HP Storage Essentials Storage Resource Management Report Optimizer Software 6.0 Contexts Guide

Guide to Creating Reports in a Complex Environment

HP Storage Essentials Storage Resource Management Report Optimizer Software Contexts Guide

Contents

About this guide

This guide provides the general background information and specific task instructions that will help you successfully create realistic reports in a complex HP Storage Essentials SRM environment.

Intended audience

This guide is intended for:

- Storage Administrators
- System Administrators

Prerequisites

Prerequisite knowledge for using this product includes:

- Networking
- Storage Area Networks (SANs)

Related documentation

SRM Report Optimizer ships with the following additional documentation:

Table 1   Additional Documentation

Document	Description
HP Storage Essentials Storage Resource Management Report Optimizer Software Quick Start Guide	Provides a basic overview of several common SRM Report Optimizer tasks, and provides references to other documents for more detailed information.
HP Storage Essentials Storage Resource Management Report Optimizer Software Installation Guide	Provides Information about installing and configuring SRM Report Optimizer on Microsoft Windows.
HP Storage Essentials Storage Resource Management Report Optimizer Software InfoView User's Guide.	Provides information about using InfoView, the corporate business intelligence portal. This guide shows you how to view, schedule, and organize reports over the web using InfoView. It also describes the different report viewers and shows you how to publish reports to the system.

Table 1 Additional Documentation

Document	Description
Performing On-Report Analysis with Web Intelligence.	Provides information about viewing, analyzing, and enhancing Web Intelligence reports interactively on the web. This guide includes information on filtering and sorting report data, adding calculations, and modifying the formatting and data content of reports (all without needing to launch a Web Intelligence report panel).
Building Reports Using the Web Intelligence Java Report Panel	Provides information about using the Web Intelligence Java Report Panel for reporting and analysis. This guide includes detailed explanations of power features, such as including advanced filters and formulas.

Document conventions and symbols

Table 2 Document conventions

Convention	Element
Medium blue text: Figure 1	Cross-reference links and e-mail addresses
Medium blue, underlined text (http://www.hp.com)	Web site addresses
Bold font	• Key names • Text typed into a GUI element, such as into a box • GUI elements that are clicked or selected, such as menu and list items, buttons, and check boxes
Italics font	Text emphasis
`Monospace font`	• File and directory names • System output • Code • Text typed at the command-line
`Monospace, italic font`	• Code variables • Command-line variables
`Monospace, bold font`	Emphasis of file and directory names, system output, code, and text typed at the command line

HP technical support

Telephone numbers for worldwide technical support are listed on the HP support web site: http://www.hp.com/support/.

Collect the following information before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

For continuous quality improvement, calls may be recorded or monitored.

HP strongly recommends that customers sign up online using the Subscriber's choice web site at http://www.hp.com/go/e-updates.

- Subscribing to this service provides you with e-mail updates on the latest product enhancements, newest versions of drivers, and firmware documentation updates as well as instant access to numerous other product resources.
- After signing up, you can quickly locate your products by selecting **Business support** and then **Storage** under Product Category.

HP-authorized reseller

For the name of your nearest HP-authorized reseller:

- In the United States, call 1-800-345-1518.
- Elsewhere, visit the HP web site: http://www.hp.com. Then click **Contact HP** to find locations and telephone numbers.

Helpful web sites

For third-party product information, see the following HP web sites:

- http://www.hp.com
- http://www.hp.com/go/storage
- http://www.hp.com/support/

1 Creating Reports in a Complex Environment

This chapter contains the following topics:

Introduction and Goals

HP Storage Essentials SRM software can manage very complex enterprise SAN environments encompassing thousands of devices. These devices can include hosts, storage arrays, backup systems, SAN switches from many different vendors, and a variety of software products. In such an environment, the HP Storage Essentials SRM database is represented in a SRM Report Optimizer universe that contains over 2500 objects with approximately 300 classes. The complexity of the HP Storage Essentials SRM database and the SRM Report Optimizer universe can be challenging when you are attempting to create new reports; for example, it may not be clear which objects need to be included when creating a report to obtain the desired report results.

This document provides the general background information and specific task instructions that will help you successfully create realistic reports in a complex HP Storage Essentials SRM environment.

Scope

This document covers the following topics:

- Selecting the correct objects and classes to be included in a report, and avoiding common problems in selecting objects.
- Selecting the correct context to be used when the report is run.

Selecting Objects for a Report

This section contains the following topics:

General Concepts: Selecting Objects

Follow these guidelines when creating reports:

Independent Classes - Asset, Chargeback, Discovery details, and Tape Library are independent classes. They do not interact with any other class, and the queries involving these classes cannot be combined with other classes. For example, you cannot combine objects from the Asset class and the Host class.

If you are interested in generating a report that contains independent classes, a different query must be added to the same report. The output can be obtained in the same report on the same page, or on a different tab.

For additional information, see "Context Types" on page 16.

Class Categories - The names of the classes in the universe are self explanatory and describe what the purpose of each class is. A few classes are repeated with additional text in the class name. The purpose of the class or sub-class is defined by additional text within the class name. The following table lists the categories and what they mean:

Table 1-1: Class Categories

Category	What it means	Example
Dependency	Use these classes and sub-classes when you are interested in dependency information. For a full description of dependency classes, see "Context Descriptions" on page 16.	Host > HBA This class lists all of the HBAs for the given host. Host > HBA for Dependency This class lists only the HBAs that are connected to fabric.
Capacity/ Performance Statistics - Latest	Collectors periodically capture every element statistic. The "Latest" class of statistics always contains the most recent values for the object. Use this class if you want to find the most recent value of the object.	Host > Host Capacity Statistics - Latest Host > Host Performance Statistics > CPU performance Statistics - Latest
Capacity/ Performance Statistics - Historical	Collectors periodically capture every element statistic. These stats, collected for every interval, are represented in the "Historical" statistics class. Use this class if you are interested in trending or change management.	Host > Host Capacity Statistics - Historical Host > Host Performance Statistics > CPU performance Statistics - Historical

Table 1-1: Class Categories

Category	What it means	Example
Capacity Statistics - Drill	Collectors periodically capture every element statistic. These stats, collected for every interval, are represented in the "Drill" statistics class. Use this class in the reports when you want to drill up or drill down. Use this class if you are interested in the drill functionality of the product.	Host > Host Volumes > Host Volume Capacity Statistics - Drill

Repeating objects - Objects are repeated across classes. Take care when picking objects from the same class. For example, when creating a report containing the Host > HBA class, use only objects from HBA class. Do not mix objects from the HBA for Dependency class. For a list of these objects, see "Summary: Contexts Visible to Report Creators and Users" on page 18.

#MULTIVALUE error - Occasionally, data values in the report show a #MULTIVALUE error. This is because the column in question has multiple values associated with it. To resolve this issue, the key object that can eliminate multiple values has to be identified and added to the report. It isn't necessary to show this value inside the report, but it needs to be added in order to avoid this error

For example, if you pick a vendor name from the Host class and Total Capacity in GB from the Host Capacity Statistics - Latest class, when you run the report you will see this error because there can be multiple values (in this case hosts) for a vendor. To resolve this error, pick a unique object. In this case, pick the Host Name object.

For additional information, see "Avoiding #MULTIVALUE Errors" on page 5.

Contexts - When creating a new report, a list of contexts based on the objects to be included in the report is displayed. You must select one context in order to create the report. Your selection of context resolves the multi-path issue, picks a particular path, and allows the report to run.

NOTE: You should deselect the option to "reset contexts on refresh" on the report side, so that the context list will not be prompted each time when you run or schedule the report.

For additional information, see "Example Use Cases" on page 21.

Avoiding Incompatible Objects

Some classes and sub-classes are independent and should not be used with any other classes or sub-classes. These classes are incompatible, and cannot be combined in a single report. Using these classes in combination with other classes and sub-classes will result in error messages indicating "incompatible objects." The following classes are independent:

- Asset Class
- Chargeback Class

- Discovery Details Class
- Tape Library Class
- NAS Class

The following table summarizes class compatibilities. Compatible classes are marked with an X, and all unmarked combinations are incompatible.

Table 1-2: Class Compatibilities

Class Name	Asset	Application	Backup	Chargeback	Discovery Details	Events	Fabric	File Server	Host	NAS	Path	Storage system	Switch	Tape Library
Asset	X													
Application		X					X		X	X	X	X	X	
Backup			X				X		X	X	X	X	X	
Chargeback				X										
Discovery Details					X									
Events						X								
Fabric		X	X				X	X	X			X	X	
File Server		X	X				X	X	X	X	X	X	X	
Host		X	X				X	X	X	X	X	X	X	
Nas		X	X				X	X	X	X				
Path		X	X				X	X	X	X	X	X	X	
Storage System		X	X				X	X	X			X	X	
Switch		X	X				X	X	X			X	X	X
Tape Library														X

Combining Incompatible Objects in a Report

You can combine incompatible objects in a report by creating separate queries for each type. For example, if you are interested in SAN and NAS capacities in your environment, you can select NAS objects in one query and SAN (storage system) objects in another query, and then run the two queries together. The output can be combined in one report or different tabs of the same report.

Avoiding #MULTIVALUE Errors

If there are multiple values for an object in a report, the #MULTIVALUE error occurs when the report is run. To avoid this situation, design reports so that each object in the report represents a unique value. In general, for each main class, a report will require a unique object.

If you have created a report containing all required objects, and a #MULTIVALUE error occurs, then include any required objects from the appropriate sub-class(es).

