted to Oracle databases.
- Definition of new data sources for an Oracle database.
- Creation of a CA SRM user inside an Oracle database. This ensures the data collection automatically and correctly executes after the registration completion.
- Validation of the user provided Oracle access parameters.

Defining a Query Service

This section describes how to create a query using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the service is ready to use. If you want to tailor a service, use the Query Service Builder Wizard to customize it.

The following example shows you how to list all Oracle datafiles. To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Query, as shown in the following diagram:

   ![](image)

   The Query table opens.
2. Click the Configuration menu and then New in the Query table. The Query Service Wizard opens. Expand Templates, Applications, Oracle, and then select Datafiles:

3. Select Oracle Datafiles from the drop-down list and check All Objects:

4. Select the execution frequency. The service can operate:
   - **Immediately**—Collection occurs immediately but only once.
   - **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
Defining a Query Service

- **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:
  - Hours
  - Days
  - Weeks
  - Months
  - Business Days

If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies.

The Retain Historical Data (Trending) option is only available when you enable periodic execution.

- **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).

If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.

- **Hold**—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

5. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.
6. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Defining an Automate Service

This section describes how to create Automate services using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the automate service is ready to use. If you want to tailor a service, use the Automate Service Builder Wizard to customize it.

The following example shows you how to notify yourself by e-mail when Oracle tablespaces are more than 70 percent occupied. To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Automate, as shown in the following diagram:

   ![Diagram showing the CA SRM Object Tree]

   The Automate table opens. You can also access Automate services from the Open Systems file menu by selecting Create Services and then Automate.
2. Click the Configuration menu and then New in the Automate table. The Automate Service Wizard opens. Expand Templates, Applications, Oracle, and then select Full Table Spaces.

3. Select 70 from the drop-down list:

4. Select Oracle Tablespaces from the drop-down list and check All Objects:
5. Enter the message that you want to be sent when the conditions have been met in the Message text box. Enter your e-mail address in the To... text box:

![Automate Service Builder](image)

6. In the Execution Frequency dialog select Immediately:
7. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.

8. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

![](image)

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
CA SRM provides a licensed option that collects storage usage data from Sybase databases.

This chapter describes how to use this option. It includes the following topics:

- Sybase support
- Sybase objects
- Registering Sybase instances
- Reporting
- Defining a Query service
- Defining an Automate service

Note: For information about supported versions of Sybase, see the documentation on the CA SRM software distribution CD-ROM or on the CA web site at ca.com.

This section contains the following topics:

- **Sybase Support** (see page 364)
- **Sybase Objects** (see page 365)
- **Registering Sybase Instances** (see page 366)
- **Defining a Query Service** (see page 370)
- **Defining an Automate Service** (see page 373)
CA SRM assembles and presents the information to manage your database storage more efficiently. CA SRM collects a variety of data to assist you in such tasks as tuning your system, setting alerts, planning capacity, reporting on raw devices, and so on. You can display unified views of data collected from multiple database instances running on different platforms. CA SRM logs on to all the databases automatically at scheduled times.

You can use CA SRM to perform the following tasks:

- Present complete logical volume information by combining data reported by Sybase with raw device data collected by the CA SRM Agent
- Monitor size, free space, and occupied space information for database instances, tablespaces, and data files
- Analyze trends for database instances, devices, tables, segments, and redo logs
- Set alerts when certain conditions are met

CA SRM collects and stores information from Sybase computers as CA SRM objects. You can filter, sort, and query these objects, represent them graphically, and customize the presentation in other ways.

**Note:** To minimize the impact of data collection on system performance, limit the scope of information you want to collect and specify the computers from which you want this information collected.

In order collect data from a Sybase 15 server, the CA SRM managed server must have the Sybase 15 ODBC driver installed. Sybase 15 ODBC drivers are backward compatible with older driver versions. You can still collect data from older database versions like 12.5 or 11.9.2 using the Sybase 15 ODBC drivers.
CA SRM captures information about the following Sybase objects:

**Instances**
Statistics for free and occupied space and size, block size, I/O activity (blocks read and written), number of redo log groups, sizes of online and archived redo logs, and redo log switches

**Databases**
Statistics for free and occupied space and size, data space usage, transaction log usage, data files usage, files usage, and date of last data collection

**Devices**
The local connected device found in the CA SRM database with statistics for allocated and unallocated space, physical location of device, storage data on created device, and date of last collection

**Segments**
Statistics for free and occupied space, extent statistics, segment type and owner information

**Tables**
Statistics for free and occupied space and size, data space usage, index space usage, rows, system table, and date of last data collection

**Users**
Registered Sybase users found in the CA SRM database with statistics for allocated, free and index spaces, number of tables owned, group name and date of last data collections

**Note:** To help ensure that the Windows Client displays the most recent data collection, refresh open user views.
Registering Sybase Instances

To register a Sybase instance, follow these steps:

1. Register the Windows domain in which the Sybase instance belongs using the CA SRM Computer Registration Wizard. For more information, see the chapter “Managing Network Storage Objects.”

2. Register the computer that has Sybase ODBC installed.
   
   **Note:** After you install the ODBC on the proxy machine, perform a Collect Now on that machine. This informs CA SRM that the ODBC is installed.

3. Register the Sybase instance using the CA SRM Sybase Registration Wizard. For more information, see Using the CA SRM Sybase Registration Wizard in this chapter.

Using the CA SRM Sybase Registration Wizard

You must run the CA SRM Sybase Registration Wizard from the computer on which the application server is installed. You can collect data from any managed computer that has Sybase software installed.

To run the Sybase Registration Wizard, follow these steps:

1. From the Open Systems menu of the Windows Client, select Register, Sybase. You can also start this wizard by selecting Configuration, Register from the Sybase table.

2. Select a computer from the drop-down list. The wizard creates this list by searching the Computers table for machines that have Sybase ODBC already installed.
   
   **Note:** You can only use a Windows machine as the Sybase proxy collector.
3. Select the Sybase instance. The instances listed are the defined data source names (DSN) from the proxy collector that you selected in the previous dialog. Type the user name and password that corresponds with the selected DSN:

![Sybase Registration Wizard](image)

4. (Optional) Create a DSN by clicking the New button:

![Create Now DSN](image)

Enter the following information:

- **Host Name**—The name of the host where the Sybase server is running.
- **Port**—The port used by the target instance on this server.
- **DSN**—The DSN name that you defined on the proxy machine to connect to this specified instance.
- **Description**—Add text to describe this connection.

You cannot create a DSN when you use Sybase 15.
5. (Optional) Click Create a New User button to create a user in the Sybase instance. Enter the system security user name and password for the proxy collector. This needs to be a Sybase administrator’s user name and password. Enter the user name and password for the Sybase instance:

![Create New User dialog]

**Note:** The database password maximum length is 30 characters.

6. In the Setting Properties dialog:
   - Choose the frequency with which you want to update the Sybase data.
   - Check the Detailed box if you want to collect detailed data.

![CA SRM Sybase Registration Wizard dialog]

**Note:** Collecting detailed information increases the time required by the data collection service.
7. Edit the fields in this dialog if you want to add a different location, organization, and contact:
   - **Location**-Lets you attach a geographic location to the computer or server. Select a location from the drop-down list. You can also click New Location to add the details of the new location in the Create New Location dialog. Click OK to exit the dialog.
   - **Organization**- Lets you attach organization to the computer or server. Select an organization from the drop-down list. You can also click New Organization to add the details of the new organization in the Create New Organization dialog. Click OK to exit the dialog.
   - **Contact**- Lets you add a contact. Click New Contact to add a contact using the Create New Contact dialog. Enter the name, telephone number, and email address of the new contact. You can access your default address book by clicking the To: Button and select the email address from there.

   **Note:** You can also add new contacts by clicking New Contact in the Create New Location dialog or Create New Organization dialog.

8. Click Register.

   CA SRM registers the server.

9. Add the following lines to the Sybase server startup script:

   ```
   use tempdb
   go
   sp_addalias <BSRMUSER>, dbo
   go
   ```

   The Sybase server is now configured for successful data collection.
Defining a Query Service

This section describes how to create a query using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the service is ready to use. If you want to tailor a service, use the Query Service Builder Wizard to customize it.

The following example shows you how to list all Sybase instances. To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Query, as shown in the following diagram:

The Query table opens.
Click the Configuration menu and then New in the Query table. The Query Service Wizard opens. Expand Templates, Applications, Sybase, and then select Sybase Instances:

2. Select Sybase Instance Occupied Space from the drop-down list and enter the occupied space:
3. In the Execution Frequency dialog select Immediately:

4. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

   **Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.

5. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Defining an Automate Service

This section describes how to create Automate services using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the automate service is ready to use. If you want to tailor a service, use the Automate Service Builder Wizard to customize it.

The following example shows you how to notify yourself by email when a Sybase user has less than 100 MB of free space. To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Automate, as shown in the following diagram:

   ![Diagram of Open Systems tree]

   The Automate table opens. You can also access Automate services from the Open Systems file menu by selecting Create Services and then Automate.
2. Click the Configuration menu and then New in the Automate table. The Automate Service Wizard opens. Expand Templates, Applications, Sybase, and then select Sybase User Full Quota:

3. Enter 100 and select MB from the drop-down list.

4. Select Sybase User Names and enter the user names in the text box.

5. Enter the message that you want to be sent when the conditions have been met in the Message text box. Enter your e-mail address in the To... text box:
6. Select the execution frequency. The service can operate:

- **Immediately**—Collection occurs immediately but only once.
- **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
- **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:
  - Hours
  - Days
  - Weeks
  - Months
  - Business Days

If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies.

The **Retain Historical Data (Trending)** option is only available when you enable periodic execution.

- **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).

If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.

- **Hold**—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

7. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.
8. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
CA SRM provides a licensed option that collects storage usage data from Veritas NetBackup.

This chapter describes how to use this option. It includes the following topics:

- Veritas NetBackup objects
- Registering Veritas NetBackup servers
- Reporting
- Defining a Query service
- Defining an Automate service

**Note:** For information about supported versions of Veritas NetBackup, see the documentation on the CA SRM software distribution CD-ROM or on the CA web site at ca.com.

This section contains the following topics:

- [Veritas NetBackup Objects](#) (see page 378)
- [Registering Veritas NetBackup Servers](#) (see page 379)
- [Reporting](#) (see page 383)
- [Defining a Query Service](#) (see page 384)
- [Defining an Automate Service](#) (see page 388)
Veritas NetBackup Objects

CA SRM collects information about the following Veritas NetBackup objects:

**Master Servers**

Objects representing the master server that controls the backup procedure, together with the media servers in the domain. The master server is the root object.

**Media Servers**

Objects representing distributed servers that handle media procedures such as read, write, import, export, and mount.

**Drives**

Objects representing a physical device used to write to a volume.

**Robots**

Objects used to control volume movement inside a library.

**Volumes**

Objects that store data for a long period of time.

**Storage Units**

Used to store backups. A storage unit is one or more storage devices of a specific type and density that attach to a NetBackup server.

**Storage Unit Groups**

Logical grouping of storage devices. You can specify a storage unit group name as a policy, in the same manner as you specify individual storage units.

**Pools**

A distinct set of media that can be used only by the users and hosts that you designate when you configure the pool.

**Jobs**

Jobs that have run, both successful and unsuccessful.

**Policies**

Series of clients, files, schedules, pools, and storage units.

**Clients**

Computers to be backed up.

**Files**

Files and directories to be backed up.

**Schedules**

Control when backups and archives occur for the clients. This can be based on hours, days, and weeks with exceptions.
Errors

Objects containing information about backup errors and the client that it affects.

Backup Images

Backup image currently stored. When Using Veritas Net Backup 4.5, BSRM cannot display any Backup Image Data.

Note: To help ensure that the Windows Client displays the most recent data collection, refresh open user views.

Registering Veritas NetBackup Servers

To register and collect data from Veritas NetBackup servers, follow these steps:

1. Ensure that iGateway is installed and running on the same computer as Veritas NetBackup.
2. Install VNBiSponsor on the same computer as Veritas NetBackup. You can find the VNBiSponsor from the iSponsor folder on DVD media.
3. Register the Veritas NetBackup server using the CA SRM Backup Registration Wizard. For more information, see Using the CA SRM Backup Registration Wizard in this chapter.
Using the CA SRM Backup Registration Wizard

You can run the CA SRM Backup Registration Wizard only from the computer running the Application Server. Also, you can initiate data collection only from the Application Server.

To register a Veritas NetBackup server using the CA SRM Backup Registration Wizard, follow these steps:

1. From the Open Systems menu, select Register, Backup Servers.
2. In the Backup Server Type dialog select Veritas NetBackup and select the operating system type from the drop-down list.
3. In the Setting Discovery Information dialog select one of the following:
   - To add backup servers manually, select Skip discovery and add candidates manually. Go to Step 4.
   - To automatically discover backup servers, select Automatically discover candidates and enter the Subnet Name and Subnet Mask. Go to Step 6:

5. In the Add server dialog:
   - Enter the name of the backup server.
   - Select the proxy collector from the drop-down list.
   - Select the data collection frequency.
   - Check the Trigger events box to receive information about events that were generated on the Veritas server. These events are specified to Veritas while installing the VNBiSponsor.
   - Enter the user name and password necessary to allow the trigger event:
6. Select the backup servers from the list of candidate servers that you want to register. You can change the proxy collectors, data collection frequencies, and trigger events for each server by clicking in the corresponding boxes. When finished, click Register:

7. Edit the fields in this dialog if you want to add a different location, organization, and contact:

   - **Location**- Lets you attach a geographic location to the computer or server. Select a location from the drop-down list. You can also click New Location to add the details of the new location in the Create New Location dialog. Click OK to exit the dialog.

   - **Organization**- Lets you attach organization to the computer or server. Select an organization from the drop-down list. You can also click New Organization to add the details of the new organization in the Create New Organization dialog. Click OK to exit the dialog.

   - **Contact**- Lets you add a contact. Click New Contact to add a contact using the Create New Contact dialog. Enter the name, telephone number, and email address of the new contact. You can access your default address book by clicking the To: Button and select the email address from there.

   **Note:** You can also add new contacts by clicking New Contact in the Create New Location dialog or Create New Organization dialog.
8. Click Register to finish.

**Note:** When CA SRM collects data from a Veritas NetBackup machine, if there are any drives which do not have a serial number, SRM names these drives automatically, using the following naming pattern:

```
sn_<number>_<server_name>
```

where `<number>` is a unique number and `<server_name>` is the name of the Veritas server.

---

**Reporting**

CA SRM provides extensive reporting on many aspects of Veritas NetBackup activity, devices, and media. You can schedule reports for execution at regular times or on demand. CA SRM produces a variety of report output formats and redirects them for distribution through email.

CA SRM provides several predefined report formats that you can use without modification. Additionally, you can generate custom reports using the Query service, and define the source objects to report on, the information to be included, the format (spreadsheet columns), and the output of the report.
Defining a Query Service

This section describes how to create a query using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the service is ready to use. If you want to tailor a service, use the Query Service Builder Wizard to customize it.

The following example shows you how to query the database for backup server clients. To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Query, as shown in the following diagram:

   - **Open Systems**
     - Network Storage
     - Backup/Archive Products
     - Applications
     - Services
       - Classes
       - Service Definitions
         - Automate
         - File Groups
         - Procedures
         - Query
         - Backup
         - TSM Message Scanner
     - Service Results
       - Asset Administration
       - System Activity

   The Query table opens.
2. Click the Configuration menu and then New in the Query table. The Query Service Wizard opens. Expand Templates, Backup Products, Veritas NetBackup, and then Media Servers:

3. Select NetBackup Media Servers from the drop-down list and check All Objects:

4. Select the execution frequency. The service can operate:
   - **Immediately**—Collection occurs immediately but only once.
   - **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
5. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.
6. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
This section describes how to create Automate services using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the automate service is ready to use. If you want to tailor a service, use the Automate Service Builder Wizard to customize it.

The following example shows you how to send an email to yourself each week listing all Veritas NetBackup jobs that are less than 70 percent complete. To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Automate, as shown in the following diagram:

The Automate table opens. You can also access Automate services from the Open Systems file menu by selecting Create Services and then Automate.
2. Click the Configuration menu and then New in the Automate table. The Automate Service Wizard opens. Expand Templates, Backup Products, then Backup Servers, and select NetBackup Job Completion.

3. Select 70 from the drop-down list:

![Automate Service Builder](image1)

4. Select NetBackup Jobs from the drop-down list and check All Objects:

![Automate Service Builder](image2)
5. Enter the message you want to send in the Message text box. Enter your email address in the To... text box:

6. Select Execute periodically, enter 1 in the Every text box, and select Weeks from the drop-down list:
7. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.

8. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Chapter 19: Managing Virtual Host VMware Servers

CA SRM collects and monitors storage capacity and other information from a server virtualization product, for example, VMware ESX server. Virtual Host Environments allows you to correlate the virtual hosts to the physical environment.

CA SRM provides a licensed option that collects storage usage data from the following virtual host server objects:
- Virtual Host Servers
- Virtual Guests
- Snap Shots
- Data Stores
- Extents
- Storage Devices

CA SRM supports the virtualization of host servers in the following ways:
- Individual Virtual Host Data Collection
- Data Collection of a Virtual Center

This section contains the following topics:
Virtual Host VMware Environment Objects (see page 394)
Registering Virtual Host VMware Servers (see page 395)
Registering Virtual Center (see page 399)
Defining a Query Service (see page 402)
Defining an Automate Service (see page 406)
Virtual Host VMware Environment Objects

CA SRM collects information about the following virtual host VMware environment objects:

**Virtual Host Server**

Objects representing the physical servers of your virtual host environment. Virtual Host Servers provides a virtualization layer that abstracts the processor, memory, storage, and networking resources of the physical host into multiple virtual machines.

**Virtual Guests**

Objects representing virtual machines. The virtual machine is called a Virtual Guest. Collection of virtual guests comprises a host (ESX) server. You can run multiple virtual guests on the same host at the same time.

**Snapshots**

Objects representing the snapshot of your virtual machine. Snapshots let you preserve the state of a virtual machine so that you can return to the same state at any given time. A snapshot captures the entire state of a virtual machine.

**Datastores**

Objects representing datastores. A datastore is a storage location for all the files that a virtual machine uses for configuration and disks. To a host, a datastore is a storage abstraction that is backed by one of the following types of storage volumes:

- Local file system
- Network Attached Storage (NAS) volume
- Storage Area Network (SAN) volume

**Extents**

Objects representing extents of your virtual host environment. Extents are drawn from storage devices and a datastore is a collection of extents. Extents lets you increase the size of the existing VMware File system partition.

**Storage Devices**

Objects representing storage devices. A storage device may represent a storage Lun exported from a disk array, a local disk or a network file system. CA SRM reports the details of the Storage Device and in case of a Lun, it provides a zoom to the Ldev of the disk array if the disk array is discovered.