The following table describes the unique objects for each class:

Table 1-3: Required Objects

Class Name	Required Object Name
Host	Host Name, Organization Name
Application	Application Name, Host Name, Organization Name
Backup	Application Name, Host Name, Organization Name
Storage System	Storage System Name, Organization Name
NAS	Filer Name, Organization Name
Switch	Switch Name, Organization Name
File Server	File Server Name, Host Name, Organization Name
Tape Library	Tape Library Name, Organization Name
Host Capacity Statistics - Historical	Host Name, Organization Name, Collection Time, Statistics Type
Host Capacity Statistics - Latest	Host Name, Organization Name
Host Volume Capacity Statistics - Historical	Host Name, Logical Volume Name, Organization Name, Collection Time, Statistics Type
Host Volume Capacity Statistics - Latest	Host Name, Logical Volume Name, Organization Name
Host Volume Capacity Statistics - Drill	Host Name, Logical Volume Name, Organization Name, Collection Time, Statistics Type
Storage System Capacity Statistics - Historical	Storage System Name, Organization Name, Collection Time, Statistics Type
Storage System Capacity Statistics - Latest	Storage System Name, Organization Name
Storage Pool Capacity Statistics - Historical	Storage System Name, Storage Pool Name, Organization Name, Collection Time, Statistics Type
Storage Pool Capacity Statistics - Latest	Storage System Name, Storage Pool Name, Organization Name

Table 1-3: Required Objects

Class Name	Required Object Name
Exchange Application Capacity - Historical	Application Name, Organization Name, Host Name, Collection Time, Statistics Type, Storage Group Name
Exchange Application Capacity - Latest	Application Name, Organization Name, Host Name, Storage Group Name
Virtual Application Capacity - Historical	Application Name, Organization Name, Host Name, Collection Time, Statistics Type, Virtual Path
Virtual Application Capacity - Latest	Application Name, Organization Name, Host Name, Virtual Path
DB Application Physical Capacity - Historical	Application Name, Organization Name, Host Name, Collection Time, Statistics Type, DB Instance Name, DB Physical Name, DB Logical Name
DB Application Physical Capacity - Latest	Application Name, Organization Name, Host Name, DB Instance Name, DB Physical Name, DB Logical Name
DB Application Instance Capacity - Historical	Application Name, Organization Name, Host Name, Collection Time, Statistics Type, DB Instance Name
DB Application Instance Capacity - Latest	Application Name, Organization Name, Host Name, DB Instance Name
Switch Capacity Statistics - Historical	Switch Name, Organization Name, Collection Time, Statistics Type
Switch Capacity Statistics - Latest	Switch Name, Organization Name

Examples: Resolving #MULTIVALUE Errors

The following table provides examples of reports that will generate the #MULTIVALUE error, and how to resolve these situations.

Table 1-4: Resolving #MULTIVALUE Errors

Use Case	Cause of #MULTIVALUE Error	Resolution
Create a report to show the latest host capacity statistics. Select all of the following: • Host class > Vendor Name object • Host Capacity Statistics - Latest class > Total in GB object	There can be multiple hosts with the same vendor name.	Select a unique object, such as Host Name.

Table 1-4: Resolving #MULTIVALUE Errors

Use Case	Cause of #MULTIVALUE Error	Resolution
Create a report to show total storage capacity. Select all of the following: • Storage System class > Vendor Name object • Storage System Capacity Statistics - Latest class > Total Capacity in GB object	There can be multiple storage systems with the same vendor name.	Select a unique object, such as Storage System name.
Create a report to show total storage capacity. Select all of the following: • Host class > Host Name object • Host Volume Capacity Statistics - Latest class > Total Capacity in GB object	There can be multiple logical volumes on a given host.	Select the Logical Volume Name object from the Host Volumes class.
Create a report to show Host Volume capacity. Select all of the following: • Host Volume Capacity Statistics - Historical class > Total in GB object • Host class > Host Name object • Host class > Logical Volume Name object	For historical capacity statistics, there can be multiple values because capacity data was collected at different times.	Select the Collection Time object from the sub-class.

NOTE: In general, you must include the main objects and all the objects in the sub-classes in the query to avoid #MULTIVALUE errors.

When to Use the "XYZ for Dependency" Classes

Some classes, such as HBA, Host Volumes, and Storage System Fiber Channel Ports, have corresponding classes such as HBA for Dependency, Host Volumes for Dependency, and Storage System Fiber Channel Ports for Dependency. Use these guidelines when choosing between "class name" classes and "class name for dependency" classes:

- Use the "Class name" class for a report containing only objects from one class or sub-classes, or when using Generic and Managed contexts
- Use "Class name for Dependency" when combining objects of different classes. Use "Class name for Dependency" classes only to find objects used in connectivity or dependency with objects in other classes. Examples include: host-dependent storage systems and host-dependent switches.

The following table shows when to use various classes versus their corresponding "XYZ for Dependency" classes (where XYZ can be Host Volume Capacity Statistics, Storage System Capacity Statistics, Switch Configuration Statistics, Storage Pool Capacity Statistics, etc.):

Table 1-5: When to Use the "XYZ for Dependency" Classes

Classes	Usage Guidelines
• Host Volumes • Host Volumes for Dependency • Host Volume Management	• Use the Host Volumes class only with the Host class and/or its sub-classes, or with Generic and Managed contexts. • Use the Host Volumes for Dependency class with other classes, such as Switch, Storage System, or NAS. • Use the Host Volume Management class when you want to find volume management volumes information.
• HBA • HBA for Dependency	• Use the HBA class only with the Host class and/or its sub-classes. The HBA class provides information about all of the HBAs for a given host. • Use the HBA for Dependency class with other classes and sub-classes, such as Switch, Storage System, or NAS. The HBA for Dependency class provides information about HBA connectivity with other devices, but not for all HBAs on a given host.
• HBA Ports • HBA Ports for Dependency	• Use the HBA Ports class only with the Host class and/or its sub-classes. The HBA Ports class provide information about all of the HBA ports for a given host. • Use the HBA Ports for Dependency class with other classes and sub-classes, such as Switch, Storage System, or NAS. Use this class to get information about HBA port dependency or connectivity with other devices. This class does not provide all of the HBA ports for a given host.

Table 1-5: When to Use the "XYZ for Dependency" Classes

Classes	Usage Guidelines
• Storage System Fiber Channel Ports • Storage System Fiber Channel Ports for Dependency	• Use the Storage System Fiber Channel Ports class to find all of the fiber channel ports for a given storage system, Use this class only with the Storage System class and/or its sub-classes, or in combination with Switch class and its sub-classes. • Use the Storage System Fiber Channel Ports for Dependency class to find ports connected to other elements. You must combine this class with the Storage System class (and its sub-classes) and other classes such as the Host or Application class. You cannot combine this class with the Switch class. This class provides only the Fiber channel port dependency or connectivity. For example, it shows the Fiber channel port connected to an HBA port. It does not show all Fiber channel ports for a given storage system.

Examples: Using the "XYZ for Dependency" Classes when Creating Reports

The following table provides examples of when to use "XYZ for Dependency" classes when creating reports:

Table 1-6: Using the "XYZ for Dependency" Classes when Creating Reports

To Create This Report	Select All of These Objects
Show host logical volumes with their capacity information	• Host > Host Name • Host > Host Volumes > Logical Volume name • Host > Host Volumes > Host Volume Capacity Statistics - Latest > Total in GB • Host > Host Volumes > Host Volume Capacity Statistics - Latest > Used in GB • Host > Host Volumes > Host Volume Capacity Statistics - Latest > Free in GB
Show host-dependent storage systems and details	• Storage System > Storage System Name • Host > Host Name • Host > HBA Ports for Dependency > HBA Port Name • Host > Host Volumes for Dependency > Logical Volume Name • Storage System > Storage Volumes > Storage Volume Name • Storage System > Storage System Fiber Channel Ports for Dependency > Storage Port Name

Table 1-6: Using the "XYZ for Dependency" Classes when Creating Reports

To Create This Report	Select All of These Objects
Show switch-dependent storage systems and details	• Switch > Switch Name • Switch > Switch Ports > Switch Port Name • Storage System > Storage System Name • Storage System > Vendor • Storage System > Storage System Fiber Channel Ports > Storage Port Name

When to Use the "XYZ - Latest," "XYZ - Historical," and "XYZ - Drill" Classes

SRM Report Optimizer provides the most recently calculated capacity statistics and historical capacity statistics.

The following table lists when to use 'XYZ - Latest", "XYZ - Historical", and "XYZ - Drill" classes.

Table 1-7: When to Use "XYZ - Latest," "XYZ - Historical," and "XYZ - Drill"

Class Name	Under what circumstances should each class be used
"XYZ" - Latest	This type of class should be used when you want to find the latest point-in-time data or the most current data.
"XYZ" - Historical	This type of class should be used when you want to find the collection of all data points over a period of time or time series report.
"XYZ" - Drill	This type of class should be used when you want to drill up or down, or see an Automatic Summarization of capacities over a period of time.

Examples: Using the "XYZ - Latest," "XYZ - Historical," and "XYZ - Drill" Classes

The following table provides examples of using the "XYZ - Latest," "XYZ - Historical," and "XYZ - Drill" Classes:

Table 1-8: Using the "XYZ - Latest," "XYZ - Historical," and "XYZ - Drill" Classes

Classes Name	Under what circumstances should each class be used
• Host > Host Volumes > Host Volume Capacity Statistics - Latest • Host Capacity Statistics - Historical > Total in GB	• Use the Latest class to show the host capacity information calculated at the point-in-time from the most current data. • Use the Historical class to show the historical host capacity information as a collection of all data points over a period of time, or as a time series report.

Table 1-8: Using the "XYZ - Latest," "XYZ - Historical," and "XYZ - Drill" Classes

Classes Name	Under what circumstances should each class be used
• Host > Host Volumes > Host Volume Capacity Statistics - Latest • Host > Host Volumes > Host Volume Capacity Statistics - Historical • Host > Host Volumes > Host Volume Capacity Statistics - Drill	• Use the Host Volume Capacity Statistics - Latest class when you want the latest host volume capacity information. For example, the latest point-in-time data or the most current data. • Use the Host Volume Capacity Statistics - Historical class when you want historical host volume capacity information. For example, a collection of all data points over a period of time, or a time series report. • Use the Host Volume Capacity Statistics - Drill class s when you want host volume and/or host capacity information. For example, if you want to use drill down/up or Automatic Summarization of capacities.
• Storage System > Performance Statistics > EVA > EVA Physical Disk Statistics- Latest • Storage System > Performance Statistics > EVA > EVA Physical Disk Statistics - Historical	• Use the EVA Physical Disk Statistics - Latest class when you want the latest EVA physical disk capacity information. For example, if you want the latest point-in-time data or the most current data. • Use the EVA Physical Disk Statistics - Historical class should when you want historical EVA physical disk capacity information. For example, if you want a collection of all data points over a period of time, or a time series report.

Events Classes

The following table describes the Events classes:

Table 1-9: Events Classes

Events Classes	Examples
• The Events class provides all events, including: application, host, storage system, switch, fabric, etc. Events is an independent class and cannot be used in combination with any other classes. • The Element Specific Events class provides event information for a specific element only (such as application, backup, file server, NAS, Host, Storage system, Switch, Tape Library, etc.).	• The Application Events class provides event information for applications only. • The Host Events class provides event information for hosts only.

Assets Classes

The following table describes the Assets classes:

Table 1-10: Assets Classes

Assets Classes	Examples
• The Asset class gives information about all the assets in your environment. The Assets class is an independent class and cannot be used in combination with any other classes. • The Element Specific Assets class gives asset information for a specific element only (such as application, backup, file server, NAS, Host, Storage system, Switch, Tape Library, etc.).	• The Application Assets class gives asset information for applications only. • The Host Assets class gives asset information for hosts only.

How to Use Wild-card Searching with the Filters

Wild-card searching is not possible with the built-in query filters that are available as part of the universe, but when you are creating filters, there are options named Matches Pattern and Different from Pattern that can be used for pattern searching.

For example, if you are creating a filter on Host Name, select the object and then select Matches Pattern or Different from Pattern. The following table provides examples of the Matches Pattern option:

Table 1-11: The Matches Pattern Option

"Matches Pattern" typed in the text field	Possible output	Comments
%usa%	• Host.test.usa.com • usa123 • Zusa	The output must contain the word "usa."
A%1%	• A1.test.usa.com • Ased1 • A74188	The output must start with "A" and include "1" as one of the characters.

The following table provides examples of the "Different from Pattern" option:

Table 1-12: The Different from Pattern Option

"Different from Pattern" typed in the text field	Possible Output	Comments
%test%	• Host.usa.com • Te23st123 • Host_123 • mycomp.usa.com	The output must not contain the word "test."
A%1%	• A.test.usa.com • sed1 • 74188	The output must not start with "A" and have "1" as one of the characters.

Selecting Context

This section contains the following topics:

About Contexts

What is a context? - Context shows the relationships among the various objects in the universe.

Where/When is a context prompted? - You will be prompted to select a context when creating a new report that contains objects from two or more different classes. For example, application and storage system classes.

Why is a context prompted? - You will be prompted to select a context when there are different paths to get the data, which is a normal situation when you create a report containing objects from two or more different type of classes. Your selection of context resolves the multi-path issue and picks a particular path, which allows your report to run.

When creating a new report, the list of possible contexts depends on the objects to be included in the report. You must select one context in order to create the desired report.

The following figure shows an example of the Query Contexts dialog box:
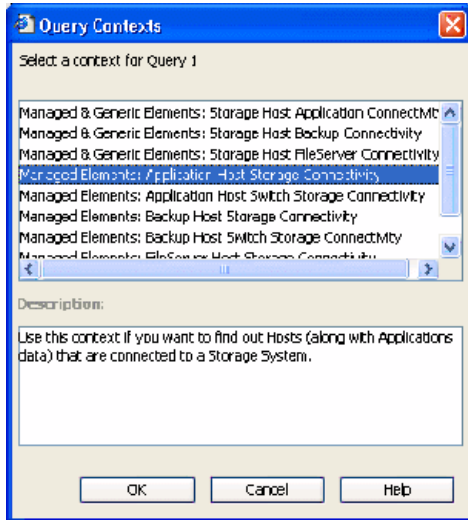
Figure 1 Query Contexts

Once the report is designed, you can disable context prompting, so that the pre-selected context will be used automatically whenever the report is run or scheduled. To disable context prompting, deselect the option labeled "Reset contexts on refresh" in the WEBI Query Properties panel:
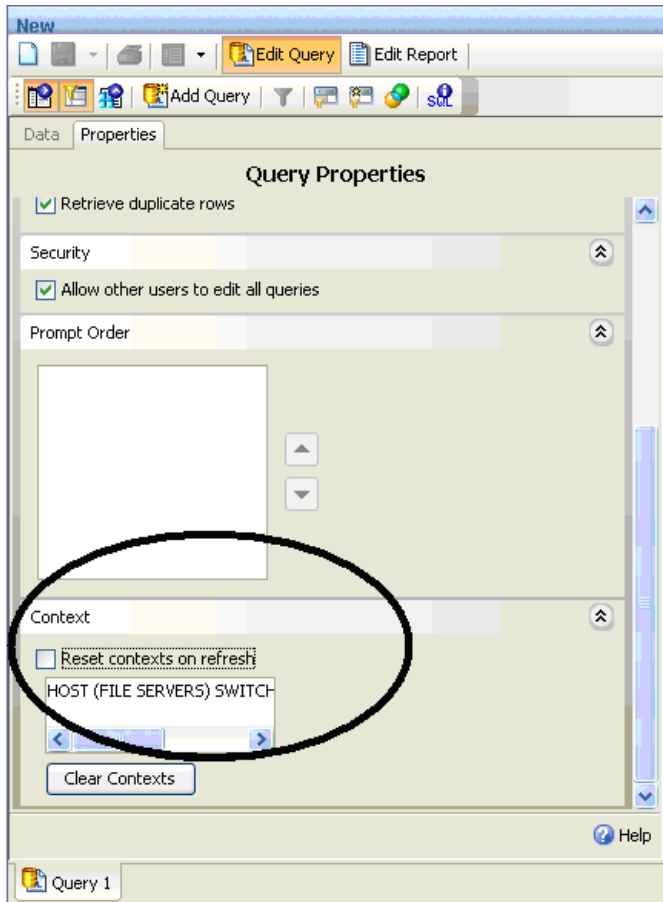
Figure 2 Reset contexts on refresh

All Report Pack reports default to a particular context, so you will not be prompted to select a context when running or scheduling a Report Pack report.

Context Types

The following are the types of contexts that are used:

- **Managed elements**: Elements that are discovered through the management server.
- **Generic elements**: Elements that are not discovered through the management server, but are available when the fabric is discovered.

Context Descriptions

The following contexts are defined in the universe:

NOTE: Not all contexts are visible to the end user.

- **Managed Elements: Application Host Switch Storage Connectivity** - Use this context if you want to find out the connectivity between (Applications and Hosts) OR (Applications and Switches) OR (Applications and Storage systems) OR (Hosts and Switches) OR (Hosts and Storage systems) OR (Switches and Storage systems) OR (Applications, Hosts, Switches and Storage systems).
- **Managed Elements: Application Host NAS Connectivity** - Use this context if you want to find out the connectivity between (Applications and Hosts) OR (Hosts and NAS) OR (Applications and NAS) OR (Applications, Hosts and NAS).
- **Managed Elements: Backup Host Switch Storage Connectivity** - Use this context if you want to find out the connectivity between (Backup and Hosts) OR (Backup and Switches) OR (Backup and Storage systems) OR (Hosts and Switches) OR (Hosts and Storage systems) OR (Switches and Storage systems) OR (Backup, Hosts, Switches and Storage systems).
- **Managed Elements: Backup Host NAS Connectivity** - Use this context if you want to find out the connectivity between (Backup and Hosts) OR (Hosts and NAS) or (Backup and NAS) OR (Backup, Hosts and NAS).
- **Managed Elements: FileServer Host Switch Storage Connectivity** - Use this context if you want to find out the connectivity between (File servers and Hosts) OR (File servers and Switches) OR (File servers and Storage systems) OR (Hosts and Switches) OR (Hosts and Storage systems) OR (Switches and Storage systems) OR (File servers, Hosts, Switches and Storage systems).
- **Managed Elements: FileServer Host NAS Connectivity** - Use this context if you want to find out the connectivity between (File servers and Hosts) OR (Hosts and NAS) OR (File servers and NAS) OR (File servers, Hosts and NAS).
- **Managed & Generic Elements: Storage Host Application Connectivity** - Use this context if you want to find out the connectivity between (Storage systems and Hosts) OR (Storage systems and Applications) OR (Hosts and Applications) OR (Storage systems, Hosts and Applications).
- **Managed & Generic Elements: Storage Host Backup Connectivity** - Use this context if you want to find out the connectivity between (Storage systems and Hosts) OR (Storage systems and Backup) OR (Hosts and Backup) OR (Storage systems, Hosts and Backup).
- **Managed & Generic Elements: Storage Host FileServer Connectivity** - Use this context if you want to find out the connectivity between (Storage systems and Hosts) OR (Storage systems and File servers) OR (Hosts and File servers) OR (Storage systems, Hosts and File servers).
- **Managed & Generic Elements: Switch Host Application Connectivity** - Use this context if you want to find out the connectivity between (Switches and Hosts) OR (Switches and Applications) OR (Hosts and Applications) OR (Switches, Hosts and Applications).
- **Managed & Generic Elements: Switch Host Backup Connectivity** - Use this context if you want to find out the connectivity between (Switches and Hosts) OR (Switches and Backup) OR (Hosts and Backup) OR (Switches, Hosts and Backup).
- **Managed & Generic Elements: Switch Host FileServer Connectivity** - Use this context if you want to find out the connectivity between (Switches and Hosts) OR (Switches and File servers) OR (Hosts and File servers) OR (Switches, Hosts and File servers).