**HBAs**

Objects representing host bus adapters. A HBA, or Host Bus Adapter, is the interface card which connects a host to a SAN (Storage Area Network).
Virtual HBAs

Objects representing all the virtual HBAs (NPIV). A N-Port ID Virtualization or NPIV, is an ANSI T11 standard that describes how a single Fiber Channel HBA port can register with the fabric using several worldwide port names (WWPNs).

Virtual Guest Data Files

Objects representing the permanent/temporary files like Virtual Hard Disks, Snapshots, Configuration files, Log files, and Memory files that are used by a Virtual Guest. One or more Virtual Hard Disks is assigned to a Virtual Guest for its usage.

Note: To ensure that the Windows Client displays the most recent data collection, you may need to refresh open user views.

Registering Virtual Host VMware Servers

To register a virtual host server with CA SRM, perform the following steps:

■ Register the virtual host server using the CA SRM Virtual Host Server Registration Wizard.
■ Set up the application host and proxy collector computers.

Register the Virtual Host VMware Server

To create a virtual host environment, register the virtual host VMware server.

Follow these steps:

1. Open the CA SRM Windows Client main window.
2. Select Open Systems, Register, Network Storage, Virtual Host.
   The CA SRM Virtual Host Server Registration Wizard welcome dialog appears.
3. Click Next.
   The Select the Type of Virtual Host Server Data Collection dialog appears.
4. Select the Virtual Host Server and click Next.
   The Set Virtual Host Server Details dialog appears.
5. Provide the following information in the Set Virtual Host Server Details dialog.
   Virtual Host Server Name / IP:
   Specifies the IP address of the virtual host server name.
   Username:
   Specifies the username of the application host listening for information.
Password:

Specifies the password associated with the user name.

6. Select the Secure Connection box if you had installed the virtual host server in either secure or nonsecure mode.

7. Select the proxy collector from the drop-down list.

   The proxy collector is the computer through which CA SRM performs data collection on the host server.

   If the proxy collector you want to use is not available in the drop-down list, then you have not registered the computer with CA SRM. For more information about registering a computer with CA SRM, see Registering New Objects in the chapter “Managing Network Storage Objects.”

8. Specify how often you want CA SRM to perform data collection. Click the Ellipsis button.

   The Data Collection Frequency dialog opens.

   Use this dialog to set the data collection frequency you want. The default value for data collection is once every day. Click OK to save the settings and close the dialog.

9. Click Next in the Virtual Host Server Details dialog.

10. Select the devices that you want to manage in the Devices managed by the Virtual Center/Virtual Host Server dialog.

11. (Optional) Click Telnet Credentials to set telnet credentials for some or all the VHS servers listed in this dialog.

    The Telnet Credentials (see page 398) dialog appears.

12. Click Next in the Devices managed by the Virtual Center/Virtual Host Server dialog.

    The Set Organization and Location dialog opens.
13. Edit the fields in this dialog if you want to add a different location, organization, and contact:

- **Location** - Lets you attach a geographic location to the computer or server. Select a location from the drop-down list. You can also click New Location to add the details of the new location in the Create New Location dialog. Click OK to exit the dialog.

- **Organization** - Lets you attach organization to the computer or server. Select an organization from the drop-down list. You can also click New Organization to add the details of the new organization in the Create New Organization dialog. Click OK to exit the dialog.

- **Contact** - Lets you add a contact. Click New Contact to add a contact using the Create New Contact dialog. Enter the name, telephone number, and email address of the new contact. You can access your default address book by clicking the To: Button and select the email address from there.

  **Note:** You can also add new contacts by clicking New Contact in the Create New Location dialog or Create New Organization dialog.

14. Click Register to complete the registration.

   The CA SRM Virtual Host Server Registration Wizard displays the registration complete message.

15. Click Close to exit the wizard.
Setting Telnet Credentials

The telnet credentials are used to get the space details of the ESX server and to get snapshot details. You can set telnet credentials for some or all the VHS servers listed in the Devices managed by the Virtual Center/Virtual Host Server dialog.

Note: These credentials are optional.

Follow these steps:
1. Provide the following information in the Telnet Credentials dialog.
   - **IP Address:** Specifies the IP address or the name of the selected VHS server. If you have selected multiple VHS servers, this field displays all of them with Semicolon separated list and these addresses cannot be modified.
   - **Username:** Specifies the user name for telnet or ssh login.
   - **Password:** Specifies the password for telnet or ssh login.
2. Select either Telnet or ssh check boxes if you want to use telnet or ssh for the connection.
3. Click OK.
   The credentials are verified for each of the selected VHS.

Setting Up the Application Host and Proxy Collector Computers

The application host is the computer that controls the virtual host server. The proxy collector is the computer through which CA SRM performs data collection on the host server. Typically, the application host and the proxy collector reside on the same computer, but they can reside on two separate computers.

Typically, the application host and proxy collector computers have different requirements. You need to have .Net framework 2.0 or higher installed on a proxy collector. And this proxy collector has to be registered as a managed computer in CA SRM for that to be listed in the VHS server proxy collector list.
Registering Virtual Center

To register a virtual center with CA SRM, perform the following steps:

- Register the virtual center using the CA SRM Virtual Host Server Registration Wizard.
- Set up the application host and proxy collector computers.

Registering the Virtual Center

To create a virtual host environment, register the virtual center.

To register the virtual center

1. Open the CA SRM Windows Client main window.
2. Select Open Systems, Register, Network Storage, Virtual Host.
   The CA SRM Virtual Host Server Registration Wizard welcome dialog appears.
3. Click Next.
   The Select the Type of Virtual Host Server Data Collection dialog appears.
4. Select the Virtual Center.
5. Click Next.
   The Set Virtual Center Details dialog opens.
6. Type the IP address of the virtual host server name.
7. Type the username of the application host listening for information.

8. Type the password associated with the user name.

9. Select the Secure Connection check box if you had installed the virtual center in either secured or non secured mode.

10. Select the proxy collector from the drop-down list.

    The proxy collector is the computer through which CA SRM performs data collection on the host server.

    If the proxy collector you want to use is not available in the drop-down list, you have not registered the computer with CA SRM. For more information about registering a computer with CA SRM, see Registering New Objects in the chapter “Managing Network Storage Objects.”

11. Specify how often you want CA SRM to perform data collection. Click the Ellipsis button.

    The Data Collection Frequency dialog opens.

    Use this dialog to set the data collection frequency you want. The default value for data collection is once every day. Click OK to save the settings and close the dialog.

12. Click Next in the Virtual Host Server Details dialog.

13. Select the check box(s) next to the virtual host servers that you want to manage in the Devices managed by the Virtual Center/Virtual Host Server dialog.

14. (Optional) Click Telnet Credentials to set telnet credentials for the selected VHS servers listed in this dialog.

    The Telnet Credentials (see page 398) dialog appears.
15. Click Next.

The Set Organization and Location dialog appears.

16. Edit the fields in this dialog if you want to add a different location, organization, and contact:

- **Location** - Lets you attach a geographic location to the computer or server. Select a location from the drop-down list. You can also click New Location to add the details of the new location in the Create New Location dialog. Click OK to exit the dialog.

- **Organization** - Lets you attach organization to the computer or server. Select an organization from the drop-down list. You can also click New Organization to add the details of the new organization in the Create New Organization dialog. Click OK to exit the dialog.

- **Contact** - Lets you add a contact. Click New Contact to add a contact using the Create New Contact dialog. Enter the name, telephone number, and email address of the new contact. You can access your default address book by clicking the To: Button and select the email address from there.

  **Note:** You can also add new contacts by clicking New Contact in the Create New Location dialog or Create New Organization dialog.

17. Click Register to complete the registration.

The CA SRM Virtual Host Server Registration Wizard displays the registration complete message.

18. Click Close to exit the wizard.
Defining a Query Service

This section describes how to create a query using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the service is ready to use. If you want to tailor a service, use the Query Service Builder Wizard to customize it.

The following example shows you how to query the database immediately for all Virtual Host Servers.

To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Query, as shown in the following diagram:

The Query table opens.
2. Click the Configuration menu and then New in the Query table. The Query Service Wizard opens. From the Query table main menu, select Configuration, New. The Template dialog opens. Expand Network Storage, then Virtual Host Environment, and select Virtual Host Servers. Click Next.

3. Select Virtual Host Servers from the Selection Type drop-down list and select one or more check boxes from the Select one or more VHS from the list. Click Next.

4. Select the execution frequency. The service can operate:
   - **Immediately**—Collection occurs immediately but only once.
   - **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
Defining a Query Service

- **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:
  - Hours
  - Days
  - Weeks
  - Months
  - Business Days

If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies.

The Retain Historical Data (Trending) option is only available when you enable periodic execution.

- **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).

If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.

- **Hold**—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

5. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.
6. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

![Query dialog](image)

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Defining an Automate Service

This section describes how to create Automate services using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the automate service is ready to use. If you want to tailor a service, use the Automate Service Builder Wizard to customize it.

The following example shows you how to scan all Full Virtual Host Servers once a week and notify you by e-mail when any of them are lesser than 70 percent full.

To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Automate, as shown in the following diagram:

   The Automate table opens. You can also access Automate services from the Open Systems file menu by selecting Create Services and then Automate.
2. Click the Configuration menu and then New in the Automate table. The Automate Service Wizard opens. From the Automate table main menu, select Configuration, New. The Template dialog opens. Expand Network Storage, then Virtual Host Environment, and select Full Virtual Host Servers. Click Next.

3. Select the percentage of used space from the drop-down list. Click Next.
4. Select Virtual Host Servers from the Selection Type drop-down list and check All Objects. Click Next.

5. Click the Message tab. Enter a message in the Message box that you want to send when the condition is met. Enter your e-mail address in the To text box and click Next.

6. Select the execution frequency. The service can operate:
   - **Immediately**—Collection occurs immediately but only once.
   - **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
■ **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:
- Hours
- Days
- Weeks
- Months
- Business Days

If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies.

The Retain Historical Data (Trending) option is only available when you enable periodic execution.

■ **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).

If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.

■ **Hold**—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

7. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.
8. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Chapter 20: Managing Virtual Host Hyper-V Servers

CA SRM collects and monitors storage capacity and other information from a server virtualization product, for example, Microsoft Hyper-V server. Virtual Host Environments allows you to correlate the virtual hosts to the physical environment.

CA SRM provides a licensed option that collects storage usage data from the following virtual host server objects:
- Virtual Host Servers
- Virtual Guests
- Virtual Hard Disks
- Snapshots

CA SRM supports the independent virtual host data collection by the Hyper-V host servers.

This section contains the following topics:
- Virtual Host Hyper-V Environment Objects (see page 411)
- Registering Virtual Host Hyper-V Servers (see page 412)
- Defining a Query Service (see page 416)
- Defining an Automate Service (see page 420)

Virtual Host Hyper-V Environment Objects

CA SRM collects information about the following virtual host Hyper-V environment objects:

Virtual Host Servers

Objects representing the physical servers of your virtual host environment. Virtual Host Servers provides a virtualization layer that abstracts the processor, memory, storage, and networking resources of the physical host into multiple virtual machines.

Virtual Guests

Objects representing the virtual machines. The virtual machine is a Virtual Guest. Collection of virtual guests comprises a host (Hyper-V) server. You can run multiple virtual guests on the same host at the same time.
Virtual Hard Disks

Objects representing virtual disks. A virtual disk is a storage location for all the files constituting a virtual machine configuration and data files. To a host, a virtual hard disk is stored as .vhd file in physical disk.

Snapshots

Objects representing the snapshot of your virtual machine. Snapshots let you preserve the state of a virtual machine so that you can return to the same state at any given time. A snapshot captures the entire state of a virtual machine.

Note: To verify that the Windows Client displays the most recent data collection, refresh open user views.

Registering Virtual Host Hyper-V Servers

To create a virtual host environment, register the virtual host Hyper-V servers using the computer registration wizard.

Follow these steps:

1. Open the CA SRM Windows Client main window.
   The CA SRM Computer Registration Wizard welcome dialog opens.
3. Click Next.
   The Select Operating System dialog opens.
4. Select the Windows operating system and click Next.
   The Selecting a Domain and Defining Security dialog opens.
5. Provide the name of the domain and the proper security credentials for the computers you want to register:

The following list describes the fields on this dialog:

**Discover computers in domain**
- Select the domain that contains the computers you want to register.

**User Name**
- Type the name of a user with at least Administrator privileges on the computers you want to register.

**Password**
- Type the password for the user name.

**Registration Type**
- Specify whether this computer is a managed computer or an agentless computer.
  - If you select Managed computers, the CA SRM Agent is installed, which enables CA SRM to collect detailed data.
  - If you select Agentless computers, CA SRM collects basic data using WMI.
**IP Addresses**

Specify whether you want to use the host name or the numeric IP address for the computer.

**Software destination location**

Specify the location in which you want the CA SRM agent to be installed on the target computers.

When you finish entering this information, click Next to start the Discovery process. The Setting Data Collection Properties dialog opens.

6. (Optional) Click Add Computer.
   The Non-published Computer dialog opens.

7. Type the computer name that you want to add and click OK.
   The Setting Data Collection Security dialog opens.

8. Type the user name and password (with Administrator privileges) on the computers you have selected to be managed.
   **Important!** If at least one Windows 2008 or later server version computers with Hyper-V on a full installation, configured to be registered, the Collect Hyper-V information check box appears on the Setting Data Collection Security dialog.
   Microsoft Hyper-V on a Server Core installation is not supported.

9. Select Collect Hyper-V check box and click Next.
   The Set Organization and Location dialog opens.
   **Note:** The Collect Hyper-V option enables data collection for the computers with Hyper-V information as part of managed computers registration. The Hyper-V information will be populated in the Virtual Host Server Environment, after the data collection is complete.
   SRM does not collect Hyper-V through System Center Virtual Machine Manager (SCVMM).
   You must have valid Virtual Host Server license for the successful data collection of the Hyper-V information. If you do not have valid Virtual Host Server license, the Hyper-V information will not be collected for those managed computers.
10. (Optional) Edit the fields in the Set Organization and Location dialog, if you want to add a different location, organization, and contact:

   **Location**
   
   Lets you attach a geographic location to the computer or server. Select a location from the drop-down list. You can also click New Location to add the details of the new location in the Create New Location dialog. Click OK to exit the dialog.

   **Organization**
   
   Lets you attach organization to the computer or server. Select an organization from the drop-down list. You can also click New Organization to add the details of the new organization in the Create New Organization dialog. Click OK to exit the dialog.

   **Contact**
   
   Lets you add a contact. Click New Contact to add a contact using the Create New Contact dialog. Enter the name, telephone number, and email address of the new contact. You can access your default address book by clicking the To: Button and select the email address from there.

   **Note:** You can also add new contacts by clicking New Contact in the Create New Location dialog or Create New Organization dialog.

11. Click Install to install the CA SRM agent software on the managed system you have identified to the wizard, completing the registration.

    Notice that your CA license information for computer and Hyper-V is updated and displays.

    The CA SRM Computer Registration Wizard displays the registration complete message.

12. Click Close to exit the wizard.
Defining a Query Service

This section describes how to create a query using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the service is ready to use. If you want to tailor a service, use the Query Service Builder Wizard to customize it.

The following example shows you how to query the database immediately for all Virtual Host Servers.

To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Query, as shown in the following diagram:

   - Open Systems
     - Network Storage
     - Backup/Archive Products
     - Applications
     - Services
       - Classes
         - Service Definitions
           - Automate
           - File Groups
           - Procedures
           - Query
           - Backup
           - TSM Message Scanner
           - Service Results
             - Asset Administration
             - System Activity

   The Query table opens.
2. Click the Configuration menu and then New in the Query table. The Query Service Wizard opens. From the Query table main menu, select Configuration, New. The Template dialog opens. Expand Network Storage, then Virtual Host Environment, and select Virtual Host Servers. Click Next.

3. Select Virtual Host Servers from the Selection Type drop-down list and select one or more check boxes from the Select one or more VHS from the list. Click Next.

4. Select the execution frequency. The service can operate:
   - **Immediately**—Collection occurs immediately but only once.
   - **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
Defining a Query Service

- **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:
  - Hours
  - Days
  - Weeks
  - Months
  - Business Days

If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies.

The Retain Historical Data (Trending) option is only available when you enable periodic execution.

- **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).

If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.

- **Hold**—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

5. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.
6. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Defining an Automate Service

This section describes how to create Automate services using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the automate service is ready to use. If you want to tailor a service, use the Automate Service Builder Wizard to customize it.

The following example shows you how to scan all Full Virtual Host Servers once a week and notify you by e-mail when any of them are lesser than 70 percent full.

To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Automate, as shown in the following diagram:

   ![Diagram](image)

   The Automate table opens. You can also access Automate services from the Open Systems file menu by selecting Create Services and then Automate.
2. Click the Configuration menu and then New in the Automate table. The Automate Service Wizard opens. From the Automate table main menu, select Configuration, New. The Template dialog opens. Expand Network Storage, then Virtual Host Environment, and select Full Virtual Host Servers. Click Next.

3. Select the percentage of used space from the drop-down list. Click Next.
4. Select Virtual Host Servers from the Selection Type drop-down list and check All Objects. Click Next.

5. Click the Message tab. Enter a message in the Message box that you want to send when the condition is met. Enter your e-mail address in the To text box and click Next.

6. Select the execution frequency. The service can operate:
   - **Immediately**—Collection occurs immediately but only once.
   - **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
■ **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:

- Hours
- Days
- Weeks
- Months
- Business Days

If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies.

The Retain Historical Data (Trending) option is only available when you enable periodic execution.

■ **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).

If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.

■ **Hold**—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

7. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.
8. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
CA SRM adds support for collecting and reporting data from IBM VSS Storage Virtualization appliance. The IBM Storage Volume Controller (SVC) data collection agent is responsible for collecting high level information like Clusters, Nodes, MDisk groups, MDisks, VDisks and so on from IBM VSS installed node by communicating to SMI-S provider configured on any platform which will reside on the managed server machine.

CA SRM helps the storage administrators to understand better the relationship between physical and virtual storage, the storage allocations between the virtualization appliance and the servers that uses the storage.

CA SRM provides a licensed option that pools storage usage data from the following virtual storage server objects:

- Applications
- Clusters
- Nodes
- Mdisks
- Mdisk Groups
- Vdisks
- Flash Copies
- Metro Mirrors
- Ports
- Internal Disk
- Storage Performance
- VDisk (volume) Copy
- Host Mapping

This section contains the following topics:

Virtual Storage Environment Objects (see page 426)
Registering Virtual Storage Environment (see page 428)
Defining a Query Service (see page 431)
Defining an Automate Service (see page 434)
Virtual Storage Environment Objects

CA SRM collects information about the following virtual storage environment objects:

**Applications**

Objects representing the applications of your storage virtualization. For example, SMI-S provider of your storage virtualization server.

**Clusters**

Objects representing the clusters of your storage virtualization. The nodes are clustered together for single point of control for administrator. A cluster can have one to four node pairs in it. Each pair of nodes is known as an input/output (I/O) group. Each node must be in only one I/O group.