- **Managed & Generic Elements: Switch Storage Connectivity** - Use this context if you want to find out the connectivity between (Storage Systems and Switches) OR vice versa
- **Managed & Generic Elements: Fabric Host Application** - Use this context if you want to find out the Host (along with Application) information related to a Fabric
- **Managed & Generic Elements: Fabric Host Backup** - Use this context if you want to find out the Host (along with Backup) information related to a Fabric.
- **Managed & Generic Elements: Fabric Host FileServer** - Use this context if you want to find out the Host (along with File server) information related to a Fabric

Summary: Contexts Visible to Report Creators and Users

The following table summarizes contexts that are visible to users who create and run reports:

Table 1-13: Context Summary

Use this context:	To show connectivity between these objects:								
Context Name	Application	Storage Systems	Hosts	Switches	NAS	Backup	File Servers	Fabrics	Tape Libraries
Managed Elements: Application Host Switch Storage connectivity	X		X						
	X			X					
	X	X							
			X	X					
		X	X						
		X		X					
	X	X	X	X					
Managed Elements: Application Host NAS connectivity	X		X						
			X		X				
	X				X				
	X		X		X				

Table 1-13: Context Summary

Use this context:	To show connectivity between these objects:								
Context Name	Application	Storage Systems	Hosts	Switches	NAS	Backup	File Servers	Fabrics	Tape Libraries
Managed Elements: Backup Host Switch Storage Connectivity			X			X			
				X		X			
		X				X			
			X	X					
		X	X						
		X		X					
		X	X	X		X			
Managed Elements: File Server Host Switch Storage connectivity			X				X		
		X					X		
				X			X		
			X	X					
		X	X						
		X		X					
		X	X	X			X		
Managed & Generic elements: Storage Host Application Connectivity		X	X						
	X	X							
	X		X						
	X	X	X						
Managed & Generic elements: Storage Host Backup connectivity		X	X						
		X				X			
			X			X			
		X	X			X			
Managed & Generic elements: Storage Host File Server connectivity		X	X						
		X					X		
			X				X		
		X	X				X		

Table 1-13: Context Summary

Use this context:	To show connectivity between these objects:								
Context Name	Application	Storage Systems	Hosts	Switches	NAS	Backup	File Servers	Fabrics	Tape Libraries
Managed & Generic elements: Switch Host Application connectivity			X	X					
	X			X					
	X		X						
	X		X	X					
Managed & Generic elements: Switch Host Backup connectivity			X	X					
				X		X			
			X			X			
			X	X		X			
Managed & Generic elements: Switch Host File Server connectivity			X	X					
				X			X		
			X				X		
			X	X			X		
Managed & Generic elements: Switch Storage connectivity		X		X					
Managed & Generic elements: Fabric Host Application	X		X				X	X	
Managed & Generic elements: Fabric Host File Server			X						
Managed & Generic elements: Fabric Storage		X						X	
Managed & Generic elements: Fabric Switch				X				X	
Managed & Generic elements: Tape Library									X

Example Use Cases

This section provides example use cases to illustrate the process of creating new reports. Each use case describes the user goal and the steps to create the desired report. This section focuses on the steps related to selecting the appropriate classes, objects, contexts, and functions to create specific reports. It is not a goal of this document to describe details such as customizing report titles and formatting, or the steps to create a simple report; these topics are documented elsewhere.

Conventions used in this section:

All objects in the SRM Report Optimizer universe are contained within a class. In some cases, an object is contained within a top-level class, and in other cases it is necessary to expand one or more sub-classes within a top-level class to find a specific object.

In describing how to select the classes of objects to be included in a report, this chapter uses the following convention:

> Class > [Subclass1] > [Subclass2] > … [SubclassN]

Where:

- Class represents the name of the top-level class, such as Host or Storage System
- [Subclass1], [Subclass2], and [SubclassN] represent the names of one or more subclasses containing the specified object (where applicable). Examples of sub-classes include Host > Host Volumes and Storage System > Storage System Volumes.

This section contains the following topics:

Use Case 1: Reporting Allocated, Mounted, and Used Storage

User Goal - Create a report showing:

- the total amount of storage allocated to a specific host
- how much of the allocated storage is mounted

- of the mounted volumes, how much is used and free

To create this report:

1. To find the storage allocated to a host, select the following objects/filters from the Report Connector universe, and drag them onto the Results Objects/Query Filters panel:

Class > Subclass(es)	Object/Filter
Host	Host Name
Storage System	Storage System Name
Storage System > Storage System Volumes	Storage Volume Name
Storage System > Storage System Volumes	Volume Size in GB
Host	Managed Hosts filter
Host	Non-Clustered Hosts filter

2. Click **Run Query** to run the report and select the proper context. The following contexts will be offered when you run the report:
   - Managed & Generic Elements: Storage Host Application Connectivity
   - Managed & Generic Elements: Storage Host Backup Connectivity
   - Managed & Generic Elements: Storage Host FileServer Connectivity
   - Managed Elements: Application Host Switch Storage Connectivity
   - Managed Elements: Backup Host Switch Storage Connectivity
   - Managed Elements: FileServer Host Switch Storage Connectivity

   To select the proper context, you must understand the differences between the two types of contexts:
   - Managed & Generic Elements Contexts will include both managed and generic elements in the report. All of these contexts will provide exactly the same data in the report. This type of context will return data from Target LUN mapping.
   - Managed Elements Contexts will include only managed elements in the report. All of these three contexts will provide exactly the same data in the report.

   Select a context type based on whether you want to see information about managed and generic elements, or only managed elements.

3. To find data about the mounted, used, and free storage for a host:
   a. Select **Edit Query**.
   b. Click **Add Query** to create another query within this report. You can either accept the default query names (for example Query 1, Query 2), or assign meaningful names to the queries for ease of use.

4. Select the following objects from the Report Connector universe, and drag them onto the Results Objects/Query Filters panel for the second query.:

Class > Subclass(es)	Object
Host	Host Name
Host > Host Volumes	Logical Volume Name
Host > Host Volumes > Host Volume Capacity Statistics - Latest	Total in GB
Host > Host Volumes > Host Volume Capacity Statistics - Latest	Used in GB
Host > Host Volumes > Host Volume Capacity Statistics - Latest	Free in GB
Host	Managed Hosts filter
Host	Non-Clustered Hosts filter

5. Run the report. This report will display two separate tables. Depending on your needs, you may select among these options to display the results on a single page, or on different tab pages:
   - Insert a table in a new report (creates two tables in two separate tab pages)
   - Insert a table in the current report (creates two tables in the same tab page)
   - Include the result objects in the document without generating a table

   These options are only available the first time you run the report. The option you select will be used each time the report is run. It cannot be changed later.

6. Group by Host name in these two tables by selecting the Host name column and clicking **Insert/Remove Break**.

7. In the first table, select the Volume Size in GB column and click **Insert Sum** to add a row to display the total storage allocated to the selected volumes.

8. In the second table, add rows to display the Total in GB, Used in GB and Free in GB, as described above (select each column, and click **Insert Sum** once for each column).

The following figures show an examples of an Allocated, Mounted, and Used Storage Report:

Host Name	Storage System N	Storage Volume N	Volume Size in GB
HP-NAS	eva4k-hyd	HP-NAS\HP-NAS-1	200
HP-NAS		Sum:	200
QA-BLADE-16	AMS1000@16.180	LDEV 09	3
	AMS1000@16.180	LDEV 10	2
	AMS1000@16.180	LDEV 1035	1
	AMS1000@16.180	LDEV 21	2
	AMS1000@16.180	LDEV 22	3
	AMS1000@16.180	LDEV 23	3
QA-BLADE-16		Sum:	14

Host Name	Logical Volume Name	Total in GB	Used in GB	Free in GB
BACKUP-180	C:	14.99	5.94	9.06
	Y:	74.56	44.21	30.35
	Z:	55	54.9	0.09
BACKUP-180	Sum:	144.55	105.04	39.5
CMS20	C:	68.33	27.67	40.66
	D:	68.33	31.1	37.23
CMS20	Sum:	136.66	58.78	77.88

Figure 3 Allocated, Mounted, and Used Storage Report

Use Case 2: Creating a High-Level List of Managed Hosts

User Goal - Create a report showing a high-level list of all managed hosts.