**Ports**

Objects representing the ports of your storage environment. Fibre-channel ports are identified by their physical port number and by a worldwide port name (WWPN).

**Nodes**

Objects representing the nodes of a cluster of your storage virtualization. A node is a single processing unit within a VSS cluster. Each pair of nodes is known as an input/output (I/O) group. Each node must be in only one I/O group.

**MDisks**

Objects representing the managed disks of your storage virtualization. A managed disk (MDisk) is a logical disk (typically a RAID or partition) that a storage subsystem exports to the SAN fabric to which the nodes in the cluster are attached.

An MDisk consist of multiple physical disks that are presented as a single logical disk to the SAN. An MDisk always provides usable blocks of physical storage to the cluster even if it does not have a one-to-one correspondence with a physical disk.

**MDisk Groups**

Objects representing group of the managed disks of your storage virtualization. An MDisk Group is a collection of MDisks that jointly contain all the data for a specified set of virtual disks (VDisks). All MDisks in a group are split into extents of the same size.

You can add MDisks to an MDisk group at any time either to increase the number of extents that are available for new VDisks or to expand existing VDisks.
VDisks

Objects representing virtual disk of your storage environment. A virtual disk (VDisk) is a logical disk that the cluster presents to the SAN.

Application servers on the SAN access VDisks. VDisks are created from a set of extents in an MDisk group. There are three types of VDisks:

- Striped
- Sequential
- Image

Flash Copies

Objects representing copies of your VDisks in your storage virtualization. Flash Copies allows you to make an instant, point-in-time copy from a source VDisk to a target VDisk.

Remote Copy

Objects representing the mirror of your VDisks in your storage virtualization. The Metro Mirrors and Global Mirror Copy Services represents the relationship between two volumes, so that updates that are made by an application to one volume are mirrored on the other volume. The volumes can be in the same system or on two different systems.

Metro Mirrors provides a consistent copy of a source VDisk on a target VDisk. Data is written to the target VDisk synchronously after it is written to the source VDisk, so the copy is continuously updated.

With Global Mirror copying, a consistent copy of a source volume on a target volume. Data is written to the target volume asynchronously, so that the copy is continuously updated, but the copy might not contain the last few updates in the event that a disaster recovery operation is performed.

Internal Disks

Objects representing all the internal storage disks of your storage virtualization. These drives are used to create a Redundant Array of Independent Disks (RAID), which are presented as managed disks (MDisks) in the system. You can open the Internal Disks detail form by clicking the Display Detailed Line button on the toolbar of this table. The form displays information about the selected internal disks.

Storage Performance

Objects representing performance. CA SRM reports detailed information about performance attributes of storage objects and the data collection.

VDisk Copy

Objects representing a single VDisk copy. Each VDisk must have at least one copy and can have a maximum of two copies after it is mirrored.
Host Mapping

Host mapping is the process of controlling which hosts have access to specific volumes within the system. Each host mapping associates a volume with a host object and provides a way for all WWPNs and iSCSI names in the host object to access the volume. You can map a volume to multiple host objects. Objects representing the volume name, host name, LUN number, and protocol (iSCSI or FC).

Registering Virtual Storage Environment

To register a virtual storage environment with CA SRM, perform the following steps:

- Set up the application host.

  An Application Host is the host where the SMI-S provider software is installed and configured for the IBM Storage Virtualizer. You can have the in-built SMI-S provider on certain storage virtualizers.

  However, for some of the storage virtualizers, you must install and configure the SMI-S provider software explicitly.

  **Note:** For more information about installing and configuring the software (SMI-S Provider) application host, see the vendor documentation that is provided with your storage virtualizer.

- Set up the proxy collector computers.

  The application host is the computer that controls the virtual storage server. The proxy collector is the computer through which CA SRM performs data collection on the host server. Typically, the application host and the proxy collector reside on the same computer, but they can reside on two separate computers. Typically, the application host and proxy collector computers have different requirements. And this proxy collector has to be registered as a managed computer in CA SRM for that to be listed in the SVC proxy collector list.

- Register the virtual storage server using the CA SRM Virtual Storage Registration Wizard.

Register the Virtual Storage Server

To create a virtual storage environment, register the virtual storage server.

**Follow these steps:**

1. Open the CA SRM Windows Client main window.
2. Select Open Systems, Register, Network Storage, Virtual Storage Servers.

   The CA SRM VSS Registration Wizard welcome dialog opens.
3. Click Next.
   The Selecting an Application Host dialog opens.

4. Type / Select the name of the VSS SMI-S provider.

5. Type the IP address, user name, password, and port number of the VSS SMI-S provider.

6. Select the Secure Connection check box if you had installed the provider in secured mode.

7. Select the proxy collector from the drop-down list.
   The proxy collector is the computer through which CA SRM performs data collection on the host server.

   If the proxy collector you want to use is not available in the drop-down list, you have not registered the computer with CA SRM. For more information about registering a computer with CA SRM, see Registering New Objects in the “Managing Network Storage Objects” chapter.

8. Specify how often you want CA SRM to perform data collection. Click the Ellipsis button.
   The Data Collection Frequency dialog opens.

   Use this dialog to set the data collection frequency you want. The default value for data collection is once every day. Click OK to save the settings and close the dialog.

9. Click Next.
   The Selecting the Namespace dialog opens.

10. Select the namespace supported by CA SRM for storage virtualization profile in the Select the Namespace section and click Next.
    The Devices managed by the VSS Application dialog opens.

    **Note:** If you select a namespace from the list which is not a supported storage virtualization profile, you might get an error message.

11. Select the devices that you want to manage and click Next.
    The Set Organization and Location dialog opens.
12. (Optional) Edit the fields if you want to add a different location, organization, or contact.

**Location**

Select a location from the drop-down list.

You can also click [New Location](see page 163) to add the details of the new location.

**Organization**

Select an organization from the drop-down list.

You can also click [New Organization](see page 163) to add the details of the new organization.

13. Click Register to complete the registration.

The CA SRM VSS Registration Wizard displays the registration complete message.

14. Click Close to exit the wizard.
Defining a Query Service

This section describes how to create a query using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the service is ready to use. If you want to tailor a service, use the Query Service Builder Wizard to customize it.

The following example shows you how to query the database immediately for all Applications.

Follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Query, as shown in the following diagram:

The Query table opens.

2. Click the Configuration menu and then New in the Query table. The Query Service Wizard opens. From the Query table main menu, select Configuration, New. The Template dialog opens.

3. Expand Network Storage, then Virtual Storage Environment, IBM SVC, and select Applications and click Next.

4. Select Applications from the Selection Type drop-down list. Select one or more check boxes from the Select one or more VSS applications from the list and click Next.

5. Select the execution frequency. The service can operate:
   - **Immediately**—Collection occurs immediately but only once.
   - **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
Defining a Query Service

- **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:
  - Hours
  - Days
  - Weeks
  - Months
  - Business Days

If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies.

The Retain Historical Data (Trending) option is only available when you enable periodic execution.

- **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).

If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.

**Hold**—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

6. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.
7. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Defining an Automate Service

This section describes how to create Automate services using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the automate service is ready to use. If you want to tailor a service, use the Automate Service Builder Wizard to customize it.

The following example shows you how to scan all Cluster Status once a week and notify you by e-mail when any of them are online.

Follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Automate, as shown in the following diagram:

   Open Systems
   - Network Storage
   - Backup/Archive Products
   - Applications
   - Services
     - Classes
     - Service Definitions
       - Automate
       - File Groups
       - Procedures
       - Query
       - Backup
       - TSM Message Scanner
   - Service Results
   - Asset Administration
   - System Activity

   The Automate table opens. You can also access Automate services from the Open Systems file menu by selecting Create Services and then Automate.

2. Click the Configuration menu and then New in the Automate table. The Automate Service Wizard opens. From the Automate table main menu, select Configuration, New.

   The Template dialog opens.

3. Expand Network Storage, then Virtual Storage Environment, IBM SVC, and select Full Clusters and click Next.

4. Select % Free Capacity for the clusters from drop down list and click Next

5. Select Clusters from the Selection Type drop-down list and check All Objects in the Selection dialog and click Next.

6. Click the Message tab in the Automate Action dialog and type a message in the Message box that you want to send when the condition is met.

7. Type your e-mail address in the To text box and click Next.
8. Select the execution frequency. The service can operate:

- **Immediately**—Collection occurs immediately but only once.
- **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
- **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:
  - Hours
  - Days
  - Weeks
  - Months
  - Business Days

If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies.

The Retain Historical Data (Trending) option is only available when you enable periodic execution.

- **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).

If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.

- **Hold**—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

9. The Summary dialog displays the parameters for the service that you have defined.

If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.
10. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

![Automate dialog box]

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Chapter 22: Managing SAN Fabric

CA SRM and SAN Fabric are fully integrated, letting you manage your storage area network (SAN) more efficiently. This chapter describes this integration. It includes the following topics:

- SAN Fabric objects
- Registering SAN Fabric
- Data collection
- Creating a Query service

This section contains the following topics:

- **SAN Fabric Objects** (see page 437)
- **Data Collection** (see page 438)
- **Register the SAN Fabric** (see page 439)
- **Defining a Query Service** (see page 445)
- **Defining an Automate Service** (see page 449)

**SAN Fabric Objects**

CA SRM recognizes the following SAN Fabric objects:

**Fabrics**

Objects that represent one or more switches connected by interswitch links (ISLs). Each fabric is uniquely identified by the WWN of the proxy switch in the fabric. The Self loop on Fabric represents a VSAN.

**Switches**

Objects that represent switches on your network. Fibre Channel switch is a network switch compatible with the Fibre Channel (FC) protocol. It allows the creation of a Fibre Channel fabric, that is currently the core component of most storage area networks. The Self loop on Switch represents a virtual switch [partition].

**Enclosures**

Objects that represent the container for all physical components in switch. Enclosure object is created for only director switches for which more than one switch is in an enclosure.

**Blades**

Objects that represent the physical properties of a blade or an embedded switch. A blade is the physical entity that corresponds with Port module. There is a one-one relationship with port module.
Ports

Objects that represent ports in switch. These could be in a port module or independently directly in the switch. This does not include remote port details. This could be Fibre Channel port or non-Fibre Channel port.

Zones

Objects that represent the logical grouping of ports to form a virtual private storage network.

Zonesets

Objects that represent the logical grouping of zones. Zones that belong to a single SAN can be grouped into a zone set, which can be activated or deactivated as a single entity across all switches in the fabric.

ZoneAlias

Objects that represent the aliases of zones, which are meaningful names assigned to devices. An alias can also be a group of devices that are managed together to make zoning easier.

ZoneMember

Objects that represent the ports and devices in zone are called zone members. A zone can contain one or more zone members. Ports that are members of a zone can communicate with each other, but they are isolated from ports in other zones. Devices, however, can belong to more than one zone.

Note: If you change a keyword in SAN Fabric, CA SRM can no longer collect data about this object.

Data Collection

CA SRM collects data from the SAN fabric and stores it in a local database. CA SRM then uploads the data into its database. When you register a computer in CA SRM, you define the frequency that you want the data to be collected and automatically start the data collection process. You can view the data collected in CA SRM.

Note: To help ensure that the Windows Client displays the most recent data collection, refresh open user views.
Register the SAN Fabric

You can collect data from any managed computer that has the SMI-S agent installed with supported protocols.

**Follow these steps:**

1. Open the CA SRM Windows Client main window and select Open Systems, Register, Network Storage, Storage Area Network Fabric.
   The CA SRM Fabric Registration Wizard welcome dialog opens.
2. Click Next.
   The Provider Credentials dialog opens.

   ![CA SRM Fabric Registration Wizard]

   **SMI-S Provider Details**
   - Name/IP
     - Defines the computer name or the IP address.
   - Username
     - Defines the user name of the SMI-S provider.
   - Password
     - Defines the password associated with the user name.
   - Port
     - Defines the port of the switch.
     - Note: The default port of the switch is 5988, which is not secured.

   ![Select the Proxy Collector]

   3. Provide the following SMI-S provider details:

      **Name / IP**
      - Defines the computer name or the IP address.

      **Username**
      - Defines the user name of the SMI-S provider.

      **Password**
      - Defines the password associated with the user name.

      **Port**
      - Defines the port of the switch.

      **Note:** The default port of the switch is 5988, which is not secured.
**Https**

Select the https check box if you had installed the provider in either secured mode.

**Community String**

Defines whether the community string is public or private. By default, the community string is public.

*Note:* The Community String is configurable field.

**Vendor**

Displays the list of switch vendors.

**Collection Frequency**

Specifies how often you want CA SRM to perform data collection on the server. Click the Ellipsis button. The *Data Collection Frequency* (see page 445) dialog opens.

**Select the proxy collector**

Displays the list of proxy collectors. Select a proxy collector from the drop-down list.

*Note:* If you have selected McData or Brocade vendor and if the fabric size is large with many switches, then the system throws a timeout error message. See the *SAN Fabric Timeout Message* (see page 522) under the Troubleshooting section to know more about how to avoid this error.

**Important!** Brocade/McData fabric switches that are managed in CA SRM must have the respective SMI agents supporting the latest firmware versions as mentioned in vendor Release Notes.

By default, Brocade SMI-S vendor provider prefers IPv4 Stack. If you would prefer to use IPv6 stack, disable it in the Configuration Tool and restart the server if it is already running.
4. Click Next.

The Discovered Switches dialog opens populating the information of set of switches in the fabric.

![CA SAN Fabric Registration Wizard](image)

**Important!** The fabric switches having valid network IP addresses and can be accessible from the Proxy collector computer are only managed in SRM.

5. You can perform the following tasks on this dialog.
   - **Apply Credentials** (see page 442)
   - **Remove Credentials** (see page 444)

6. Click Next in the Discovered Switches dialog.

The Set Organization and Location dialog opens.

7. (Optional) You can add a location, organization, or contact to the switch you want to register.
   - Attach a geographic location to the switch, select one from the drop-down list. You can manually add a location by clicking New Location. This step opens the Create New Location dialog. Type the location information and select a contact.
   - Attach an organization to the switch, select one from the drop-down list. You can manually add an organization by clicking New Organization. This step opens the Create New Organization dialog. Type the organization name and select a contact.
   - Add a contact by clicking New Contact in the Organization or Location dialogs. This step opens the Create a New Contact dialog. Type the name, telephone number and e-mail address of the new contact person. You can access your default address book by selecting the e-mail address from there. Clicking OK returns you to the New Location or New Organization dialog.
8. Click Register in the Set Organization and Location dialog.

The Registration Completion Wizard displays the registration complete message with the total count of registered switches.

9. Click Close to exit the wizard.

**Apply Switch Credentials**

Apply switch credentials to register the switch in the fabric.

**To apply switch credentials to register switch**

1. Select the switches for which you want to apply the credentials.
2. Click Apply Credentials.

The Switch Credentials dialog opens.

- **SMI-S**
  - Name/IP: [input field]
  - Username: [input field]
  - Password: [input field]

- **Port**: [5988] [on-off]
  - [HTTPS]

- **Collection Frequency**: Every Day

- **SNMP (Optional)**
  - Version: V3
  - User Name: [input field]
  - Security Level: noAuthNoPriv
    - Authentication Protocol: [N/A]
    - Authentication Key: [N/A]
    - Privacy Protocol: [N/A]
    - Privacy Key: [input field]

3. Provide the SMI-S provider details in the SMIS-S section.

**Name / IP**

Type the computer name or the IP address.
Username
Type the user name of the SMI-S provider.

Password
Type the password associated with the user name.

Port
Type the port of the switch.

Note: The default port of the switch is 5988, which is not secured.

Collection Frequency
Specifies how often you want CA SRM to perform data collection on the server. Click the Ellipsis button. The Data Collection Frequency (see page 445) dialog opens.

Note: If you select the Brocade / McData vendor in the Provider Credentials screen, the SMI-S provider section is dimmed.

4. (Optional) Provide the following SNMP details in the SNMP section.

Note: By default, the SNMP is optional. If you have selected QLogic vendor in the Provider Credentials dialog, you see V1 and V2c options only. For all other vendors, SNMP V3 option is enabled.

Version
Specify the version of the SNMP.

If you select the SNMPV1 or V2c version, the community string field only is displayed.

If you select the SNMPV3 version, the Username, Security Level, Authentication Protocol, Authentication Key, Privacy Protocol, and Privacy Key fields are displayed.

Community String
This is applicable only if you select V1 and V2c versions. By default, the community string is public.

Username
Type the user name of the SNMP.
Security Level

Select the security level of the SNMP. The three options available for security level are:

noAuthNoPriv

This is the default option set. If you select this option, all the other following fields are dimmed.

authNoPriv

If you select this option, the Authentication Protocol and Authentication Key are enabled.

authPriv

If you select this option, all the options are enabled.

Authentication Protocol

Select the authentication protocol of the SNMP. The available authentication algorithms are MD5 and SHA.

Authentication Key

Type the authentication key of the SNMP. The authentication key is the password for the selected authentication protocol.

Privacy Protocol

Select the privacy protocol of the SNMP. The available privacy algorithms are AES and DES.

Privacy Key

Type the privacy key of the SNMP. The privacy key is the password for the selected privacy protocol.

5. Click OK.

The Discovered Switches dialog opens. The credentials for the selected switch are applied and displays Yes under the Credentials Set column.

Remove Switch Credentials

You can remove selected switch(es) whose credentials are set to Yes under the Credentials Set column in the Discovered Switches dialog.

To remove the switch credentials

1. Select the switch or set of switches and click Remove Credentials.

The credentials of the selected switch(es) are removed and displays No under the Credentials Set column.
Setting the Data Collection Frequency

You can specify how often you want CA SRM to perform data collection on the server.

To set the data collection frequency

1. Use the Data Collection Frequency dialog to set the data collection frequency you want. The default value for data collection is once every day. Click OK to save the settings and close the dialog.

Defining a Query Service

This section describes how to create a query using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the service is ready to use. If you want to tailor a service, use the Query Service Builder Wizard to customize it.

The following example shows you how to query the database immediately for all Applications.

To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Query, as shown in the following diagram:

```
[Diagram showing tree structure of CA SRM Object Tree with selected Query]
```

The Query table opens.
2. Click the Configuration menu and then New in the Query table. The Query Service Wizard opens. From the Query table main menu, select Configuration, New. The Template dialog opens. Expand Templates, Network Storage, SAN Fabric, and select Fabrics. Click Next.

3. Select Fabrics from the Selection Type drop-down list and select All Objects check box from the Select one or more fabrics from the list. Click Next.

4. Select the execution frequency. The service can operate:
   - **Immediately**—Collection occurs immediately but only once.
   - **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
- **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:
  - Hours
  - Days
  - Weeks
  - Months
  - Business Days

If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies.

The Retain Historical Data (Trending) option is only available when you enable periodic execution.

- **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).

  If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.

**Hold**—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

5. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.
6. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Defining an Automate Service

This section describes how to create Automate services using the Service Builder Wizard. The Service Builder Wizard contains predefined sets of sample services. After completing the configuration steps, the automate service is ready to use. If you want to tailor a service, use the Automate Service Builder Wizard to customize it.

The following example shows you how to scan all Cluster Status once a week and notify you by e-mail when any of them are online.

To do this, follow these steps:

1. Expand the CA SRM Object Tree, Open Systems, Services, Service Definitions, and then select Automate, as shown in the following diagram:

```
    + Open Systems
      + Network Storage
      + Backup/Archive Products
      + Applications
      + Services
        + Classes
          + Service Definitions
            + Automate
            + File Groups
            + Procedures
            + Query
            + Backup
            + TSM Message Scanner
        + Service Results
          + Asset Administration
          + System Activity
```

The Automate table opens. You can also access Automate services from the Open Systems file menu by selecting Create Services and then Automate.
2. Click the Configuration menu and then New in the Automate table. The Automate Service Wizard opens. From the Automate table main menu, select Configuration, New. The Template dialog opens. Expand Templates, Network Storage, SAN Fabric, and select Fabrics that are not Updated. Click Next.

3. Enter the number of hours and click Next.
4. Select Fabrics from the Selection Type drop-down list and check All Objects. Click Next.

![Automate Service Builder](image)

5. Click the Message tab. Enter a message in the Message box that you want to send when the condition is met. Enter your e-mail address in the To text box and click Next.

![Automate Service Builder](image)

6. Select the execution frequency. The service can operate:
   - **Immediately**—Collection occurs immediately but only once.
   - **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
Defining an Automate Service

- **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:
  - Hours
  - Days
  - Weeks
  - Months
  - Business Days

If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies.

The Retain Historical Data (Trending) option is only available when you enable periodic execution.

- **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).

If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.

- **Hold**—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

7. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.
8. Enter a name for the service in the dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog:

![Automate Service Dialogue Box]

You can use the CA SRM Activity Monitor to check the progress of any service that you create. From the Open Systems menu, select Activity Monitor.
Enterprise Definition Language (EDL) is a special purpose language designed to facilitate the selection and manipulation of network objects for storage management purposes, and for writing timing and filter statements.

CA SRM uses EDL to configure services and create classes. If you are an advanced user, you may want to use EDL to create and modify statements; however, the wizards provided with CA SRM should satisfy the needs of most users.

This chapter provides an overview of EDL, a review of its syntax, and a sequence of examples to help you write EDL statements.

This section contains the following topics:

- Using EDL with CA SRM (see page 456)
- EDL Reference (see page 476)
- Aggregate Functions (see page 479)
- Using Class Definitions (see page 481)
Using EDL with CA SRM

CA SRM provides two methods of selecting network objects:

**Direct selection**
Points to one or more network objects using the system’s browsing facilities.

**EDL statement**
A statement that evaluates the selection. In simplest terms, it is an explicit reference (a string containing the name or names of selected network objects).

EDL can distinguish network objects and their built-in relationships, such as OWNED_BY or IS_ON; therefore, the more complex the selection, the more useful EDL becomes. EDL statements are uniquely efficient in expressing storage management requirements and operations.

If you are manipulating network objects such as domains, computers, or files, you can use direct selection or explicit reference. If you want to select multiple objects or select objects by their relationships (such as the files of a given user) or by their attributes (such as files of a certain size or files that have changed after a certain date) you must use EDL.

You can use EDL in the following situations:

- **Service source definition**
  This statement finds all volumes that are more than 70 percent full:

  ```
  VOLUME WHERE VOLUME_PERCENT_OCC_SPACE > 70
  ```

- **Class definition**
  This statement creates a class to limit the scope of a query to old files:

  ```
  FILE WHERE FILE_LAST_ACCESS_DATE < TODAY – 1 YEAR
  ```

- **Object definition for Automate services**
  This statement determines the source on which the Command Line statement (such as a delete command) will be activated.

  ```
  FILE WHERE FILE_EXTENSION IN ['TMP', 'tmp']
  ```

- **Definition of timing conditions**
  This statement can be used to control when a service is activated.

  ```
  EVERY DAY
  EVERY BUSINESS_DAY AFTER 5:00 PM
  ```

You can use different types of EDL expressions for different purposes. Use **EDL selection statements** for class and service definitions. Use **EDL conditional statements** for filters. Use **EDL timing statements** to specify service execution timing. You can use a subset of timing statements in conditions.
In some instances, the system furnishes an EDL icon, which invokes the EDL editor. The EDL editor provides the environment and the typing aids you use to generate EDL statements.

After you have defined the EDL statement, CA SRM compiles and stores it as part of the service or class definition. The actual EDL expression submitted for compilation can contain other parameters added transparently by the service definition dialog.

**Building Blocks**

The following items are the building blocks of EDL statements:

**Objects**

Database objects such as computers, servers, volumes, files, and so.

*Note:* In EDL, COMPUTER and SERVER are equivalent objects. You can use them interchangeably.

**Attributes**

Object attributes that appear as columns (fields) in the object table. Computers have such attributes as name, operating system, size, and free space. EDL applies the correct attributes to each object.

**Relationships**

Connections between various types of database objects. EDL is aware of the relationships between objects.

**Keywords**

Predefined symbols and words that have special meaning in EDL.

**Operators**

Combined objects and values in EDL expressions.
### EDL Editor

You can open the EDL editor from service definition dialogs or from the class definition dialog. The following shows you an example of the EDL Editor dialog:

![EDL Editor](image_url)

The EDL editor opens with slight variations, depending on the dialog from which you call it. The EDL editor provides access to the following functions:

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>Exits the editor and inserts the EDL expression into the service definition dialog from which the editor was called.</td>
</tr>
<tr>
<td>Cancel</td>
<td>Exits the editor without saving anything.</td>
</tr>
<tr>
<td>Save*</td>
<td>Saves the class definition.</td>
</tr>
<tr>
<td>Clear</td>
<td>Deletes the entire statement.</td>
</tr>
<tr>
<td>Syntax*</td>
<td>Checks the validity of the EDL statement and issues a message indicating whether the syntax is correct.</td>
</tr>
<tr>
<td>Assistant</td>
<td>Provides help with the formulation of EDL conditional statements in class definitions, filter definitions, and in supplying sources to services in EDL format.</td>
</tr>
<tr>
<td>Context</td>
<td>Provides context-sensitive help (brief description with example) for the selected item in a secondary dialog.</td>
</tr>
</tbody>
</table>
* Only in the Class definition dialog.

The EDL editor dialog offers several building blocks to help you write EDL statements. Double-click any building block to transfer the element to the Expression text box at the bottom of the dialog.

The following EDL building blocks appear in the editor:

- **Objects**—Drop-down list of objects included in the CA SRM database and recognized by EDL (computers, classes, users, and so on). For more information, see the online help.

- **Attributes**—The object attributes listed are those that correspond to the object selected in the Object drop-down list. If you double-click an attribute, the object name is concatenated to the object name with the selected attribute and transferred to the Expression text box.

  CA SRM associates each attribute with a data type. When used in comparisons, the expressions on the right must match the attribute type.

  If you select the object COMPUTER from the Object list and double-click the attribute FREE_SPACE, the string COMPUTER_FREE_SPACE is transferred to the Expression text box.

  Attributes can assume values of different types, as shown in the following examples:

  - `FILE_SIZE = 2 MB` (size), `USER_NAME = "JDOE"` (string)
  - `FILE_HAS_VALID_OWNER = TRUE` (Boolean)
  - `VOLUME_TYPE = "FAT"` (Enum string)

  The attribute can assume any value from a finite list of values. For more information, see the online help.

- **Relationships**—The relationships in this list correspond to the object selected in the Object drop-down list.

  Some network objects are related to each other. Because computers can be part of domains, the relationships between these objects is expressed as follows:

  - A computer **BELONGS_TO** a domain.
  - A domain **CONTAINS** a computer.
  - The system also identifies implied relationships between objects. An implied relationship is one that the system assumes between two objects if no relationship is specified explicitly. Using the implied relationship of **IS_OWNED_BY** between files and users, you can write a statement such as:

    `FILE WHERE USER_NAME = "JSMITH"

    to replace the more explicit statement:

    `FILE WHERE FILE IS_OWNED_BY USER "JSMITH"`
Similarly, using the implied relationship of IS_REGISTERED_ON between TSM nodes and TSM servers, you can write a statement such as:

TSM_NODE WHERE TSM_SERVER_NAME = "ATLANTA"

to replace the more explicit statement:

TSM_NODE WHERE TSM_NODE IS_REGISTERED_ON TSM_SERVER "ATLANTA"

**Keywords**—Predefined symbols and words that have special meaning in EDL. For a list of EDL keywords, see EDL Reference in this chapter.

EDL statements appear in the Expression text box at the bottom of the window. You can enter the statements directly or use the objects listed in the typing aid.

**EDL Assistant**

The EDL Assistant helps you to formulate EDL conditional statements for class definitions and filter definitions, and to supply sources. To start the EDL Assistant, follow these steps:

1. Select the object for which you want to formulate the EDL statement from the EDL Editor Object drop-down list.
2. Click the Assistant button. The EDL Assistant dialog opens:

   ![EDL Assistant Dialog](Image)

   - **Object**
   - **Attribute**
   - **Operator**
   - **Value**
3. Select an object from the Object drop-down list.
   The list contains the object you selected in the EDL Editor and related objects that are valid as conditions to the object selected in the EDL Editor.

4. Select an attribute from the Attribute drop-down list.
   The Attribute drop-down list shows the attributes appropriate for the selected object. You can specify an aggregate function for this attribute by clicking Aggregate (to the right of the Attribute drop-down list).

5. Select an operator from the Operator drop-down list.

6. Click the right arrow next to the Value field and enter the value or use the aids available in the dialog to construct one.

7. Click OK.

When the EDL Assistant dialog closes, your definition appears in the Expression text box of the EDL Editor.

You can use the EDL Assistant to define several conditions and connect them by means of AND, OR, AND NOT, and OR NOT logical operators.

**Syntax**

EDL selection statements have the following general syntax:

```
OBJECT WHERE CONDITION
```

For example:

```
VOLUME WHERE VOLUME_SIZE > 5GB
```

<table>
<thead>
<tr>
<th>Clauses</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBJECT</td>
<td>The OBJECT clause can be an actual object (such as a file or computer) or include an object name pattern (for example, every file with an *.exe extension). The following are examples of valid object clauses:</td>
</tr>
<tr>
<td></td>
<td><code>COMPUTER (object)</code></td>
</tr>
<tr>
<td></td>
<td><code>file &quot;*.txt&quot; (object with pattern)</code></td>
</tr>
<tr>
<td></td>
<td><code>MY_COMPUTERS (class)</code></td>
</tr>
</tbody>
</table>
Using EDL with CA SRM

### Clauses

<table>
<thead>
<tr>
<th>Clause</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONDITION</td>
<td>The CONDITION can be one of the following:</td>
</tr>
<tr>
<td></td>
<td>(1) ATTRIBUTE OPERATOR VALUE</td>
</tr>
<tr>
<td></td>
<td>for example:</td>
</tr>
<tr>
<td></td>
<td>VOLUME_SIZE &gt;= 3GB</td>
</tr>
<tr>
<td></td>
<td>(2) OBJECT RELATION SELECTION</td>
</tr>
<tr>
<td></td>
<td>for example:</td>
</tr>
<tr>
<td></td>
<td>TSM_SESSION BELONGS TO TSM_NODE “QA”</td>
</tr>
</tbody>
</table>

You can combine these basic conditions using the logical operators AND, OR, and NOT.

**Note:** In the actual EDL statement, entries in quotation marks are case-sensitive and must appear exactly as they appear in the CA SRM database. For example, DIRECTORY “usr” is not the same as DIRECTORY “USR”. To remove case sensitivity, use the UCASE keyword. For example, UCASE(DIRECTORY) “USR” finds directories USR, Usr, and usr.

For more information about timing expressions, see Special Statements in this chapter.

### Joining Objects and Conditions

The keyword WHERE connects any OBJECT to any CONDITION. You can join the OBJECT:

FILE "QA1#" (which selects all the files on computer QA1)

to the CONDITION:

FILE_SIZE > 500KB (which matches all the files larger than 500 KB)

using the query:

FILE "QA1#" WHERE FILE_SIZE > 500 KB

The result is all files on computer QA1 that are larger than 500 KB.

The attribute in the CONDITION (FILE_SIZE) is also an attribute of the object FILE.

### Implied Relationship

EDL identifies implied relationships between certain objects. In the following EDL statement, the system identifies the implicit relationship between file and computer through directory and volume:

FILE WHERE COMPUTER_OPERATING_SYSTEM="WINDOWS**"
No Relationship Provided

In cases where the system cannot find a relationship between the object clause and the condition, it reports the statement as invalid. The following statement is invalid because there is no relationship between Storage Manager and File:

TSM_SESSION WHERE FILE_SIZE > 100 MB

TSM Nodes With More Than 10 Objects Failed to Back Up

Similarly, you can join the OBJECT:

TSM_NODE "QA*"

This selects all the TSM nodes names that start with QA to the following CONDITION

TSM_NODE_OBJECTS_FAILED > 10

This selects all the TSM node names where more than ten objects failed to be backed up to write a query:

TSM_NODE "QA*" WHERE TSM_NODE_OBJECTS_FAILED > 10

The result is all TSM nodes with more than ten objects that failed to be backed up.

The attribute in the CONDITION (OBJECTS_FAILED) is also an attribute of the object TSM_NODE.

Implied Relationship

EDL identifies implied relationships between certain objects. In the following EDL statement, the system identifies the implicit relationship between TSM session and TSM server through TSM node:

TSM_SESSION WHERE TSM_SERVER_NAME ~ "QA*"

No Relationship Provided

In cases where the system cannot find any relationship between the object clause and the condition, it reports the statement as invalid. The following statement is invalid because there is no relationship between TSM user and session:

TSM_USER WHERE TSM_SESSION_XFER_TIME > 3 HOURS
Objects

An EDL Object can be one of the following:

- An object type:
  
  - COMPUTER       (selects all computers on the system)

- A file pattern, always assumed to be a file:
  
  - "*.C"           (selects all files that match the pattern)

- An object pattern:
  
  - USER "A*"       (selects users whose names begin with A)

Note: You must close the pattern within double quotes. For a description of legal EDL patterns, see Patterns in this chapter.

If you enter the name of an object type alone, CA SRM selects all instances of that object type. The object FILE selects all the files. The object COMPUTER selects all the computers. By qualifying the object you narrow the selection.

You can write the object so that the objects include a list of elements enclosed within square brackets and separated by commas, as shown below:

<table>
<thead>
<tr>
<th>Objects</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every File on Computer List</td>
<td>To select every file on a list of computers, enter the following:</td>
</tr>
<tr>
<td></td>
<td>FILE [&quot;COMPUTER1#&quot;, &quot;COMPUTER2#&quot;, &quot;COMPUTER3#&quot;]</td>
</tr>
<tr>
<td>Every File on Volume List</td>
<td>To select every file on a list of volumes, enter the following:</td>
</tr>
<tr>
<td></td>
<td>FILE [&quot;COMPUTER1VOL1#&quot;, &quot;COMPUTER2VOL2#&quot;, &quot;COMPUTER3VOL3#&quot;]</td>
</tr>
<tr>
<td>Every Volume on Computer List</td>
<td>To select every volume on a list of computers, enter the following:</td>
</tr>
<tr>
<td></td>
<td>VOLUME [&quot;COMPUTER1&quot;, &quot;COMPUTER2&quot;, &quot;COMPUTER3&quot;]</td>
</tr>
</tbody>
</table>
Conditions

You can use condition statements to qualify selections. The following formats are used:

**ATTRIBUTE OPERATOR VALUE**

and

**OBJECT RELATION SELECTION**

The following examples illustrate some of the most common conditions of the ATTRIBUTE-OPERATOR-VALUE type, using a variety of attributes. The implied object in all cases is FILE. See Keywords in this chapter for the list of EDL operators. Examples using the attribute FILE_NAME follow:

<table>
<thead>
<tr>
<th>Objects</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Files with Name</td>
<td>To select all the files with the name &quot;MYFILE.EXT,&quot; enter the following:</td>
</tr>
<tr>
<td></td>
<td>FILE_NAME = &quot;MYFILE.EXT&quot;</td>
</tr>
<tr>
<td>All Files with .XLS Extension</td>
<td>To select all the files with the extension .XLS, enter the following:</td>
</tr>
<tr>
<td></td>
<td>FILE_EXTENSION = &quot;XLS&quot;</td>
</tr>
<tr>
<td>All Files with .DOC or .WP Extension</td>
<td>To select all the files with the extension .DOC or .WP, enter the following:</td>
</tr>
<tr>
<td></td>
<td>FILE_EXTENSION = &quot;DOC&quot; or FILE_EXTENSION = &quot;WP&quot;</td>
</tr>
<tr>
<td>All Files Ending in R1 and .DT Extension</td>
<td>To select all the file names ending in &quot;R1&quot; and the extension .DT, enter the following:</td>
</tr>
<tr>
<td></td>
<td>FILE_NAME ~ &quot;*R1.DT&quot;</td>
</tr>
<tr>
<td>All Files Where Name Contains WIN</td>
<td>To select all the files with a name containing &quot;WIN&quot; (WIN.COM, WINWORD.EXE, and so on), enter the following:</td>
</tr>
<tr>
<td></td>
<td>FILE_NAME ~ &quot;<em>WIN</em>&quot;</td>
</tr>
<tr>
<td>All Files with .R Extension</td>
<td>To select all of the files with the extension .R? (? can be any character), enter the following:</td>
</tr>
<tr>
<td></td>
<td>FILE_NAME ~ &quot;*.R?&quot;</td>
</tr>
<tr>
<td>All Files, Except .MDB Extension</td>
<td>To select all the files except those with the extension .MDB, enter the following:</td>
</tr>
<tr>
<td></td>
<td>NOT FILE_EXTENSION = &quot;MDB&quot;</td>
</tr>
</tbody>
</table>
The following lists examples using the attribute TSM_NODE_NAME:

<table>
<thead>
<tr>
<th>Objects</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSM Node with Name MYNODE</td>
<td>To select the TSM node with the name &quot;MYNODE,&quot; enter the following:</td>
</tr>
<tr>
<td></td>
<td>TSM_NODE_NAME = &quot;MYNODE&quot;</td>
</tr>
<tr>
<td>TSM Nodes with Names Starting MIS</td>
<td>To select all the TSM nodes with names starting with MIS, enter the following:</td>
</tr>
<tr>
<td></td>
<td>TSM_NODE_NAME ~ &quot;MIS*&quot;</td>
</tr>
<tr>
<td>TSM Nodes with Names Starting MIS and ACC</td>
<td>To select all the TSM nodes with names starting with MIS and with ACC, enter the following:</td>
</tr>
<tr>
<td></td>
<td>TSM_NODE_NAME ~ &quot;MIS*&quot; OR TSM_NODE_NAME ~ &quot;ACC*&quot;</td>
</tr>
<tr>
<td>TSM Nodes with Names Ending R1</td>
<td>To select all the TSM nodes with names ending in &quot;R1,&quot; enter the following:</td>
</tr>
<tr>
<td></td>
<td>TSM_NODE_NAME ~ &quot;*R1&quot;</td>
</tr>
<tr>
<td>TSM Nodes with Name Containing WIN</td>
<td>To select all the TSM nodes with a name containing &quot;WIN,&quot; enter the following:</td>
</tr>
<tr>
<td></td>
<td>TSM_NODE_NAME ~ &quot;<em>WIN</em>&quot;</td>
</tr>
<tr>
<td>TSM Nodes with Name Starting A and Ending R</td>
<td>To select all of the TSM nodes with names starting with A and ending in R, enter the following:</td>
</tr>
<tr>
<td></td>
<td>TSM_NODE_NAME ~ &quot;A*R&quot;</td>
</tr>
<tr>
<td>TSM Nodes Except Names Starting AIX</td>
<td>To select all the TSM nodes except those whose names start with AIX, enter the following:</td>
</tr>
<tr>
<td></td>
<td>NOT (TSM_NODE_NAME ~ &quot;AIX*&quot;)</td>
</tr>
</tbody>
</table>