To create this report:

1. To find host information, select the following objects from the SRM Report Optimizer universe, and drag them into the Results Objects/Query Filters panel:

Class > Subclass(es)	Object/Filter
Host	Host Name
Host	IP Address
Host	DNS Name
Host	Model
Host	Vendor
Host	OS
Host	OS Version
Host	# of Processors

Class > Subclass(es)	Object/Filter
Host	Total Physical Memory in MB
Host > Host CIM Extension Version	Build Number
Host	Managed Hosts filter
Host	Non-Cluster Host filter

2. Click **Run Query** to run the report.

3. To find the HBA count and CIM extension versions, select the following objects from the SRM Report Optimizer universe, and drag them into the Results Objects/Query Filters panel:

Class > Subclass(es)	Class > Subclass(es)
Host > HBA	HBA Name
Host > Host CIM Extension Version	Major Version
Host > Host CIM Extension Version	Minor Version
Host > Host CIM Extension Version	Small Version

4. Create a variable named "HBA count" using the following formula:

   `=Count([HBA Name]) in ([Host Name])`

5. Drag "HBA count" to report.

6. Insert a new column named CIM Extension Version:

   a. Right-click at the end of the table.

   b. Select **Insert column after** from the Insert submenu

7. Add the following formula to the CIM Extension Version" column by double-clicking on the column, any entering the following in the edit field:

   ```
   "=If(IsNull([Major Version]) And IsNull([Minor Version]) And
   IsNull([Small Version]);" ";[Major Version]+"."+[Minor
   Version]+"."+[Small Version])"
   ```

8. Run the report.

9. This report may generate a #MULTIVALUE error or double count in the HBA Count field. To avoid this:

   a. Select **Host > Host Organization Name** and drag it to the Results Objects panel.

   b. Update "HBA count" with the following formula by double clicking on "HBA count" in the Data tab and entering the following in the edit field:

   ```
   "=Count([HBA Name]) In ([Host Name];[Host Organization Name])"
   ```

10. Run the report.

The following figure shows an example of a Host Summary Report:

Host Name	IP Address	DNS Name	Model	Vendor	OS
conquistador	16.118.237.117	conquistador.selab.usa.hp.com	sun4u	SUN	Solaris
crusader	16.118.237.116	crusader.selab.usa.hp.com	sun4u	SUN	Solaris
greyflood	16.118.235.85	greyflood.selab.usa.hp.com	sun4u	SUN	Solaris
HP-NAS	16.180.170.106	16.180.170.106	ProLiant DL585 G1	HP	Windows(R) Server 2003
hpux128hpux	16.180.170.49	16.180.170.49	9000/800/rp3440	HP	HP-UX
kenmore	16.118.236.147	16.118.236.147	sun4u	SUN	Solaris
nashak	16.118.237.79	nashak.selab.usa.hp.com	sun4u	SUN	Solaris

Figure 4 Host Summary Report

NOTE: The Host Summary Report contains additional details not visible in this figure.

Use Case 3: Reporting the Application-Specific Utilization for a Managed Application

User Goal - Create a report showing the application specific utilization for a managed application. For example, this report will show table space utilization for a database, or mail store utilization for Microsoft Exchange.

To create this report:

1. To find information about the database applications, select the following objects/filters from the Report Connector universe, and drag them into the Results Objects/Query Filters panel:

Class > Subclass(es)	Object/Filter
Host	Host Name
Host	IP Address
Application	Application with Host Name
Application > DB Application Physical Capacity - Latest	DB Logical Name
Application > DB Application Physical Capacity - Latest	DB Physical Name
Application > DB Application Physical Capacity - Latest	Total in GB
Application > DB Application Physical Capacity - Latest	Used in GB

Class > Subclass(es)	Object/Filter
Application > DB Application Physical Capacity - Latest	Free in GB
Application	Select Application with Host Name filter

2. To find information about the Exchange applications:

   a. Click **Add a combined** query.

   b. Use the default operator "UNION" to combine these two queries.

   c. Remove all the default objects except Host Name, IP Address, and Application with Host Name.

   d. Select the following objects/filters from the SRM Report Optimizer universe, and drag them onto the Results Objects/Query Filters panel. You must select these objects in the same order as for the first query.

| Class > Subclass(es)	Object/Filter
Application > Exchange Application Capacity - Latest	Storage Group Name
Application > Exchange Application Capacity - Latest	Exchange Filepath
Application > Exchange Application Capacity - Latest	Total in GB
Application > Exchange Application Capacity - Latest	Used in GB
Application > Exchange Application Capacity - Latest	Free in GB
Application	Select Application with Host Name filter

3. To find information about Virtual applications:

   a. Click **Add a combined query**.

   b. Use the default operator "UNION" to combine these three queries.

   c. Remove all the default objects except Host Name, IP Address, and Application with Host Name.

d. Select the following objects/filters from the SRM Report Optimizer universe, and drag them onto the Results Objects/Query Filters panel. You must select the objects in the same order as for the first query:

Class > Subclass(es)	Object/Filter
Application > Virtual Application Capacity - Latest	Application Path
Application > Virtual Application Capacity - Latest	Total in GB
Application > Virtual Application Capacity - Latest	Used in GB
Application > Virtual Application Capacity - Latest	Free in GB
Application	Select Application with Host Name filter

e. To have the same number and order of objects in both queries, drag Application > Vendor from the SRM Report Optimizer universe, and insert it into the Results Objects panel, between the Application Path and Total in GB objects.

The combined queries display as follows:
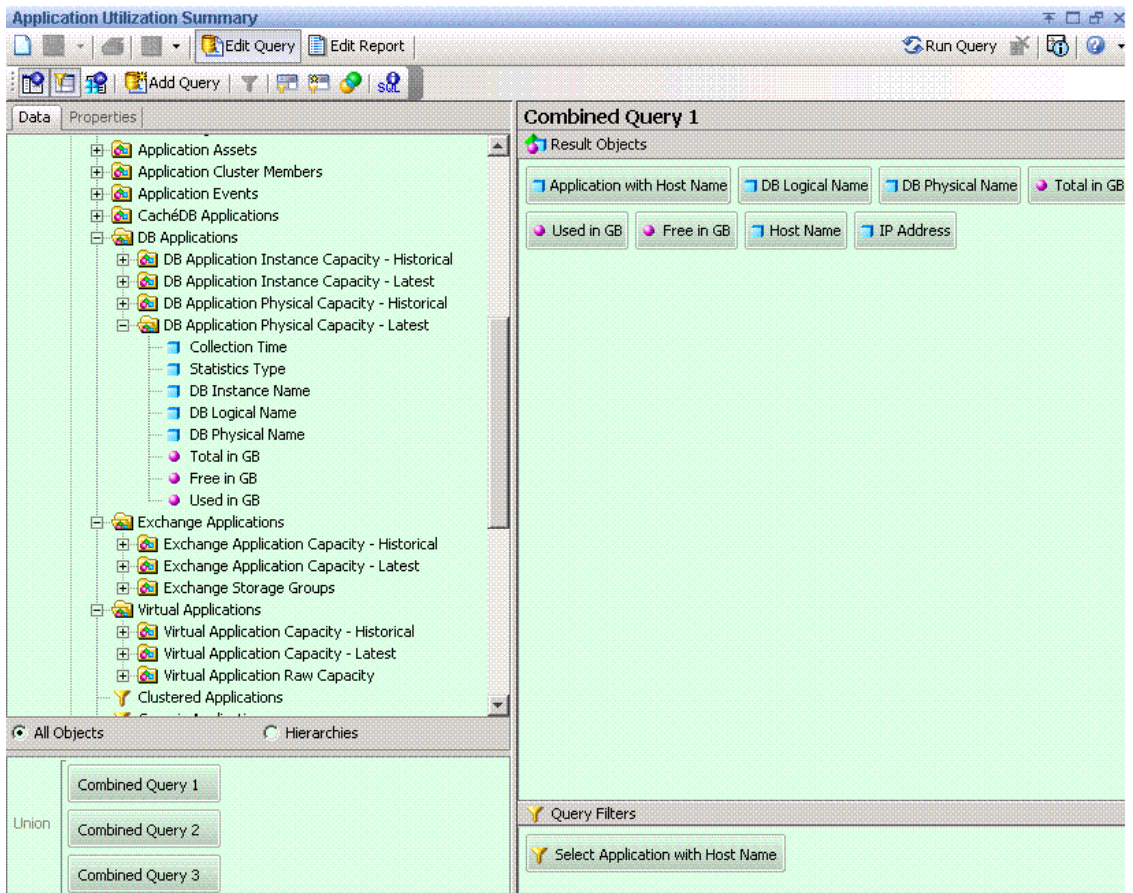
4. Run the report. The following contexts will be offered when you run the report:
   • Managed & Generic Elements: Fabric Host Application
   • Managed & Generic Elements: Storage Host Application Connectivity
   • Managed & Generic Elements: Switch Host Application Connectivity
   • Managed Elements: Application Host NAS Connectivity
   • Managed Elements: Application Host Switch Storage Connectivity
5. Select **Managed Elements: Application Host Switch Storage Connectivity**.
6. Remove unnecessary columns from the report:
   • DB Physical Name.
   • Host Name and IP Address
7. Create the necessary variables using the following formulas:

Variable Name	Formula
V_Total	=Sum([Total in GB])

Variable Name	Formula
V_Used	=Sum([Used in GB])
V_Free	=Sum([Free in GB])
% Used	=If ([V_Total]=0;0;[V_Used]/[V_Total])
% Free	=If ([V_Total]=0;0;[V_Free]/[V_Total])

- **a.** Replace content of Total in GB with V_Total.
- **b.** Replace content of Used in GB with V_Used.
- **c.** Replace content of Free in GB with V_Free.
- **d.** Drag % Used and % Free to the end column of the table.
8. Format the report:
   - **a.** Right-click these two columns: % Used and % Free
   - **b.** Select **Format Number**, and follow the Number Format dialog box instructions to set these two columns to percentage format.
   - **c.** Drag Application with Host Name to the top of the table to create the section.
9. Create totals for each application:
   - **a.** Highlight the Total in GB column and select **Sum** from the drop-down list of the Insert Sum button.
   - **b.** Highlight the Used in GB column and select **Sum** from the drop-down list of the Insert Sum button.
   - **c.** Highlight the Free in GB column and select **Sum** from the drop-down list of the Insert Sum button.
   - **d.** Select the cell under %Used and enter:

     `"=If(Sum([V_Total])=0;0;Sum([V_Used])/Sum([V_Total]))"`
   - **e.** Select the cell under % Free and enter:

     `"=If(Sum([V_Total])=0;0;Sum([V_Free])/Sum([V_Total]))"`

     Right-click these two cells and select **Format Number**, and then follow the Number Format dialog box instruction to set these two cells to percentage format.
10. Run the report.