In the following examples we replace FILE_NAME with USER_NAME. This is a valid substitution because a relationship exists between files and users. Although USER_NAME is not a file attribute, based on the OWNED_BY relationship between files and users, EDL interprets these statements to mean, "files owned by users whose name is..." The following examples contain the full EDL statement showing both object and condition. They use the attribute USER_NAME:

<table>
<thead>
<tr>
<th>Objects</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Files Belonging to User BSMITH</td>
<td>To select all the files that belong to the user BSMITH, enter the following:</td>
</tr>
<tr>
<td></td>
<td>FILE WHERE FILE_OWNER_NAME = &quot;BSMITH&quot;</td>
</tr>
<tr>
<td>All Files Belonging to Users Beginning ADMIN</td>
<td>To select all the files that belong to users whose names begin with &quot;ADMIN,&quot; enter the following:</td>
</tr>
<tr>
<td></td>
<td>FILE WHERE FILE_OWNER_NAME ~ &quot;ADMIN*&quot;</td>
</tr>
</tbody>
</table>
Using EDL with CA SRM

Chapter 23: Enterprise Definition Language

### Objects

<table>
<thead>
<tr>
<th>All Files Belonging to User in List</th>
<th>To select all the files that belong to one of the users in the list, enter the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FILE WHERE FILE_OWNER_NAME IN [&quot;JPOST&quot;, &quot;BMAC&quot;, &quot;VHALL&quot;]</td>
</tr>
</tbody>
</table>

In the following examples we replace TSM_NODE_NAME with TSM_SERVER_NAME. This is a valid substitution because a relationship exists between TSM nodes and servers. Although TSM_SERVER_NAME is not a node attribute, based on the IS_REGISTERED_ON relationship between TSM nodes and servers, EDL interprets these statements to mean, "TSM nodes registered on the TSM servers ..." For clarity, the following examples contain the full EDL statement, showing both object and condition. They use the attribute TSM_SERVER_NAME:

### Objects

<table>
<thead>
<tr>
<th>Nodes Belonging to TSM Server ATALANTA</th>
<th>To select all the nodes that belong to the TSM server ATALANTA, enter the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TSM_NODE WHERE TSM_SERVER_NAME = &quot;ATALANTA&quot;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nodes Belonging to TSM Servers and Names Beginning AIX</th>
<th>To select all the nodes that belong to TSM servers the names of which begin with AIX, enter the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TSM_NODE WHERE TSM_SERVER_NAME ~ &quot;AIX*&quot;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nodes Belonging to TSM Server in List</th>
<th>To select all the nodes that belong to one of the TSM servers in the list, enter the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TSM_NODE WHERE TSM_SERVER_NAME IN [&quot;JPOST&quot;, &quot;BMAC&quot;, &quot;VHALL&quot;]</td>
</tr>
</tbody>
</table>

The following list shows examples using the attribute FILE_SIZE:

### Objects

<table>
<thead>
<tr>
<th>Files Larger Than 10 MB</th>
<th>To select all the files larger than 10 MB, enter the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FILE SIZE &gt; 10 MB</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Files Larger than 1 MB and Smaller than 2 MB</th>
<th>To select all the files larger than 1 MB but smaller than 2 MB, enter the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FILE_SIZE &gt; 1 MB AND FILE_SIZE &lt; 2 MB</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Files Larger Than or Equal to 1 MB</th>
<th>To select all the files larger than or equal to 1 MB, enter the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FILE_SIZE &gt;= 1 MB</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Files More Than 10 Percent of Volume</th>
<th>To select all the files that are bigger than 10 percent of the volume on which they reside, enter the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FILE_SIZE &gt; (0.1 * VOLUME_SIZE)</td>
</tr>
</tbody>
</table>
The following list shows examples using the attribute VOLUME_SIZE:

<table>
<thead>
<tr>
<th>Objects</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volumes Larger Than 10 GB</td>
<td>To select all the volumes larger than 10 GB, enter the following:</td>
</tr>
<tr>
<td></td>
<td>VOLUME_SIZE &gt; 10 GB</td>
</tr>
<tr>
<td>Volumes Larger 1 GB and Smaller 2 GB</td>
<td>To select all the volumes larger than 1 GB but smaller than 2 GB, enter the following:</td>
</tr>
<tr>
<td></td>
<td>VOLUME_SIZE &gt; 1 GB AND VOLUME_SIZE &lt; 2 GB</td>
</tr>
<tr>
<td>Volumes Larger Than or Equal to 1 GB</td>
<td>To select all the volumes larger than or equal to 1 GB, enter the following:</td>
</tr>
<tr>
<td></td>
<td>VOLUME_SIZE &gt;= 1 GB</td>
</tr>
<tr>
<td>Volumes More Than 10 Percent of Computer</td>
<td>To select all the volumes that constitute more than 10 percent of the size of the computer on which they reside, enter the following:</td>
</tr>
<tr>
<td></td>
<td>VOLUME_SIZE &gt; (0.1 * COMPUTER_SIZE)</td>
</tr>
</tbody>
</table>

The following list shows examples using date attributes (supported date formats are: MM/DD/YY; MM/DD/YYYY; MMM DD,YY; MMM DD,YYYY):

<table>
<thead>
<tr>
<th>Objects</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Files Created Before 29 February 2003</td>
<td>To select all the files created before 29 February 2003, enter the following:</td>
</tr>
<tr>
<td></td>
<td>FILE_CREATION_DATE &lt; 2/29/2003</td>
</tr>
<tr>
<td>Files Accessed on or After 29 February 2003</td>
<td>To select all the files accessed on or after 2/29/2003, enter the following:</td>
</tr>
<tr>
<td></td>
<td>FILE_LAST_ACCESS_DATE &gt;= 2/29/2003</td>
</tr>
</tbody>
</table>
### Objects

<table>
<thead>
<tr>
<th>Objects</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Files Modified Today</td>
<td>To select all the files that were modified today, enter the following:  [FILE_LAST_MODIFIED_DATE = TODAY]</td>
</tr>
<tr>
<td>Files Modified Previous Two Weeks</td>
<td>To select all the files that were modified in the previous two weeks, enter the following: [FILE_LAST_MODIFIED_DATE &gt; TODAY - 2 WEEKS]</td>
</tr>
<tr>
<td>Files Modified Previous 12 Hours</td>
<td>To select all the files that were modified in the previous 12 hours, enter the following: [FILE_LAST_MODIFIED_DATE &gt;= NOW - 12 HOURS]</td>
</tr>
<tr>
<td>Files Created Previous Year</td>
<td>To select all the files created in the previous year, enter the following: [FILE_CREATION_DATE &gt;= TODAY - 365 DAYS]</td>
</tr>
<tr>
<td>Nodes Accessed Before 29 February 2003</td>
<td>To select all the nodes last accessed before 29 February 2003, enter the following: [TSM_NODE_LAST_ACCESS_TIME &lt; 2/29/2003]</td>
</tr>
<tr>
<td>Nodes Accessed on or After 29 February 2003</td>
<td>To select all the nodes last accessed on or after 29 February 2003, enter the following: [TSM_NODE_LAST_ACCESS_TIME &gt;= 2/29/2003]</td>
</tr>
<tr>
<td>Sessions Started Today</td>
<td>To select all the sessions started in the past 24 hours, enter the following: [TSM_SESSION_START_TIME = NOW - 24 HOURS]</td>
</tr>
<tr>
<td>Sessions Started Previous Two Weeks</td>
<td>To select all the sessions that were started in the previous two weeks, enter the following: [TSM_SESSION_START_TIME &gt; TODAY - 2 WEEKS]</td>
</tr>
</tbody>
</table>

The following examples illustrate the syntax of conditions of the type OBJECT-RELATION-SELECTION:

<table>
<thead>
<tr>
<th>Objects</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Files Belonging to BSMITH</td>
<td>To select all the files that belong to the user &quot;BSMITH,&quot; enter the following: [FILE IS OWNED BY USER &quot;BSMITH&quot;]</td>
</tr>
<tr>
<td>Files in SYS Directory</td>
<td>To select all the files in the SYS directory on all computers, enter the following: [FILE IS IN DIRECTORY &quot;**SYS*.*&quot;]</td>
</tr>
</tbody>
</table>
Using EDL with CA SRM

### Objects

<table>
<thead>
<tr>
<th>Objects</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sessions Belonging to TSM Server ATLANTA</td>
<td>To select all the sessions that belong to the TSM server ATLANTA, enter the following:</td>
</tr>
<tr>
<td></td>
<td>TSM_SESSION_BELONGS_TO TSM_SERVER &quot;ATLANTA&quot;</td>
</tr>
<tr>
<td>TSM Users Defined on ASDM Nodes Started on UNIX</td>
<td>To select all the TSM users that are defined on the ASDM nodes starting with UNIX on all servers, enter the following:</td>
</tr>
<tr>
<td></td>
<td>TSM_USER_IS_DEFINED_ON TSM_NODE &quot;/<em>/UNIX/</em>&quot;</td>
</tr>
</tbody>
</table>

### Combining Conditions

You can combine conditions with the relational operators AND, OR, and NOT:

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Files Accessed Since 1 January 2003 and Larger Than 2 MB</td>
<td>To select all the files that have been accessed since 1 January 2003 and that are larger than 2 MB, enter the following:</td>
</tr>
<tr>
<td></td>
<td>FILE_LAST_ACCESS_DATE &gt; 1/1/2003 AND FILE_SIZE &gt; 2MB</td>
</tr>
<tr>
<td>Files Belonging to JASON or JANET</td>
<td>To select all the files that belong to JASON or JANET, enter the following:</td>
</tr>
<tr>
<td></td>
<td>FILE_OWNER_NAME=&quot;JASON&quot; OR FILE_OWNER_NAME=&quot;JANET&quot;</td>
</tr>
</tbody>
</table>

You can combine conditions with the logical operators AND, OR, and NOT:

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSM Servers With Average Transfer Rate Higher Than 3000 bps and Less Than 10 Failed Objects</td>
<td>To select all the TSM servers that have an average transfer rate higher than 3000 bps and that have less than 10 failed objects, enter the following:</td>
</tr>
<tr>
<td></td>
<td>TSM_SERVER_AVERAGE_XFER_RATE &gt; 3000 AND TSM_SERVER_OBJECTS_FAILED &lt; 10</td>
</tr>
</tbody>
</table>
### Aggregate Functions in Conditions

You can include aggregate functions and aliases defined by the keyword AS in conditions. The following examples illustrate the syntax of aggregate functions in conditions:

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Volumes With Total File Size Greater Than 1 GB | To select all the volumes where total file size is greater than 1 GB, enter the following:  
  ```sql
  VOLUME_NAME WHERE SUM(FILE_SIZE) > 1 GB
  ```  |
| Volumes That Exceed 90 Percent of the Largest Volume | To select all the volumes the size of which exceeds 90 percent of the size of the largest volume, enter the following:  
  ```sql
  VOLUME_NAME WHERE VOLUME_SIZE > 0.9 * MAX(VOLUME_SIZE)
  ```  |
| Files Greater Than Average | To select all the files with sizes greater than the average, enter the following:  
  ```sql
  FILE_FULL_NAME WHERE FILE_SIZE > AVERAGE(FILE_SIZE)
  ```  |
| Query Table Listing Owner Names and Files for Owners With More Than 100 MB Data | To define a query result table listing owner names and files for each owner that has more than 100 MB of data, enter the following:  
  ```sql
  OWNER_NAME, FILE_FULLNAME WHERE SUM(FILE_SIZE) BY OWNER > 100MB
  ```  |
| Query Table Listing All Records Where File Size Per Volume Per Owner Exceeds 12 MB | To define a query result table with the following columns: VOLUME_NAME, SFS, OWNER_NAME and lists all the records where total file size per volume per owner exceeds 12 MB, enter the following:  
  ```sql
  VOLUME_NAME, SUM(FILE_SIZE) AS SFS, OWNER_NAME, WHERE SFS > 12MB
  ```  |
| Nodes Where Failed File Backups Greater Than 100 | To select all the nodes where total number of failed file backups for all the sessions is greater than 100, enter the following:  
  ```sql
  TSM_NODE WHERE SUM(TSM_SESSION_OBJECTS_FAILED) > 100
  ```  |
| Volumes Exceeding 90 Percent of Largest Volume | To select all the volumes the size of which exceeds 90 percent of the size of the largest volume, enter the following:  
  ```sql
  VOLUME_NAME WHERE VOLUME_SIZE > 0.9 * MAX(VOLUME_SIZE)
  ```  |
| Nodes With Session Where Transfer Rate Higher Than Average | To select all the nodes where there was a session with a transfer rate higher than the average, enter the following:  
  ```sql
  TSM_NODE WHERE TSM_SESSION_XFER_RATE > AVERAGE(TSM_SESSION_XFER_RATE)
  ```  |
Special Statements

This section describes the following types of EDL statements:

- Inclusions
- Union/Intersect/Exclude statements
- Timing expressions

Inclusions

The following classes have been defined for the examples that follow:

Class name: BUSPROJECT
FILE ["*.DOC", "*.XLS", "*.MDB", "*.HTM"]

Class name: FUNPROJECT
FILE ["*.AVI", "*.WAV", "*.HTM"]

Class name: NETW1
COMPUTER WHERE COMPUTER_OPERATING_SYSTEM IN ['SUNOS', 'SOLARIS', 'LINUX']

Class name: NETW2
COMPUTER WHERE COMPUTER_OPERATING_SYSTEM IN ['WINDOWS', 'NETWARE4', 'LINUX']

The IN operator expresses an inclusion. The object selected as a result of the inclusion is based on the object being a member of a group of objects. For example:

Class name: JASBPROJECT
FILE WHERE FILE_OWNER_NAME="JASON"
AND FILE IN BUSPROJECT

This selects the files that belong to user Jason and that are included in the class BUSPROJECT. You can replace the class definition (BUSPROJECT) in the statement with the list of files that constitute the class.

Class name: MAINETW2
COMPUTER WHERE COMPUTER_SIZE > 15 GB AND
COMPUTER IN NETW2

The previous statement selects the computers that have more than 15 GB of space and run Windows or NetWare4. You can replace the class definition (NETW2) in the statement with the list of operating systems that constitute the class.
Union, Intersect, and Exclude

Selections involving union, intersect, and exclude merge two lists of objects, usually (but not necessarily) supplied in the form of classes:

<table>
<thead>
<tr>
<th>Examples</th>
<th>Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example 1: Union Statement</td>
<td>The following union statement merges the lists of files in the two classes and selects all the files that appear in both lists:</td>
</tr>
<tr>
<td>BUSPROJECT UNION FUNPROJECT</td>
<td></td>
</tr>
<tr>
<td>Example 2: Union Statement</td>
<td>The following union statement merges the lists of operating systems in the two classes and selects all the operating systems that appear in the list, in this case &quot;SUNOS&quot;, &quot;SOLARIS&quot;, &quot;LINUX&quot;, &quot;WINDOWS&quot;, &quot;NETWARE4&quot;:</td>
</tr>
<tr>
<td>NETW1 UNION NETW2</td>
<td></td>
</tr>
<tr>
<td>Example 1: Intersect Statement</td>
<td>The following intersect statement selects only the files common to both classes; in this case, the *.HTM files:</td>
</tr>
<tr>
<td>BUSPROJECT INTERSECT FUNPROJECT</td>
<td></td>
</tr>
<tr>
<td>Example 2: Intersect Statement</td>
<td>The following intersect statement selects only the operating systems common to both classes, in this case, the LINUX:</td>
</tr>
<tr>
<td>NETW1 INTERSECT NETW2</td>
<td></td>
</tr>
<tr>
<td>Example 1: Exclude Statement</td>
<td>The following exclude statement selects the files that appear in the class BUSPROJECT and that do not appear in FUNPROJECT. In this example, these are the *.DOC, *.XLS, and *.MDB files:</td>
</tr>
<tr>
<td>BUSPROJECT EXCLUDE FUNPROJECT</td>
<td></td>
</tr>
<tr>
<td>Example 2: Exclude Statement</td>
<td>The following exclude statement selects the files that appear in the class FUNPROJECT not including those that appear in BUSPROJECT. In this example, these are the *.AVI and *.WAV files:</td>
</tr>
<tr>
<td>FUNPROJECT EXCLUDE BUSPROJECT</td>
<td></td>
</tr>
<tr>
<td>Example 3: Exclude Statement</td>
<td>The following exclude statement selects the operating systems that appear in the class NETW1 and that do not appear in NETW2. In this example, these are the &quot;SUNOS&quot; and &quot;SOLARIS&quot;:</td>
</tr>
<tr>
<td>NETW1 EXCLUDE NETW2</td>
<td></td>
</tr>
<tr>
<td>Example 4: Exclude Statement</td>
<td>The following exclude statement selects the operating systems that appear in the class NETW2 not including those that appear in NETW1. In this example, these are &quot;WINDOWS&quot; and &quot;NETWARE4&quot;:</td>
</tr>
<tr>
<td>NETW2 EXCLUDE NETW1</td>
<td></td>
</tr>
</tbody>
</table>
In all cases, you can replace the class definitions (BUSPROJECT and FUNPROJECT on the one hand, NETW1 and NETW2 on the other) with lists of files and operating systems that constitute the classes.

**Timing Expressions**

Timing expressions appear in the timing parameters of services. Use them to specify when and how often to execute the service. You can specify timing in the following ways:

- As a given point in time or a range.
- As a sequence of points in time.
- A special case of timing expression is the keyword HOLD; it indicates that the service must be compiled and built, but not submitted for execution. Use this timing condition for services that you want to execute from the command line.

You can use the following designations in timing expressions:

- DAY OF MONTH
- BUSINESS_DAY OF WEEK
- BUSINESS_DAY OF MONTH
- WEEK OF MONTH
- WEEK OF QUARTER
- WEEK OF YEAR
- MONTH OF QUARTER
- MONTH OF YEAR
- WEEKEND OF MONTH
- WEEKEND OF QUARTER
- WEEKEND OF YEAR
Examples of timing specified as a given point or range follow:

<table>
<thead>
<tr>
<th>Ranges</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range Entire Day</td>
<td>To define a range that spans the entire day of 15 February 2003, enter the following:</td>
</tr>
<tr>
<td></td>
<td>2/15/2003</td>
</tr>
<tr>
<td>Range Between 15:00 and 0:00</td>
<td>To define a smaller range than the previous example, covering the time between 15:00 and 00:00 on 15 February 2003, enter the following:</td>
</tr>
<tr>
<td></td>
<td>2/15/2003 AFTER 15:00</td>
</tr>
<tr>
<td></td>
<td>To specify midnight, use 00:00, not 24:00.</td>
</tr>
<tr>
<td>Exact Time</td>
<td>To define a precise point in time on 15 February 2003, enter the following:</td>
</tr>
<tr>
<td></td>
<td>2/15/2003 AT 15:00</td>
</tr>
<tr>
<td></td>
<td>If you use the command AT, the service runs only at the specified time.</td>
</tr>
</tbody>
</table>
Use the following special timing expressions only with services that are part of procedures. They let you specify the timing of a service in relation to the beginning or end of another service in the procedure. You identify services by their service ID (step) number within the procedure:

### Examples

<table>
<thead>
<tr>
<th>Statements</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Beginning of Service When Step 3 Ends</strong></td>
<td>To define the beginning of the service at the time when Step 3 ends, enter the following:</td>
</tr>
<tr>
<td></td>
<td><strong>AFTER END OF 3</strong></td>
</tr>
<tr>
<td><strong>Beginning of Service in Relation to Another Service in Same Procedure</strong></td>
<td>To define the beginning of the service in relation to another service in the same procedure, enter the following:</td>
</tr>
<tr>
<td></td>
<td><strong>BEFORE START OF 5</strong></td>
</tr>
</tbody>
</table>

You can assign an absolute time to only one service per procedure; the timing of all other services is then derived from this absolute time. If Step 5 is scheduled to begin at 14:00, and the current step must be executed before Step 5 begins, the system subtracts the estimated time of execution of the current step from 14:00 to determine the start time of the current step.

### EDL Reference

This section presents information about the following topics:

- Patterns
- Aggregate functions
- Relationships
- Keywords
Patterns

A *pattern* is a name or path name constant that contains wildcard characters. You can use the following pre-defined wildcard characters:

'?' (question mark)—indicates a single character. For more information, see Question Mark in this chapter.

'*' (asterisk)—indicates a group of characters. For more information, see Asterisk in this chapter.

'#' (pound)—indicates a group of characters, including the "\" (directory separator). For more information, see Pound in this chapter.

**Note:** Some file systems allow * and # characters in directory and file names. To specify these characters in a path name within an EDL expression, you must precede them by a single quote. To specify DIR#1 use DIR’#1. If the path name already includes a single quote character, it must be preceded by another single quote.

EDL supports both the Novell and the UNC notations for patterns that refer to path names:

<table>
<thead>
<tr>
<th>Notations</th>
<th>Paths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novell</td>
<td>COMPUTER/VOLUME:D1D2FILENAME</td>
</tr>
<tr>
<td>UNC</td>
<td>\COMPUTER\VOL\D1\D2\FILENAME</td>
</tr>
</tbody>
</table>

For a complete list of examples of how path names containing '*' and '#' patterns are parsed, see the online help.

The wildcard characters are used as follows:

<table>
<thead>
<tr>
<th>Wildcards</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question Mark</td>
<td>The question mark represents one character. The following examples illustrate this:</td>
</tr>
<tr>
<td></td>
<td>■ X? matches all 2-character names where the first letter is “X”.</td>
</tr>
<tr>
<td></td>
<td>■ A??C matches all 4-character names in which the first letter is “A” and the fourth letter is “C”.</td>
</tr>
</tbody>
</table>
Wildcards | Definitions
--- | ---
Asterisk | The asterisk represents zero or more characters, excluding path name separators. The following examples illustrate this:
- matches all names.
- \*.* matches all names that contain a period somewhere.
- \*. matches all names that end in a period.
- X* matches all names in which the first letter is “X”.
- A*C matches all names in which the first letter is “A” and the last letter is “C”.
- \D1\*\D2\*\C matches all files with extension “.C” that reside in directory “D2” under any directory in root directory “D1”.

The following files match the pattern:
- \D1\Y\D2\X.C, '\D1\Z\D2\XLS.C'

The following files do not match the pattern:
- \D1\D2\X.C, '\D1\X.C', '\D2\Y\D1\X.C'

Pound | Pound matches zero or more characters in directory names, including path name directory separators. The following examples illustrate this:
- \D1\#\F.E matches all files named “F.E” in any subdirectory of “\D1”.

The following files match the pattern:
- \D1\F.E, '\D1\D2\F.E', '\D1\D2\D3\F.E'

You can use wildcard characters in any component of a path name: node name, volume name, drive letter, directory names, and file name. CA SRM interprets missing components in a path name in the widest possible way. The following examples illustrate this:
- X.Y matches any file named “X.Y” on the network. It is equivalent to ‘\:"\:\\#X.Y’.
- \S1\*\D1\X.Y matches files named “X.Y” in root directory “D1” on any volume of a node named “S1”.
- ‘\:*\SYS\#*.C matches any file with extension “.C” on volumes named “SYS” on any node in the network.
Aggregate Functions

EDL supports the following aggregate functions:

- `sum()`
- `average()`
- `count()`
- `max()`
- `min()`

All aggregate functions except `count()` work on numerical input; you can use `count()` with other data types, such as string and enum:

<table>
<thead>
<tr>
<th>Examples</th>
<th>Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volumes Containing More Than 100,000 Files</td>
<td>To select all the volumes that contain more than 100,000 files, enter the following:</td>
</tr>
<tr>
<td></td>
<td><code>VOLUME_NAME WHERE COUNT(FILE_FULL_NAME) &gt; 100000</code></td>
</tr>
<tr>
<td>TSM Servers Where Total Objects Failed to</td>
<td>To select all the TSM servers on which the total number of objects that failed to back up is greater</td>
</tr>
<tr>
<td>Backup Greater Than Average</td>
<td>than the average, enter the following:</td>
</tr>
<tr>
<td></td>
<td><code>TSM_SERVER_NAME WHERE TSM_SERVER_OBJECTS_FAILED &gt; AVERAGE(TSM_SERVER_OBJECTS_FAILED)</code></td>
</tr>
<tr>
<td>TSM Nodes with More Than 100 Backup Sessions</td>
<td>To select all the TSM nodes that had more than 100 backup sessions, enter the following:</td>
</tr>
<tr>
<td></td>
<td><code>TSM_NODE WHERE COUNT(TSM_SESSION) &gt; 100</code></td>
</tr>
</tbody>
</table>

You can use aggregate functions with the keyword `BY`:

<table>
<thead>
<tr>
<th>Examples</th>
<th>Statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Query Table All Files Belonging to Owners</td>
<td>To define a query result table that lists all files belonging to owners who use more than 100 MB of space, enter the following:</td>
</tr>
<tr>
<td>Using More Than 100 MB of Space</td>
<td><code>FILE_FULL_NAME, OWNER_NAME WHERE SUM(FILE_SIZE) BY OWNER &gt; 100 MB</code></td>
</tr>
<tr>
<td>Query Table TSM Nodes Registered on TSM</td>
<td>To define a query result table that lists all TSM nodes registered on TSM servers that transferred more than 100 GB of backup files, enter the following:</td>
</tr>
<tr>
<td>Servers That Transferred More Than 100 GB of</td>
<td><code>TSM_SERVER_NAME, TSM_NODE_NAME WHERE SUM(TSM_NODE_BYTES_XFERRED) BY TSM_SERVER &gt; 100 GB</code></td>
</tr>
<tr>
<td>Backup Files</td>
<td></td>
</tr>
</tbody>
</table>
You can use aggregate functions with the keyword AS. When you apply an aggregate function to an object attribute in query definition, you should see that you assign a custom name to the attribute column to make the result more readable. If you do not do this, the default column name will contain both attribute and function names, which may be too long.

**Keywords**

The following shows EDL keywords grouped by type:

<table>
<thead>
<tr>
<th>EDL Keywords</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operators</td>
<td>() [] + - * / ~ !~ = &lt;= &lt; &gt;= &lt;&gt; , : AND, OR, NOT, DIV, MOD</td>
</tr>
<tr>
<td>Date and Time</td>
<td>January-December, Jan-Dec Monday-Sunday, Business_Day, Weekend AM, PM, Second, S, Seconds, Minute, Minutes, M, Hour, Hours, H, Day, Days, Week, Weeks, Quarter, Year, Years</td>
</tr>
<tr>
<td>Sequence</td>
<td>First, Second, Third, Fourth, Fifth, st, nd, rd, th, Last, All, Start, End</td>
</tr>
<tr>
<td>Size</td>
<td>B, KB, MB, GB, TB</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>Ucase, Lcase Where, At, After, As, By, Before, From, To, Every, Of, Variable, Union, Intersect, Sorted_by, Hold</td>
</tr>
</tbody>
</table>

**Note:** The keywords are sorted alphabetically in the EDL editor dialog.

Use the keyword AS to provide user-defined names for output columns in query result tables and aliases (synonyms) in conditional expressions.

Use the keyword BY to provide a basis for aggregation (object or attribute) in defining queries that contain aggregate functions.

Use the keyword SORTED_BY to specify the sort order of query result.

Use the keyword TOP to limit the number of entries in the result table.

For more information, see the online help.
Using Class Definitions

You can use the CA SRM Class Builder Wizard to create classes. After you have created a class using the Class Builder Wizard, you can tailor it using Enterprise Definition Language (EDL). EDL statement classes combine objects and their attributes, relationships between objects, predefined keywords, and operators. A class definition can also reference another class.

The following examples illustrate how you can use class definitions to create queries of increasing complexity and scope:

<table>
<thead>
<tr>
<th>Class Definitions</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>A class named TEMP_FILES consists of the following statement, which selects all the files (on all servers) that have a suffix of TMP:</td>
</tr>
<tr>
<td></td>
<td>FILE &quot;*.TMP&quot;</td>
</tr>
<tr>
<td></td>
<td>You can create EDL statements in text form. After you define the class TEMP_FILES, it can be supplied as the value of the source parameter to any service definition dialog.</td>
</tr>
<tr>
<td>CA ARCserve</td>
<td>The following statement defines the class of failed CA ARCserve Backup backup sessions:</td>
</tr>
<tr>
<td>Backup</td>
<td>ARC_SESSION WHERE ARC_SESSION_STATUS = &quot;FAILED&quot;</td>
</tr>
<tr>
<td>Exchange 2000</td>
<td>The following statement defines a class of Exchange 2000 servers that have public stores larger than 20 GB:</td>
</tr>
<tr>
<td></td>
<td>EXCH_SERVER where EXCH_SITE_PUB_STORE_SIZE &gt; 20 GB</td>
</tr>
<tr>
<td>TSM</td>
<td>The following statement defines a class named QA as all nodes with names starting with QA:</td>
</tr>
<tr>
<td></td>
<td>TSM_NODE &quot;QA*&quot;</td>
</tr>
<tr>
<td></td>
<td>Another class, named FAILED_SESSIONS is defined as</td>
</tr>
<tr>
<td></td>
<td>TSM_SESSION WHERE TSM_SESSION_OBJECTS_FAILED &gt; 10</td>
</tr>
<tr>
<td></td>
<td>Use the following statement to define all the sessions that failed in the QA department:</td>
</tr>
<tr>
<td></td>
<td>TSM_SESSION WHERE TSM_SESSION IN FAILED_SESSIONS AND TSM_NODE IN QA</td>
</tr>
<tr>
<td>Class Definitions</td>
<td>Examples</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------</td>
</tr>
</tbody>
</table>
| Oracle            | The following statement defines a class named MANUAL as all the data files that are not auto extendable and are more than 80 percent full:  
ORA_DF WHERE ORA_DF_PERCENT_FREE_SPACE < 20 AND ORA_DF_IS_AUTOEXTEND = FALSE  
Use the following statement to define all the volumes that need immediate attention to reclaim free space:  
VOLUME WHERE VOLUME_PERCENT_FREE_SPACE < 10  
AND  
VOLUME CONTAINS ORA_DF  
WHERE  
ORA_DF IN MANUAL |
| NetApp            | The following statement defines a class of NetApp volumes that contain less than 15 percent free space:  
NETAPP_VOLUME where NETAPP_VOLUME_PERCENT_FREE_SPACE < 15 |
| Disk Array        | The following statement defines a class of disk arrays larger than 100 MB:  
DAR_DISK_ARRAY where DAR_DISK_ARRAY_SIZE > 100MB |
Chapter 24: Capacity Based Licensing Tool

The Capacity Based Licensing tool provides an estimation as to how much data CA SRM monitors along with the assets CA SRM manages. This tool operates as a command line utility that enables you to generate reports. These reports provide the storage consumption based in terabytes. They are encrypted, but an HTML version is provided for you. You can view the HTML reports with your web browser.

You need to execute the capacity tool manually. There are three options to do this:

- Click ccreport.bat. You can locate ccreport.bat in the following directory:
  - For 32 bit operating systems: C:\Program Files\CA\BrightStor SRM\Bin folder.
  - For 64 bit operating systems: C:\Program files(x86)\CA\Brightstor SRM folder\Bin folder.
  
  **Note:** This directory path for 64-bit operating systems is for fresh installations only.

- Enter commands directly at the command prompt.
- Select Start, Programs, CA, Storage Resource Manager, Utilities, and then Diagnostic Report Manager.

You cannot run this utility remotely. You need to run it on the Application Server machine. The utility is compatible with CA SRM r11.6 only.

**Note:**

- If you add a license file, you need to restart the iGateway before running the ccreport utility.
- Before running Capacity Based License reports, invoke TLI DC manually to get the very recent capacity details. The following are the steps to invoke TLI DC.

**Follow these steps:**

1. Open Windows Client.
2. In the Object tree view, select Application, All Applications.
3. From the Configuration menu in the right pane, select Recalculate Data.

The data collection happens and the capacity based license reports display the updated details.

This section contains the following topics:

- **Using the Executable** (see page 484)
- **Using the Command Line** (see page 484)
Using the Executable

To run the utility using the cbreport.exe, click it. A DOS box opens and the utility executes. After it finishes, a status message displays. If the utility completes successfully, a message notifies you about the success and gives you the path of the generated files. If the utility does not complete successfully, an error message notifies you about the failure and gives you the path of the error log.

Using the Command Line

You can activate the utility manually through the command line:

`cbreport [[set the File Name variable]]`

When you run this command, it executes in encryption mode. No data is hidden. If you do not give a file name, then the file name is auto-generated.

Below are all of the activation options:

[[set the File Name variable] [-hidedata <true/false> [-hiddendata <AssetName>] ] ]

Enter field names after hiddendata to hide those fields in the report. AssetName is the only field that you can hide.

[-encrypt] [set the File Name variable]]

This explicitly specifies the utility needs to execute in encrypt mode. All the fields are shown to you.

[-encrypt [set the File Name variable] [-hidedata <true/false> [-hiddendata <AssetName>] ] ]

This executes the utility in encrypt mode. The hidden fields that you specify, are not displayed in the generated report.

[-decrypt [set the File Name variable]

This will enable the user to decrypt the file. The file name is a mandatory value.

-`help`

This opens the help with instructions on how to use this utility. It provides examples and descriptions of the subcommands along with their arguments.

-`version`

Provides the version information of the utility.
Chapter 25: CA SRM Basic Techniques

This chapter provides step-by-step instructions for some of the most common techniques you can use in CA SRM. It includes the following topics:

- Defining a class
- Sending a report by email
- Executing CA SRM services from a command prompt
- Using CA SRM Remote Run

For information about using the CA SRM Windows Client graphical user interface, see the Windows Client Guide.

This section contains the following topics:

- Defining a Class (see page 485)
- Sending a Report by Email (see page 488)
- Executing CA SRM Services from a Command Prompt (see page 491)
- Chargeback Query (see page 492)

Defining a Class

This example shows you how to build a files class that collects data about files accessed in the previous 10 days. To do this, follow these steps:

1. You can access the Classes service from the Open Systems menu by selecting Create Services and then Classes. You can also access the service by expanding the CA SRM Object Tree, expand Open Systems, Services, and then select Classes, as shown in the following diagram:

[Diagram showing the CA SRM Object Tree with Open Systems, Network Storage, Backup/Archive Products, Applications, Services, Classes, Service Definitions, Automate, File Groups, Procedures, Query, Backup, TSM Message Scanner, Service Results, Asset Administration, System Activity]
Defining a Class

From the Configuration menu, select New. Each folder in the dialog contains a number of predefined templates you can use to easily construct a Class. For example, expand the Network Storage folder and then Managed Computers. You can build a Class based on Computers, Files, and so on. For this example select Files:

2. Select Files accessed in the last <days> from the Selection Type drop-down list and enter 10 in the text box:
3. The Summary dialog displays the parameters for the class that you have defined. If you want to make changes, click the Back button. If there are no changes, click Save:

**Note:** If you make changes in the Advanced dialog, you will have to use it for all of your future changes. After you use the Advanced dialog for a service, you can no longer edit the service in the Service Builder Wizard.

4. Enter the name of the class and optionally enter a description of the class. Click OK:
Sending a Report by Email

The following example shows you how to create a report showing all Windows computers managed by CA SRM and send it by email. The report is sorted by the computers with the most occupied space. To do this, follow these steps:

1. From the Open Systems Object Tree, expand Network Storage, Hosts, Computers, and select Windows Computers, as shown in the following diagram:

```plaintext
Open Systems schemer2
- Network Storage
  - NetApp
  - Disk Arrays
  - Virtual Storage Environment
  - Virtual Host Environment
  - SAN Fabric
  - Storage Analysis
- Hosts
  - Domains
  - Computers
    - Clustered Nodes
    - Clustered Virtual Servers
    - Clusters
    - Computers at Risk
    - Computers not Updated Today
    - Computers with Active Launchers
    - Full Computers
    - UNIX Computers
    - Managed Computers
    - Managed Computers - Agentless
    - NetWare Computers
    - UNIX Computers
    - Windows Computers
```

Sort the Occupied Space column from highest to lowest by clicking on it. A down arrow appears indicating the sort: **Occupied Space (GB)**

---

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2. From the Windows Computers table main menu, select File, Output Report. The Record Range dialog lets you select how many rows of the table view you want to include in your report. To create a report showing the first 10 computers with the most occupied space, select First and enter 10 in the Rows text box:

3. Click Destinations and clear the Printer check box (selected by default) and check the e-Mail box. The Mail destination is now active. Select it:
4. In the Mail dialog:
   - Enter the email addresses of the people to whom you want to send your message, separating each entry with a semicolon (","). To access your default Address Book, click the To... button.
   - Enter a subject in the Subject text box and a message in the Text text box.
   - Select a format in which to send the report. You can email reports in Adobe PDF, HTML, or as an Excel spreadsheet:

5. Click Perform. The service generates the report and sends it to the recipients you specified.
Executing CA SRM Services from a Command Prompt

The following example shows you how to execute the CA SRM service, MANAGED_COMPUTERS, from a command prompt on the Application Server.