The following figure shows an example of an Application Utilization Summary Report:

Management DB on CMS20

Name	Total in GB	Used in GB	Free in GB	% Used	% Free
BCPDATATBS	0.4883	0.0665	0.4219	13.61%	86.39%
BCPINDXTBS	0.2930	0.0401	0.2529	13.69%	86.31%
CONFIG	0.0625	0.0568	0.0057	90.82%	9.18%
CONFIG_IDX	0.0346	0.0346	0.0000	100.00%	0.00%
CURRENTDATA	0.6584	0.6582	0.0002	99.96%	0.04%
CURRENTDATA_IDX	0.2281	0.2275	0.0007	99.71%	0.29%
FSRMDATATBS	0.4883	0.1710	0.3174	35.01%	64.99%
FSRMINDXTBS	0.2930	0.0675	0.2256	23.02%	76.98%
HISTORY	0.2500	0.0001	0.2499	0.02%	99.98%
HISTORY_IDX	0.0625	0.0001	0.0624	0.10%	99.90%
MWDATATBS	0.9767	0.2990	0.6777	30.61%	69.39%
MWINDXTBS	0.5861	0.5704	0.0156	97.33%	2.67%
OIQDATATBS	0.2500	0.0045	0.2455	1.78%	98.22%
OIQINDXTBS	0.1250	0.0059	0.1191	4.69%	95.31%
RedoGroup RedoGroup 1	0.4883	0.4883	0.0000	100.00%	0.00%
RedoGroup RedoGroup 2	0.4883	0.4883	0.0000	100.00%	0.00%
RedoGroup RedoGroup 3	0.4883	0.4883	0.0000	100.00%	0.00%
RedoGroup RedoGroup 4	0.4883	0.4883	0.0000	100.00%	0.00%
RedoGroup RedoGroup 5	0.4883	0.4883	0.0000	100.00%	0.00%
SIMDATATBS	0.6002	0.6002	0.0000	100.00%	0.00%

Figure 5 Application Utilization Summary Report

Use Case 4: Reporting a Specified Number of Oldest Files for Each Volume in Each File Server

User Goal - Create a report showing a specified number of the oldest files for each volume in each file server.

To create this report:

1. To find information about file servers, select the following objects/filters from the SRM Report Optimizer universe, and drag them onto the Results Objects/Query Filters panel:

Class > Subclass(es)	Object/Filter
File Server	File Server Name
File Server > Volumes Summary	Volume Name

Class > Subclass(es)	Object/Filter
File Server > Volumes Summary > Top N Aged Files	File Name
File Server > Volumes Summary > Top N Aged Files	File Modified
File Server > Volumes Summary > Top N Aged Files	File Created
File Server > Volumes Summary > Top N Aged Files	File Owner Name
File Server > Volumes Summary > Top N Aged Files	File Accessed
File Server > Volumes Summary > Top N Aged Files	File Size in GB

2. Add database ranking to the query by clicking **Add a database ranking**:
   a. Select **Bottom** from the first drop-down list:

   b. Drag File Name to the "Drop a dimension here" field.
   c. Select **Prompt** from the second drop-down list:
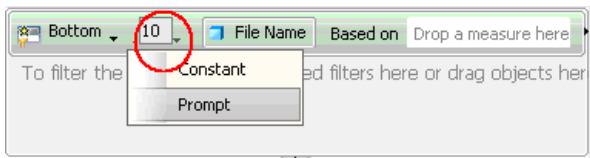
   d. Change "Bottom x File Name (Enter x)" back to "Top x File Name (Enter x)."
   e. Drag File Accessed to the "Drop a measure here" field.

f. Click the arrow button at the right end of the filter box.
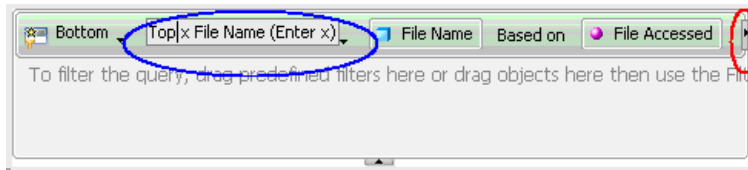
g. Drag File Name to the "drop a dimension here" field after the For Each label.

h. Drag 'File Server Name' to "drop a dimension" here" field after For Each label.

i. Drag 'Volume Name' to "drop a dimension" here" field after For Each label.
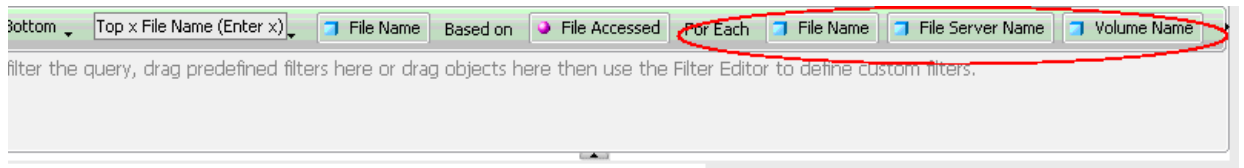
3. Create the necessary variables using the following formulas:

Variable Name	Formula
UsedResponse	=ToNumber(UserResponse("Top x File Name (Enter x)"))
File_Rank	=Rank([File Accessed]; ([File Server Name];[Volume Name];[File Name]); ([File Server Name];[Volume Name]))
Rank_Condition	=If([File_Rank]<=[UserResponse] ForAll([File Name]) ForEach([Volume Name]);1;0)

4. Add a "Rank_Condition" report filer to rank the file name based on the file access time:

   a. Click **Show/Hide filter pane**.

   b. Drag the Rank_Condition variable to the Report filter pane.

   c. Select **Not equal to** from the Operator drop-down menu and set the value to 0.
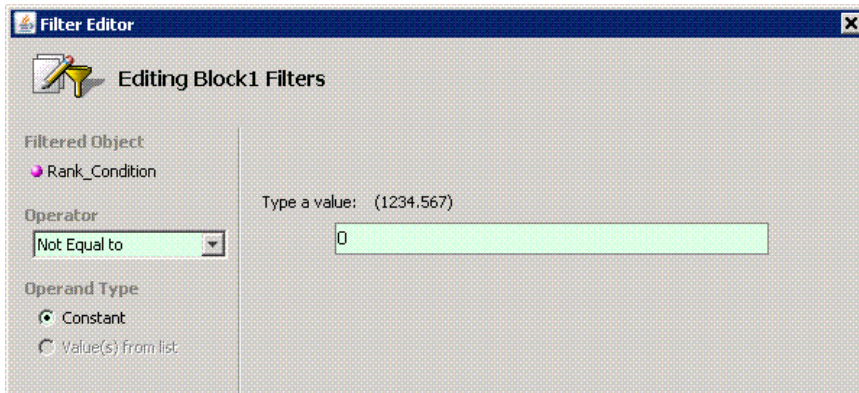
5. Drag File Server Name to the top of the table to create a section.

6. Run the report.

The following figure shows an example of a Top N Aged Files report:

	File Size in GB	File Owner Name	File Created	File Accessed	File Modified
.0_10\jre\bin\instrument.dll	0.0001	BUILTIN\Administrators	2008-06-05	2006-11-09	2006-11-09
.0_10\jre\bin\ioser12.dll	0.0000	BUILTIN\Administrators	2008-06-05	2006-11-09	2006-11-09
.0_10\jre\bin\j2pkcs11.dll	0.0001	BUILTIN\Administrators	2008-06-05	2006-11-09	2006-11-09
.0_10\jre\bin\jaas_nt.dll	0.0000	BUILTIN\Administrators	2008-06-05	2006-11-09	2006-11-09
.0_10\jre\bin\java_crw_demo.dl	0.0000	BUILTIN\Administrators	2008-06-05	2006-11-09	2006-11-09
.0_10\jre\bin\java.exe	0.0000	BUILTIN\Administrators	2008-06-05	2006-11-09	2006-11-09
.0_10\jre\bin\jawt.dll	0.0000	BUILTIN\Administrators	2008-06-05	2006-11-09	2006-11-09
.0_10\jre\bin\JdbcOdbc.dll	0.0000	BUILTIN\Administrators	2008-06-05	2006-11-09	2006-11-09
.0_10\jre\bin\jdwp.dll	0.0002	BUILTIN\Administrators	2008-06-05	2006-11-09	2006-11-09
.0_10\jre\bin\jpeg.dll	0.0001	BUILTIN\Administrators	2008-06-05	2006-11-09	2006-11-09
\hpsim.exe	0.1575	BUILTIN\Administrators	2006-01-10	2008-05-10	2005-11-24
\hpsim.icf	0.0000	BUILTIN\Administrators	2006-01-10	2008-05-10	2005-11-24
\simfinal.exe	0.0001	BUILTIN\Administrators	2006-01-10	2008-05-10	2005-11-24
\simfinal.icf	0.0000	BUILTIN\Administrators	2006-01-10	2008-05-10	2005-11-24
5sp4_032_RC4_20060201115 ad.exe	0.0001	BUILTIN\Administrators	2006-07-27	2008-05-10	2006-02-02
5sp4_032_RC4_20060201115 2000\setup.exe	0.0002	BUILTIN\Administrators	2006-07-27	2008-05-10	2006-02-02

Figure 6 Top N Aged Files Report

Use Case 5: Reporting NAS Information and Details for the Client host and Application

User Goal - Create a report showing NAS information and details for the client host and application.