You must define and execute the procedure or service using the HOLD timing condition. To do this, click the Advanced button in the Summary dialog when you perform a service, click the Condition button, and then enter HOLD. The service will remain in this state until you issue a command to start using the VDPXSRV utility.

To execute CA SRM services from a command prompt, follow these steps:

1. If necessary, unlock the Application Server screen. Click on the toolbar.
2. Activate VDPXSRV on the Application Server using the following command:
   
   VDPXSRV MANAGED_COMPUTERS

3. (Optional) Add /WAIT to the command line to indicate that you want VDPXSRV to wait for the service to complete before terminating.
4. (Optional) Add /RESULT=<log_file> to the command line to indicate that you want VDPXSRV to create a log file to record possible VDPXSRV messages.
5. (Optional) Add pairs of <key>=<value> parameters to be passed to the service. For example:
   
   a. Define and execute the TopTenUsers report with the special timing condition HOLD. In the EDL expression of the service definition, use variables (prefixed with a $ sign) such as:
   
   FILE WHERE SERVER_NAME = $SNAME AND VOLUME_NAME = $VNAME AND FILE_SIZE > $BIG
   
   b. Activate VDPXSRV on the Application Server computer and provide values for the variables defined in the service query:
   
   VDPXSRV TopTenUsersR /WAIT /RES=c:\temp\result.log $SNAME=SERVER2 $VNAME=SYS $BIG=1024
   
   Note: You must enter all units as unqualified base units. For example, enter file_size only in bytes and do not add qualifiers such as KB, MB, or GB qualifiers. You cannot use EDL expression containing dates.

   You can also execute a predefined procedure. For example, you can enter the key /PROC in the command line immediately after the procedure name.
Chargeback Query

Use the chargeback query in conjunction with the Unicenter Service Accounting. This function enables you to create reports that help you relate the storage resources to their cost through the observation of consumption patterns. You need to have Unicenter Service Accounting r11.1 installed, and you also need to define a BrightStor metric to utilize the CA SRM data produced by this query. The XML file exported by CA SRM needs to match the XSL file that is shipped with Unicenter Service Delivery’s xmlAgent. A BrightStor metric named BrightStor Total File Usage is included with Unicenter Service Accounting.

See the Unicenter Service Accounting documentation on how to define a metric.

To create the query in CA SRM, follow these steps.

1. Access the Query service from the Open Systems file menu by selecting Create Services and then Query. You can also access the service from the Query table.

2. Select the application you want to create a chargeback report for and then select a template:
3. Select a selection type and then select the specific objects you want to query:

4. Select the execution frequency. The service can operate:
   - **Immediately**—Collection occurs immediately but only once.
   - **Execute once**—Collection occurs at a future date but only once. Click the drop-down list to enter the date in the calendar.
   - **Execute periodically**—Collection occurs at regular intervals. Designate the interval in the Every box. Enter a number then select the frequency:
     - Hours
     - Days
     - Weeks
     - Months
     - Business Days
   If you select Weeks, you can choose a specific day in the On box. The On box is inactive for the other frequencies.
   The Retain Historical Data (Trending) option is only available when you enable periodic execution.
   - **Specific Time**—Collection occurs at, or as soon as possible after, a specific time of day. If a server is down and CA SRM cannot collect at the specified time, CA SRM collects as soon as it can that day (prior to midnight).
   If you want to collect at a specific time check this box. This only works in conjunction with the Execute once and Execute periodically options. Use the spin box to designate the time of day you want the collection to occur.
**Hold**—This option keeps the service available but the service does not run. It remains on hold until you change the option to one of the frequencies listed above. You can use the Hold option for situations where you want to kickoff this service from outside of CA SRM using the command line option. Hold is not available for every service.

5. Enter the xmlAgent path. The query creates the chargeback XML file here:
If CA SRM finds Unicenter Service Accounting on the local machine, CA SRM provides a default directory.

6. The Summary dialog displays the parameters for the service that you have defined. If you want to make changes, click the Back button. If there are no changes, click Launch to name and then execute the service. Click Save to save the service without executing it. CA SRM runs the service according to the configuration shown in this dialog.

7. Enter a name for the query in this dialog. You can also provide an optional description. When you finish, click OK. The service executes or saves depending on what you selected in the previous dialog.

The query creates a file name that looks like this: BS_Chargebackxx.xml. The xx is the object name. So in the preceding example the file name generated by the query is BS_ChargebackOracleDatafiles.xml.
Appendix A: Troubleshooting

This chapter provides step-by-step instructions for troubleshooting the most common installation, Application Server, UNIX and Linux, and CA SRM Windows Client problems.

This section contains the following topics:

- Important Warnings (see page 497)
- Application Server Problems (see page 497)
- Obtaining Debug Information (see page 500)
- Login Problems (see page 505)
- Errors in Service Execution (see page 506)
- Windows Client Error Messages (see page 507)
- Sybase Data Collection Fails Following Restart (see page 520)
- Change the TCP Ports (see page 521)
- SAN Fabric Timeout Message (see page 522)
- iSponsor Server Error (see page 522)
- Password Expiry / Change (see page 523)
- fscanner Fails in Solaris (see page 524)
- RSCD Commands (see page 525)
- SQL Database Migration (see page 525)

Important Warnings

... change the date/time on the Application Server computer while CA SRM is active

This can cause the internal synchronization mechanisms of the Application Server to function incorrectly.

... delete files from Application Server TEMP directory

If you delete the “#*.tmp files from the Application Server temp directory while CA SRM is active, the Application Server loses files it needs. This produces the following error message:

Cannot map \<Server-name>\Database\Enterprise\aabmeta.btr. Invalid pathname.

Application Server Problems

You can use the BSRM Monitor to help you identify the cause of an Application Server problem. For more information about the Monitor functions, see the online help.

This section describes the actions you should take if an application server has a problem.
Useful Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job</td>
<td>Runtime entity that carries out a user-defined service. A job contains tasks and other jobs. When a job is running, all its tasks appear in the Active Jobs panel of the Application Server.</td>
</tr>
<tr>
<td>Process</td>
<td>Can be a job or task.</td>
</tr>
<tr>
<td>Agent</td>
<td>Internal component of a job; an executable command running on a node (a launcher).</td>
</tr>
<tr>
<td>Task</td>
<td>Instance of an agent; it uses a token containing specific parameters for the run.</td>
</tr>
</tbody>
</table>

Service Hangs

Problem:

A service is hanging. The expected execution time of the service has been exceeded.

Solution:

The following are typical reasons a job hangs:

- An agent or process is waiting for an input.
- An agent or process is waiting for a launcher.

Hanging is always due to an unavailable launcher. For example, if Process A is waiting for input from Process B, then Process B is not sending the input because it is waiting for a launcher with the necessary resources.

To solve this problem, follow these steps:

1. Activate the CA SRM Monitor.
2. Locate the service that you want to monitor. It can reside in one of the following folders:
   - **Active Services**—Locate the agent that is currently running and track its progress. If you cannot find an active agent, locate the inactive agent waiting for a launcher and try to determine the type of launcher for which the system is waiting (for example, NDS support).
   - **Services on Hold**—The job is waiting to be activated by an external event (for example, another service).
   - **Completed Services**—Check the completed job summary to verify that it executed successfully.
Service Fails

Problem:

A service failed. Failure symptoms usually appear in several locations. For example, "Failure in file searcher agent" appears in all of the following locations:

- Operator Attention
- CA SRM Monitor Attentions Messages dialog
- Global Log file (Use the Open Systems/Status/Global Log command from the CA SRM Windows Client menu to check this)
- Error Log file (Use the Open Systems/Status/Error Log command from the CA SRM Windows Client menu to check this)
- Windows Event Log (Check this only if you specified that you want messages sent to the Windows Event Log)

Solution:

To solve this problem, follow these steps:

1. Activate the CA SRM Monitor.
2. Open the Services on Hold folder. Check the completed job summary to determine what the problem was.
3. If the description in the error message is not self-explanatory, contact CA Technical Support.

Problem:

When running Microsoft Windows Server 2003, the Application Server does not start and you receive a "Smalltalk error" message.

Solution:

Microsoft Windows Server 2003 has a data execution prevention feature. You need to permit NSMS.exe to run, or it will fail. To solve this problem, follow these steps:

1. Go to My Computer/Properties/Advanced/Settings(Performance)/Data Execution Prevention.
2. Make sure prevention is OFF for NSMS.exe.
Empty or Incomplete Report or Query

Problem:

There is an empty or incomplete report or query. A service completes normally and appears in the list of Completed Services on the monitor, but the resulting report or query returned an incomplete or empty result.

Solution:

To solve this problem, follow these steps:

1. Activate the CA SRM Monitor.
2. Locate the service in the Completed Services folder.
3. Inspect the scanning statistics (totals) on the job summary of the service.
   * If the values are zero, go to Step 4.
4. (Optional) Locate the agent summary of the service and inspect the execution results of individual agents.

Data Collections Fail Due to SQL Connection Error

Problem:

If any data collections fail in SRM due to the SQL server problem, the system throws the following message, "E113: SQL Error while connecting to SRM database - [Microsoft][SQL Native Client] Unable to complete login process due to delay in opening server connection".

Solution:

To resolve this error, change the configurable parameter 'SQLTimeout' under section [DBA] available in BOS.ini and increase the SQL Timeout value.

Obtaining Debug Information

In some cases when you encounter a problem, a support person asks you to provide debug information. This section shows you how to collect this information.

Note: Collecting debug information can impact system performance.

Obtaining Debug Information from the SRM Agents

The following sections describe how to obtain debug information from the CA SRM agents.
From Windows Agent

To obtain debug information from the Windows agent

1. Go to the folder...\Program Files\CA\CA SRM\Software\Bin. Open the rsc.ini file and add the following lines:

   [Debug]
   Output=c:temp\bin\rsc.log
   [Functions]
   Enable Trace=all
   Enable Exception Trace= all

2. Ensure that the path to the debug file is valid.

3. Turn debug mode on after you finish collecting the debug results by replacing 'all' with 'none'.

   Important! Leaving debug mode on continuously can cause significant degradation of performance.

From Any CA SRM Agent

To obtain debug information about the communication between CA SRM and a computer with the CA SRM agent

1. On the host computer, go to the folder c:windows. Open the galil.ini file and add the following lines:

   [GNR]
   gnxdeb=4
   resultfile=c:temp\vne.log

2. Run the test and save the DBWIN content to a file.

3. Use the GNX Tester for isolating connectivity problems between CA SRM and host computers.

   Important! Leaving debug mode on continuously can cause significant degradation of performance.
From the UNIX Agent

To obtain debug information from the UNIX agent

1. Go to the folder .../usr/rsc/config. Open the rsc.conf file and remove the comment sign ('#') from the following lines:
   
   ```
   DEBUG_FILE= /xxx/yyy/debug.txt
   DEBUG_LEVEL= 62
   ```

2. Ensure that the path to the debug file is valid.

3. Turn debug mode off when you finish collecting the debug results by returning the comment signs.

   **Important!** Leaving debug mode on continuously can cause significant degradation of performance.

Obtaining Debug Information from Managed Objects

If you are having trouble working with a CA SRM managed object (for instance, an Exchange server, or a CA ARCserve Backup server), Technical Support may ask you to enable tracing for the managed object. You can use the Trace Manager to enable tracing for CA SRM managed objects.

Trace Manager Requirements

The following are the requirements for running the Trace Manager.

- The Trace Manager must be run on an Application Server or a managed computer. You cannot run the Trace Manager on a computer that only has the Windows Client installed.
- The Trace Manager must be run locally.
Enable Tracing for Managed Objects

If you are having problems with a managed object, Technical support may ask you to enable tracing for the managed object. The Trace Manager allows you to manage the collection of tracing information for managed objects.

To enable tracing using the Trace Manager

1. Browse to the directory that contains the Trace Manager and double-click the program file. By default, the Trace Manager is installed to the following location:
   - For 32-bit operating systems: C:\Program Files\CA\BrightStor SRM\UT\TraceManager.exe
   - For 64-bit operating systems: C:\Program files(x86)\CA\BrightStor SRM\UT\TraceManager.exe
     
     Note: This directory path for 64-bit operating systems is for fresh installations only.

   The Trace Manager opens.

2. Select the check boxes for the managed objects you want to trace and click Turn on selected tracing.
   
   Note: If you do not select the check box for a managed object, tracing is disabled for that object when you click the button.

   A dialog appears, informing you that tracing has been enabled for the selected objects.

   After you have obtained tracing information about the managed objects, you can use the Diagnostic Report Manager to collect the pertinent data.
Disable Tracing for Managed Objects

If you are collecting tracing information about a managed object because of a Technical Support request, you may want to disable tracing after the problem has been solved. The Trace Manager allows you to manage the collection of tracing information for managed objects.

To disable tracing using the Trace Manager

1. Browse to the directory that contains the Trace Manager and double-click the program file. By default, the Trace Manager is installed to the following location:
   - For 32-bit operating systems: C:\Program Files\CA\BrightStor SRM\UT\TraceManager.exe
   - For 64-bit operating systems: C:\Program files(x86)\CA\BrightStor SRM\UT\TraceManager.exe

   **Note:** This directory path for 64-bit operating systems is for fresh installations only.

   The Trace Manager opens.

2. Click **Turn off all tracing**.

   A dialog appears, informing you that tracing has been disabled for all managed objects.
Login Problems

The following section lists problems with logins and their solutions.

**Problem:**

You cannot login.

**Solutions:**

To login to a Novell Netware server:

- Ensure that your user name and password are defined on the bindery context of the server. To do this, use the user name and password to map a drive letter to the server through Windows.
- Ensure that the context you specified is correct.
- Ensure that you have not violated user login restrictions (number of logins, allowed computers to login from, and so on).

To login to a Windows server:

- Try to use the user name and password to login to the server through Windows.
- Open a debug mode on the Windows server, set the GNR debug mode in the client computer, and then send the two dump files to product support.
- Check whether the user belongs to the default domain. (Avoid defining local users on computers that belong to a domain.)
- Check user access rights.
- Check services (Inetd).

To login to a UNIX server:

- Ensure that you can ping the server.
- Open a debug mode on the UNIX server, set the GNR debug mode on the client computer, and then send the two dump files to product support.

**Problem:**

How do you verify Login fails for NetWare 4.11 with bindery emulation?

**Solution:**

In the Configuration/Security/Verify dialog on NetWare 4.11 servers that use bindery emulation, you must enter the user name and password in capital letters—even if the actual user name on the server is in lowercase.
Problem:

How do you verify TSM ODBC connection?

Solution:

To verify your TSM ODBC connection, use the TSM ODBC Tester. For more information, see the online help.

Errors in Service Execution

The following section lists server execution problems and their solutions.

Problem:

There is a network data collection failure. The network data collection service collects user information but fails to collect volume information about Windows computers.

Solution:

The data collection service shares scanning and requires the accounts CA SRM uses to log onto Windows computers must be a member of one of the following groups:

- Local Administrators
- Local Account Operators
- Global (domain) Server operators
- Global (domain) Print operators
- Global (domain) Communication operators

If the user is not a member of one of these groups, the data collection service reports no shares and issues no error or warning messages.

Problem:

Report print preview does not work.

Solution:

Check that your computer has at least one configured printer. If you want to add a printer, use Print Manager in the Windows Control Panel.
Problem:
Trend Report hangs when printing is invoked.

Solution:
The Trend Report Viewer may appear not to be responding; however, this process can take a considerable amount time. Allow enough time for the processing to complete.

Problem:
"RPC Server is unavailable" message received on Application Server and Windows Client when you try an agentless data collection on a Windows XP SP2 machine or any other machine with Windows firewall enabled.

Solution:
The firewall blocks all incoming Remote Procedure Call (RPC) traffic which prevents the agentless data collection. To correct this, use the ERemote.reg utility located in the c:\Program Files\CA\CA SRM\UT directory. This utility adds a key to the registry enabling remote administration. You must run this on the target Windows XP SP2 (or Windows firewall enabled) machine. You also need to open the following ports:

- 445: File and Print Sharing
- 135: RPC port

Windows Client Error Messages

E001 Internal Error <Error ID>. Operation could not be completed.

Reason:
Fatal error.

Action:
Contact CA Technical Support.


Reason:
Fatal operation error.

Action:
Contact CA Technical Support.
E003  Fatal Error <Error ID>. Restart the program.

Reason:
Fatal error.

Action:
Contact CA Technical Support.

E004  Operation failed. Not enough memory to complete this operation.

Reason:
Your computer is out of memory resources.

Action:
Close any unnecessary applications and increase Page File size using the Windows Control Panel.

E005  Error while reading or writing file <file name>. Check permissions, file existence, or disk space.

Disk Space

Reason:
The destination drive is out of space.

Action:
Free some space on the destination drive and retry.

Permissions

Reason:
The rename or open file operation failed.

Action:
Check the related file security rights and file presence.
File Existence

Reason:
The system tried to create a file with a name that already exists.

Action:
Contact CA Technical Support.

E008 Communication Error. Check TCP/IP setup of this computer.

Reason:
An internal CA SRM component was not registered properly on the Name Server.

Action:
Restart the Application Server. If the problem persists, contact CA Technical Support.

E0011 Cannot execute program <file name>. Insufficient memory.

Memory

Reason:
System is out of memory or the executable file is corrupt.

Action:
Close unused applications to free memory.

File Name and Location

Reason:
The file or path was not found.

Action:
Ensure the file exists in the specified path.
Open Files

Reason:
Too many files are open.

Action:
Increase the number of open files by adding "Files=100" to the system environment variables.

E0012  Database error. Database may be corrupted.

Reason:
Fatal database error.

Action:
Contact CA Technical Support.

E0013  Database error. Cannot add record. Record already exists.

Object Name

Reason:
You tried to add an object that already exists to the database.

Action:
Use a different name.

Interactive Error

Reason:
If the error is not caused by an interactive operation, it is a fatal error.

Action:
Contact CA Technical Support.
E0014  Database error. Cannot find record.

Reason:
Fatal database error.

Action:
Contact CA Technical Support.

E0015  Cannot perform database operation. Disk full. Free some space on database volume.

Reason:
The disk on the volume where the CA SRM database resides is full.

Action:
Free some space on the volume and retry.

E0016  Cannot perform database operation. You may not have permission to access the database files.

Reason:
You may not have enough security rights to access the CA SRM database files.

Action:
From the Help menu, open About CA SRM and locate the database directory. Verify that you have full security rights.

E0020  Database error. Cannot delete table or database. Some files may have not been deleted.

Reason:
Fatal database error.

Action:
Contact CA Technical Support.
Time Delay

Reason:

There is a time delay problem and the workstation does not receive a response from the server in an appropriate time frame.

Action:

See your network administrator for information about increasing timeout and retry parameters.

E0023 Network Error. Cannot connect to server <Server Name>.

Computer Not Found

Reason:

The specified computer was not found on the network, according to the TCP/IP setting.

Action:

To solve the problem, follow these steps:

1. Open the COMPUTERS table and ensure the TCP/IP address for this computer is correct.
2. Ping the computer using the TCP/IP address listed in the computer properties.

CA SRM Agent Not Responding on Windows

Reason:

The CA SRM agent does not respond on the specified computer (Windows).

Action:

Ensure that the CA SRM agent is installed on the specified computer and the respective CA SRM Windows agent must be up and running.
CA SRM Agent Not Responding on UNIX

Reason:

The CA SRM agent does not respond on the specified UNIX server.

Action:

Check that the CA SRM agent (RSCD daemon) is properly configured on the UNIX computer by issuing the following command:

```
rpcinfo -t <hostname> rscd
```

The system should respond with "program 300370 version 1 ready and waiting" or something similar.

E0025 Network Error. Cannot connect to server <Server Name>. Invalid username/password.

Username and Password Invalid

Reason:

The given user name and password pair is not valid.

Action:

To solve the problem, follow these steps:
1. Check for a typing error.
2. Contact your network administrator to validate the user name and password for the specified computer.

Product Serial Number

Reason:

The product serial number used on the client side may be different from that used on the specified server side.

Action:

On Windows—Open the file LIC.INI in the agent installation directory and verify that the entry SN=XXXXX is the same as what appears in the About dialog of the product.

On UNIX—Open the file rsc.conf in the agent installation directory (the default is /usr/rsc/config/) and ensure that the entry: LICENSE=XXXXX is the same as what appears in the About dialog of the product.
E0026 Cannot perform operation on server <Server Name> now. Try again later.

Reason:
The requested operation cannot be performed because of communication resource blocking.

Action:
Try later. If the problem persists, contact CA Technical Support.

E0027 Cannot perform operation on server <Server Name>. Operating system not supported.

Reason:
The designated computer runs an unsupported operating system version.

Action:
See the Readme for a list of supported operating systems versions.

E0028 Cannot perform operation. Not enough free drive letters. Free at least one drive letter.

Reason:
The computer performing the operation ran out of free drive letters.

Action:
Free some drive letters and retry.

E0033 Access to <Object> <Object Name> denied (<server error string>). Check access rights.

Reason:
The access to the specified network object failed.

Action:
See the message that appears in parentheses for more information about the nature of the error.
**E0034 Cannot perform operation. <Object Type> <Object Name> does not exist.**

**Reason:**

The requested operation (Delete, Rename, Create, and so on) failed to run.

**Action:**

To solve the problem, follow these steps:

1. Check security rights for the specified object.
2. Ensure that the user ID you are using has enough rights to perform the operation.

**E0035 Cannot find or access license information. Re-install license file.**

**Reason:**

CA SRM cannot retrieve your license information during normal operation.

**Action:**

Reinstall the license file. For more information, see the Overview guide.

**E0036 License information validation failed. You may have the wrong license file.**

**Serial Number**

**Reason:**

The license file does not match the serial number of your registered product.

**Action:**

Compare the serial number you have in your APK with the one displayed in the About dialog of the product. If they are different, contact CA Technical Support.

**Damaged License File**

**Reason:**

The license file is damaged.

**Action:**

Contact CA Technical Support.
E0037  Database Manager error. Illegal script command line <Command>.

Reason:
Fatal installation problem.

Action:
Contact CA Technical Support.

E0038  Database Manager error. Illegal table definition.

Reason:
Fatal installation problem.

Action:
Contact CA Technical Support.

E0040  Cannot print. Printer is not properly installed.

Reason:
The computer on which the report engine runs does not have a configured printer or it is not properly installed.

Action:
To solve the problem, follow these steps:
1. Add a printer to the computer and try again.
2. Verify that you can use the printer from another application, for example, Notepad.

E0041  Cannot attach to <Server Name>. User <Name> is already attached.

Reason:
You have tried to access a Novell NetWare server from CA SRM. The current computer is already logged on to the specified server but with a different user ID.

Action:
Close the other connection and retry.
E0042  Cannot perform operation. <Platform Name> platform is not supported.

**Reason:**

Fatal error.

**Action:**

Contact CA Technical Support.

E0043  Cannot perform operation. User <User Name> does not have console privileges.

**Reason:**

A user tried to run a command on a remote NW4.x server with CA SRM; however, they do not have Console Privileges on the designated server.

**Action:**

Grant Console Privileges to the specified user.

E0044  The IP address of the Communication Name Server (ENS) is unknown. Please check the entry NameServerIpAddress in the file GALIL.INI in the Windows directory.

**Reason:**

The CA SRM Name Server IP address is not recognized from the remote computer.

**Action:**

To solve the problem, follow these steps:

1. Edit the `\kbase\in\galil.ini` file under the CA SRM software directory.
2. Ensure that the parameter NameServerIpAddress in Section CMM INIT is valid by pinging this address locally.
3. Ping the address from the remote computer. If it fails, contact your network administrator.
4. Reinstall the remote CA SRM Windows Client.
E0045 Cannot connect to <Server Name>. Check security definition for Storage Administrator <Name>.

Security Access

Reason:
You have added a computer or a domain to CA SRM but did not configure the security access to it.

Action:
For more information, see the chapter “Configuring CA SRM.”

No Computer or Volume

Reason:
A computer or a volume is not present in the database.

Action:
For more information, see Registering Managed Objects in the chapter “Configuring CA SRM.”

E0046 Cannot complete operation. Cannot map <Path>. Invalid pathname.

Reason:
The specified remote computer path cannot be reached from the current computer.

Action:
To solve this problem, follow these steps:
1. Check security rights to the remote computer.
2. Ensure that the specified computer and share exist.

E0047 Cannot complete operation. Mapping to pathname <Path> has not been found.

Reason:
The requested operation requires a drive mapping to the designated specified path.

Action:
Assign a drive letter to the \computer\share and retry.
**E0048 Cannot connect to server **<Server Name>**. Already connected as user **<User Name>**, but current user does not have SUPERVISOR equivalence.**

**Reason:**

The error occurs because:

- You are accessing a Novell NetWare server.
- A connection already exists to the server from this computer for a different user who is not a SUPERVISOR.
- You chose not to allow Public Launchers when you installed CA SRM.

**Action:**

Remove the original mapping and retry.

- E0049 Cannot connect to server **<Server Name>**. User **<User Name>** does not have SUPERVISOR equivalence.

**Reason:**

The error occurs because:

- You are accessing a Novell NetWare server.
- The user ID you are using to access the specified server has no SUPERVISOR equivalence.
- You chose not to allow Public Launchers when you installed CA SRM.

**Action:**

Retry as a user with SUPERVISOR access rights.

**E0051 Report Error. Cannot export to local path. Export file should be on a network volume.**

**Reason:**

You have specified a local path for the location of the resulting export file. This setting is invalid because the report can run on a different computer.

**Action:**

Specify a network accessible path.
**E0054 Error in execution of <Component Name>.**

**Reason:**

The CA SRM Windows Client failed to load one or more of its internal components.

**Action:**

Reinstall the CA SRM Windows Client.

**E0057 Prefix <Prefix Characters> is already in use. Please select a different prefix.**

**Reason:**

You chose an already existing prefix when you configured the External Application Server directory.

**Action:**

Specify a different prefix and retry.

---

**Sybase Data Collection Fails Following Restart**

**Symptom:**

After I restart a registered Sybase server, data collection on the server fails with the following errors:

- SBSLL007 Failed to execute SQL Statement
- SBSLL0024: Data collection fails due to insufficient privileges of the user

**Solution:**

Do the following:

1. Add the following lines to the Sybase server startup script:
   ```
   use tempdb
   go
   sp_dropuser <BSRMUSER>
   sp_addalias <BSRMUSER>, dbo
   go
   ```

2. Save and close the startup script.

   The Sybase server is now configured for successful data collection.
Change the TCP Ports

If you receive a Communication Error from the Windows Client, it might be because another application on the network is using the same TCP ports as CA SRM (one such application is Laplink RemoteAssist™). If this happens, you will need to change CA SRM's TCP ports.

To change CA SRM's TCP ports

1. On the Application Server machine, shut down the Windows Client and the Application Server.
2. Locate five free TCP ports on your network. To view a list of the ports currently in use, run the following Windows command:
   `netstat`
3. Open the `RPC_PORT.INI` file and change the value of each parameter to one of the five new ports. By default, the `RPC_PORT.INI` file is located in the `C:\CA SRM Data\Database\Configuration` folder.

   The parameters that you need to change are listed below with their default values:

   - `GNS_PORT_NUMBER` = 2571
   - `MRT_PORT_NUMBER` = 2572
   - `LNC_PORT_NUMBER` = 2573
   - `ASRPC_PORT_NUMBER` = 2574
   - `RSC_PORT_NUMBER` = 2575

4. Save and close `RPC_PORT.INI`.
5. Restart the Application Server and the Windows Client.

   CA SRM uses the new TCP ports and the conflict is resolved.
SAN Fabric Timeout Message

If your fabric is quite large with more switches (for example, 15 and above in a fabric), discovering switches may take long time and at times, the system throws a timeout error message.

To resolve this error, you can update the following files located at `<BrightStor SRM Data\Database\Configuration>` folder:

**BOS.ini**

Increase the timeout value (milliseconds) of the `ExecutewaitInterval` in the `[BOS]` section of the BOS.ini file.

**Fab.ini**

Increase the timeout value (seconds) of the `nSmisTimeOut` in the `[GENERAL]` section of the Fab.ini file.

**Configuration.ini**

Increase the timeout value (milliseconds) of the `DiscoveryTimeout` in the `[Fabric Configuration Wizard]` section of the Configuration.ini file located at the BrightStor SRM bin folder.

iSponsor Server Error

Due to iTech incompatibilities, you might get iSponsor Server error when you run Capacity-based licensing.

To resolve this problem, you need to add `SRM\bin` path to `LIBPATH` and restart the iGateway service.
Password Expiry / Change

SQL Credentials:

When SRM is running with SQL credentials and if the SQL Server user password expires or changed, there may be chances in failing to start.

To change the SQL credentials in the Windows Client (host definition)
1. Open the Windows Services window and select the SRM BOS Service properties.
2. Type GnsOnly in the Start Parameters text box of the Properties window and click Start.
3. Open the SRM Windows Client and navigate to Host definition wizard.
4. Type the changed SQL Server user password in the Host Definition properties.
5. Save the Host Definition properties and close the Windows Client.
6. Restart the SRM BOS Service and re-connect the Application Server.

Domain Credentials:

When there is a change in domain credentials, the data collections fail.

To change the domain credentials in the Windows Client (host definition)
1. Open Windows Client and navigate to the domains table in the Object Tree.
2. Select the appropriate domain and change the password from the Modify Dialog.
3. Save the Modify Dialog.
Application Server is Running in Service Mode:

When SRM is running in Service Mode, there may be chances in failing to start the Application Server service when the domain password changed.

To change the domain password in the Windows Client

1. Open Application Server Configuration Utility from Start Menu, CA SRM folder.
2. Switch to standard mode.
3. Switch back to services mode again by providing the changed password.
   Note: Ensure that application server service is started and running from Windows Services.
4. Follow the domain credentials section steps in order to update the password in domains table.

fscanner Fails in Solaris

Symptom:

When you invoke File and Storage Analysis, volume data collection may throw the following error:

cannot run fscanner. May be some GNU libraries are missing and volume DC with fail in Solaris 8 and Solaris 9.

Solution:

You must install the following patches from Solaris to resolve this error:

Patches for Solaris 8

- Solaris 8 SPARC 108434-17, 108435-17
- 108434-17: SunOS 5.9: 32 bit Shared Library Patch for c++
- 108435-17: SunOS 5.9: 64 bit Shared Library Patch for c++

Patches for Solaris 9

- Solaris 9 SPARC 111711-11, 111712-11
- 111711-11: SunOS 5.9: 32 bit Shared Library Patch for c++
- 111712-11: SunOS 5.9: 64 bit Shared Library Patch for c++
You can see if a specific patch has been installed with the following command:

```
$ /usr/sbin/patchadd -p | grep <patch_number>
```

You may download necessary Solaris patches from http://sunsolve.sun.com. The revision numbers on the required patches listed above are minimum’s—you may install a newer version of a patch than what is listed here. For example, patch 108434-17 is required for Solaris 8, but installing patch 108434-25 instead is allowed.

If you are running Solaris 10, no specific operating system patches are required.

## RSCD Commands

The following listed RSCD commands can be used in verifying adapter, multipath and SAN information on UNIX and Linux platforms:

<table>
<thead>
<tr>
<th>Use sancollect command</th>
<th>Use RSCD command</th>
<th>To get ....</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>sancollect -h -a 1</code></td>
<td><code>./rsc -Y</code></td>
<td>The adapter information</td>
</tr>
<tr>
<td><code>sancollect -h -m</code></td>
<td><code>./rsc -Z</code></td>
<td>The multipath information</td>
</tr>
<tr>
<td><code>sancollect -h -s &lt;file name&gt;</code></td>
<td><code>./rsc -S</code></td>
<td>The SAN information</td>
</tr>
</tbody>
</table>

**Number of Physical Disks**  
Example: 1 or 2  
**Physical Disk Name**  
Example: /dev/sdb

## SQL Database Migration

The following section lists detailed instructions to perform the SQL database migrations for CA SRM and SRM Web Reporter.
Problem:

How do you configure CA SRM when SRM databases are moved from one SQL Server instance to another?

Solution:

CA SRM database includes ENTRPRIS, QUERIES, and SAVED USER QUERIES. Backup the GNS_DUMP.TXT file from the ...\BrightStor SRM Data\Database\GNS\ folder.

Follow these steps:

1. Open Bos.ini file from <Drive:>&lt;BrightStor SRM Data\Database\Configuration and update the DbInstance under [DBA] section as follows:
   
   DbInstance=<New SQL instance name>

2. Open Services wizard and select the CA SRM Bos Service properties.

3. Type GnsOnly in the Start Parameters text box of the properties window.

4. Click Start.

5. Open SRM Windows Client click Host List icon.
   
   The Host List dialog opens.

6. Right-click and select Host Definition.
   
   The Host Definition dialog opens.

7. Change the SQL server instance and provide user credentials.

8. Save the Host Definition properties and close the Windows Client.

9. Restart SRM BOS Service in normal mode and start the Application Server service.

The Windows Client now fetches the data from the new SQL server instance.

Problem:

How do you configure CA SRM Web Reporter after you migrate the CASRMCentralDB from one SQ L server to another server?

Solution:

During the SRM Web Reporter installation, the CASRMCentralDB database is created on the SQL server instance. The database also creates a Designer connection named SRM_ODBC, which is used to view the reports from CA SRM Web Reporter Java Info View. This connection internally uses the system DSN to connect to the SQL server. CA SRM creates the CASRMCentralDB DSN using the SQL Server Native Client.
Considering the scenario mentioned, perform the following tasks, after you migrate the CASRMCentralDB from one SQL server to another SQL server.

1. Modify the system DSN details.
2. Modify Designer connection details.
3. Modify the CASRMCentralDB credentials from Web Reporter Control Panel.

**Important!** Log in to the CA SRM Web Reporter computer with the same user credentials that you used for installing CA SRM Web Reporter.
Modifying the system DSN details

Follow these steps:

1. Open the Data Sources (ODBC) from the Windows Control Panel.
   The ODBC Data Source Administrator dialog opens.
2. On the System DSN tab, select the CASRMCentralDB from the System Data Sources section, as shown in the following image.
   Note: Open C:\Windows\SysWOW64\odbcad32 if you are using a 64-bit machine
3. Click Configure.
   The Microsoft SQL Server DSN Configuration dialog opens.
4. Select / type the server name in the Server field as shown in the following image.
5. Click Next and select the Windows authentication.

6. Retain or modify the default settings (as per your requirements) in the continued dialogs.

7. Click Finish.

8. Click Test Data Source in the ODBC Microsoft SQL Server Setup dialog.
   The SQL Server ODBC Data Source Test dialog displays test results.
Modifying the Designer connection details

Follow these steps:

1. Access the BusinessObjects and open the Designer.
   The Universe Designer opens.
2. Select Tools, and Connections.
   The Wizard Connection dialog opens.

[Image of Wizard Connection dialog]

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Network Layer</th>
<th>Database Engine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auditing Co...</td>
<td>Secured</td>
<td>ODBC</td>
<td>MySQL 5</td>
</tr>
<tr>
<td>Conversion ...</td>
<td>Secured</td>
<td>Oracle OCI</td>
<td>Oracle 10</td>
</tr>
<tr>
<td>SRM_ODBC</td>
<td>Secured</td>
<td>ODBC</td>
<td>MS SQL Server...</td>
</tr>
<tr>
<td>club</td>
<td>Secured</td>
<td>ODBC</td>
<td>MS Access 2000</td>
</tr>
<tr>
<td>club-webi</td>
<td>Secured</td>
<td>ODBC</td>
<td>MS Access 2007</td>
</tr>
<tr>
<td>eFashion</td>
<td>Secured</td>
<td>ODBC</td>
<td>MS Access 2000</td>
</tr>
<tr>
<td>eFashion-webi</td>
<td>Secured</td>
<td>ODBC</td>
<td>MS Access 2007</td>
</tr>
</tbody>
</table>
3. Select the SRM_ODBC connection from the connections list.

4. Click Edit and modify the user name and password credentials in the Edit SRM_ODBC connection dialog.

   **Note:** The user must have access to the new SQL server machine for CASRMCentralDB.

5. Click Next.

6. Retain the default settings in the continued dialogs and click Finish.

   The Wizard Connection dialog opens.

7. Click Test to verify the connection.

   The Test the connection dialog displays the test results.

Now you can view the reports from SRM Web Reporter Java Info View without any issues.
Modifying the CASRMCentralDB from CA SRM Web Reporter Control Panel

Follow these steps:

1. Open the folder C:\Program Files (x86)\CA\CA SRM Web Reporter and backup a copy of the wrcp.ini file.

2. Open wrcp.ini file and change the WRCP_CDB_SQLSERVERNAME property to the new SQL server instance and save the file.

   **Example:** `WRCP_CDB_SQLSERVERNAME = NEW_SQL_SERVER_INSTANCE_NAME`


   The CA SRM Web Reporter Control Panel Settings dialog opens.

4. Select the Modify Credentials tab.

   ![CA SRM Web Reporter Control Panel Settings](image)

   - **General Settings**
   - **Trend Stages**
   - **Modify Credentials**

   Please specify the Windows Authenticated Username and Password. This User Account will be used by the Trend Service for Trend Data Consolidation. The Validate button will validate the credentials.

   - **Authentication**
     - Windows Authentication
     - SQL Server Authentication

   - **Trend Username**

   - **Password**

   - **Validate**

   - **Save**
   - **Cancel**
   - **Help**

5. Select the Windows Authentication option and provide the trend username and password credentials.

6. Click Validate to validate the user credentials.

7. Click Save.

   The details are saved.
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