To create this report:

1. To find information on NAS systems, select the following objects/filters from the SRM Report Optimizer universe, and drag them onto the Results Objects/Query Filters panel:

Class > Subclass(es)	Object/Filter
NAS	Filer Name
NAS	IP Address
NAS	DNS Name
NAS	OS
NAS	OS Version
NAS	Select NAS Hosts filter

2. Run the report.
3. Click **Add Query** to add another query.
4. To find information on NAS Client Hosts, select the following objects/filters from the SRM Report Optimizer universe, and drag them onto the Results Objects/Query Filters panel:

| Class > Subclass(es)	Object/Filter
NAS	Filer Name
NAS	Associated NAS Client Hosts filter
Host	Host Name
Host	OS
Host > Host Volumes for Dependency	Logical Volume Name
Host > Host Volumes for Dependency	Share Name

5. Click **Add Query** to add another query.

6. To find information on the applications, select the following objects/filters from the SRM Report Optimizer universe, and drag them onto the Results Objects/Query Filters panel:

Class > Subclass(es)	Object/Filter
Application	Application Name
Application	Description
NAS	Filer Name
NAS > NAS Dependent NAS Hosts	NAS Host
NAS	NAS Hosts filter

7. Drag Filer Name from the report to the top of the table to create a section.
8. Run the report.

The following figure shows an example of a NAS Dependency Report:

Figure 7 NAS Dependency Report

Use Case 6: Reporting Storage Tier Information, Hosts, and Storage Volumes

User Goal - Create a report showing the storage tier information, hosts, and storage volumes for each storage pool.

To create this report:

1. To find information on Host Storage Volumes, select the following objects/filters from the SRM Report Optimizer universe, and drag them onto the Results Objects/Query Filters panel:

Class > Subclass(es)	Object/Filter
Host	Host Name
Storage System	Vendor
Storage System > Storage System Volumes	Storage System Name
Storage System > Storage System Volumes	Storage Pool Name
Storage System > Storage Tier Information for Chargeback	Tier Name
Storage System > Storage System Assets	Storage Tier Classification
Host	Managed Hosts filter
Storage System	Managed Storage system filter

2. Click the **Add Query** to add another query.
3. To find information on Storage Tiers, select the following objects/filters from the SRM Report Optimizer universe, and drag them onto the Results Objects/Query Filters panel:

Class > Subclass(es)	Object/Filter
Host	Host Name
Host > Host Assets	Department Name
Storage System > Storage System Volumes	Storage System Name
Storage System > Storage System Volumes	Storage Pool Name
Storage System > Storage System Volumes	Storage Volume Name
Storage System > Storage System Volumes	Volume Size in GB

Class > Subclass(es)	Object/Filter
Host > HBA for Dependency > HBA Ports for Dependency	Port Name
Host > HBA for Dependency > HBA Ports for Dependency	WWN
Storage System > Storage Tier Information for Chargeback	Cost per GB
Host	Managed Hosts filter
Storage System	Managed Storage system filter

4. Run the report.
5. Create sections for Storage System Name and Storage Pool Name:
   a. Merge dimensions on Storage System Name, Storage Pool Name, and Host Name on these two queries by clicking the **Merge Dimensions** and following the screen instructions.
   b. Create a section with Storage System Name.
   c. Create a section with Storage Pool Name which is nested in the Storage System Name section.
   d. Right-click the "Storage pool name" section, and click **Remove** in the sub-menu to remove the section name only. The following message displays:
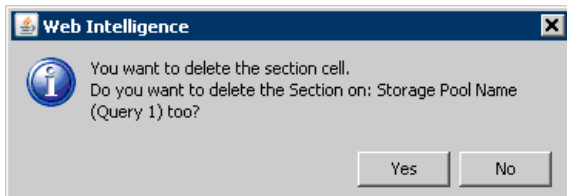
   e. Click **No** to delete the section cell (but not the section).
   f. Similarly, right-click on the "Storage system name" section, and click **Remove** in the sub-menu to remove the section name only.
6. Run the report.
7. Calculate the total cost as follows:
   a. Double-click the Cost per GB column and enter:
      "=Ceil([Volume Size in GB]*[Cost per GB])"
   b. Right-click on the Cost per GB column, and select **Format Number**.
   c. Select **Currency** in the Number Format dialog box and follow the screen to select the correct currency format.
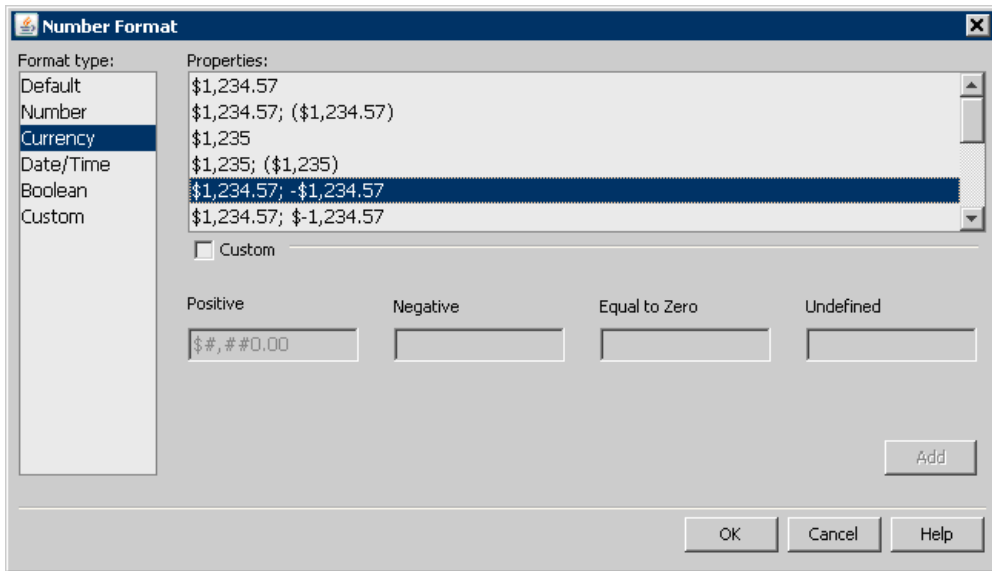
d. Rename Cost per GB to Cost.

8. Run the report.

The following figure shows an example of an Array-based Chargeback Report:

Figure 8 Array-based Chargeback Report

NOTE: This report contains additional details that are not visible in the figure.

Use Case 7: Reporting Media Utilization Trends over a Specified Period

User Goal - Create a report showing media utilization trends over a specified time period.

To create this report:

1. To find media information, select the following objects/filters from the SRM Report Optimizer universe, and drag them onto the Results Objects/Query Filters panel:

| Class > Subclass(es)	Object/Filter
Backup > Backup Manager Details	Backup Manager Name
Backup > Media Server Details	Media Server Name
Backup > Resource Summary Statistics - Historical	Collection Time

Class > Subclass(es)	Object/Filter
Backup > Resource Summary Statistics - Historical	Total Available Media
Backup > Resource Summary Statistics - Historical	Total Allocated Media
Backup > Resource Summary Statistics - Historical	Total Frozen Media
Backup > Resource Summary Statistics - Historical	Total Suspended Media
Backup > Backup Manager Details	Select Backup Manager filter
Backup > Media Server Details	Select Media Server Name filter
Backup > Resource Summary Statistics - Historical	Schedule Time Period filter

2. Create the necessary variables using the following formulas:

Variable Name	Formula
Total Allocated	=Sum([Total Allocated Media])
Total Available	=Sum([Total Available Media])
Total Frozen	=Sum([Total Frozen Media])
Total Suspended	=Sum([Total Suspended Media])

3. Replace the content of these variables
   a. Replace content of Total Allocated Media with Total Allocated.
   b. Replace content of Total Available Media with Total Available.
   c. Replace content of Total Frozen Media' with Total Frozen.
   d. Replace content of Total Suspended Media with Total Suspended.
4. Create a line graph.
   a. Select a line graph from the Templates tab, and drag it to the Results Objects panel.
   b. Drag Collection Time to "Place dimension objects here" in the line graph.

c. Drag Total Allocated, Total Available, Total Frozen, and Total Suspended to "Place measure objects here."
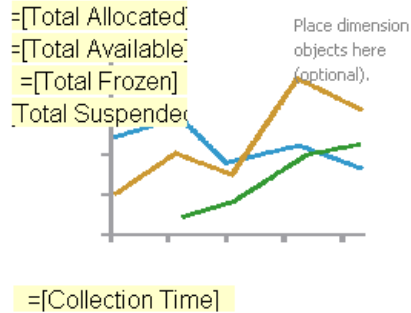
d. Uncheck the box "3D Look" under Properties > Display.

5. Run the report. When prompted, select the following fields:

The following figure shows an example of a Media Trend - Media Summary Report:

Figure 9 Media Trend - Media Summary Report

Use Case 8: Reporting all Managed Hosts without Cluster Hosts and Cluster Member Hosts

User Goal - Create a report showing the high-level list of all managed hosts without cluster hosts and cluster member hosts.

To create this report, follow the steps outlined below.

1. To find media information, select the following objects/filters from the SRM Report Optimizer universe, and drag them onto the Results Objects/Query Filters panel:

Class > Subclass(es)	Object/Filter
Host	Host Name
Host	Description
Host	Vendor

Class > Subclass(es)	Object/Filter
Host	OS
Host	OS Version
Host	Managed Hosts filter

2. Run the report.
3. Filter out the cluster host and cluster member hosts as follows:
   a. Drag the Non-Cluster Host filter from the Host class onto the query filter panel.
   b. Click **Add a Sub-query**. The sub-query dialog box displays:
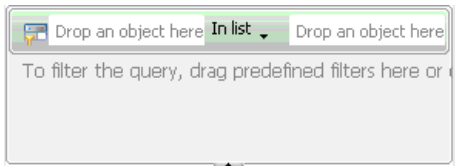
   c. Drag Host Name to the first "Drop an object here" field in the sub-query.
   d. Select **Not Equal to** from the drop-down list in the sub-query:
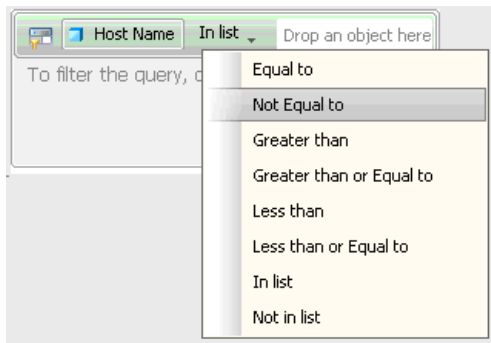
   e. Drag Member Host Name from the Host > Host Cluster Details > Cluster Node Members class, and drop it into the second drop box in the sub-query.
4. Run the report.

The following figure shows an example of a hosts report without clusters and cluster nodes:

Host Name	Description	Vendor	OS
CMS20	AT/AT COMPATIBLE	HP	Windows(R) Server 2003
conquistador	SUNW,Ultra-60	SUN	Solaris
crusader	SUNW,Ultra-60	SUN	Solaris
greyflood	SUNW,Sun-Fire-V245	SUN	Solaris
HP-NAS	AT/AT COMPATIBLE	HP	Windows(R) Server 2003
hpux128			
hpux128hpux	HP-UX Server :: PA-RISC Ver:2.0	HP	HP-UX
kenmore	SUNW,Ultra-250	SUN	Solaris
nashak	SUNW,Sun-Blade-1000	SUN	Solaris
qa61			
QA70	AT/AT COMPATIBLE	Hewlett-Packard	Windows(R) Server 2003
QA73	AT/AT COMPATIBLE	Hewlett-Packard	
qa76			
QA77	AT/AT COMPATIBLE	Hewlett-Packard	Windows(R) Server 2003
QA86	AT/AT COMPATIBLE	Hewlett-Packard	Windows(R) Server 2003
RHEL4-U6-X64	Red Hat Enterprise Linux AS release 4 (Nahant Update 6)	HP	LINUX
silverlode	SUNW,Sun-Fire-V245	SUN	Solaris
sputnik	SUNW,Ultra-80	SUN	Solaris
suni386	i86pc	SUN	Solaris
utyeuqtrwurt	SUNW,Ultra-60	SUN	Solaris
vbrd			

Figure 10 Hosts Report Without Clusters and Cluster Nodes

Use Case 9: Reporting Host capacity with Drill-down to Host Volumes

User Goal - Create a report showing host capacity for each host, and providing the ability to drill-do.wn to each host volume.

To create this report:

1. To find host capacity information, select the following objects/filters from the SRM Report Optimizer universe, and drag them onto the Results Objects/Query Filters panel:

Class > Subclass(es)	Object/Filter
Host	Host Name
Host	IP Address
Host > Host Volumes > Host Volume Capacity Statistics - Historical	Statistics type

Class > Subclass(es)	Object/Filter
Host > Host Volumes > Host Volume Capacity Statistics - Historical	Total in GB
Host > Host Volumes > Host Volume Capacity Statistics - Historical	Used in GB
Host > Host Volumes > Host Volume Capacity Statistics - Historical	Free in GB
Host	Managed Hosts filter
Host > Host Volumes > Host Volume Capacity Statistics - Historical	Latest Collection time filter

2. Drag the Host > Host Volumes > Host Volume Capacity Statistics - Historical > Statistics type to the Query Filters panel.
3. Select **Equal to** from the drop-down list.
4. Select **Value(s) from list** from the drop-down list:
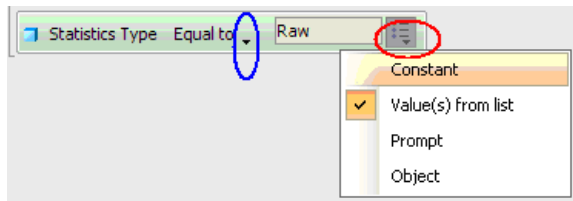
5. Select **Raw** from Statistics Type in the List of Values dialog box:
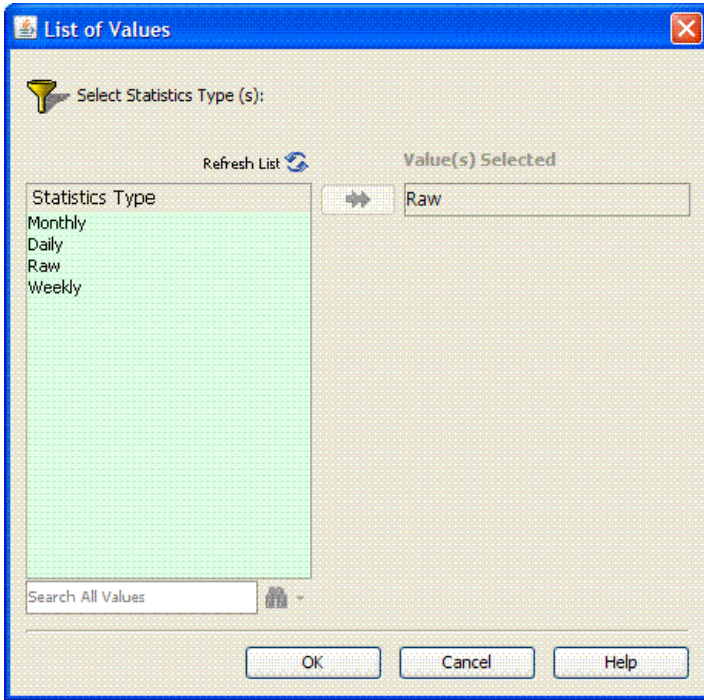
6. Create variables:

| Variable Name	Formula
Used space in GB	=Sum([Used in GB])
Free space in GB	=Sum([Free in GB])

7. Run the report.
8. Create a bar chart:
   a. Select **Vertical Grouped bar chart** from the Templates tab.
   b. Drag Free space in GB and Used space in GB to "Drop measure objects here" in the graph.
   c. Drag Host Name to "drop Dimension objects here" in the graph.
   d. Enter "Host capacity" in Title > Text under the Properties page in Edit Report.
   e. Check the Legend box under the Properties page in Edit Report.

Figure 11 Bar chart and properties page

9. Run the report.

The following figure shows a Host Capacity Report before drill-down to the host logical volume:
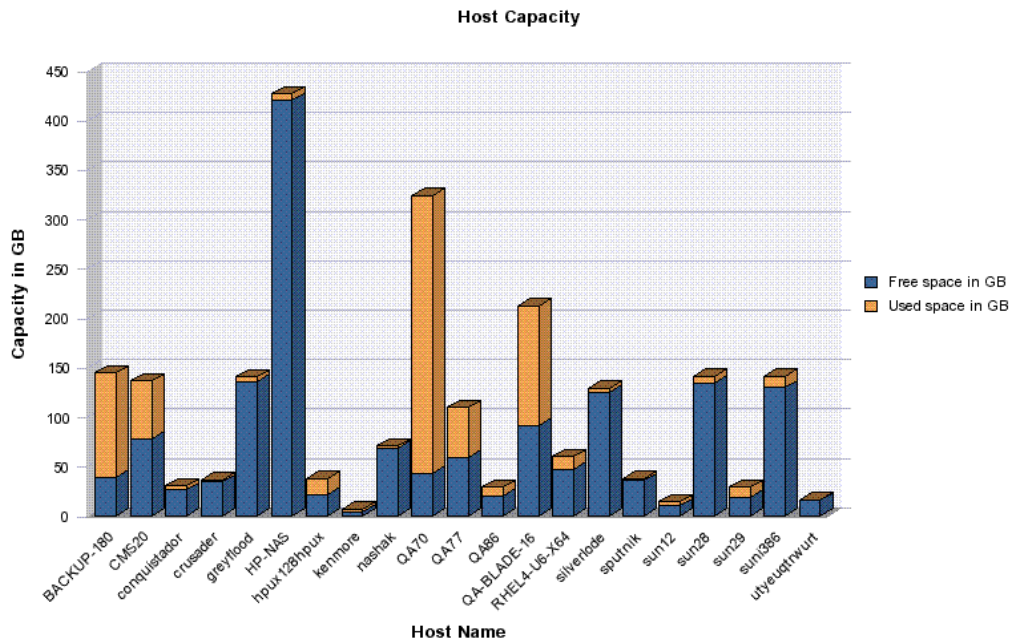
Host Capacity

Host Name	Total space in GB	Used space in GB	Free space in GB
BACKUP-180	144.55	105.04	39.5
CMS20	136.66	58.75	77.91
conquistador	30.69	4.22	26.46
crusader	36.76	1.99	34.76

Figure 12 Host Capacity Before Drill-down to the Host Logical Volume

1. To drill down to the details for a host volume, click the **Drill** in "Edit Report."
2. Click one of the host names to show the host logical volumes for the selected host, along with the total, used, and free for each volume.

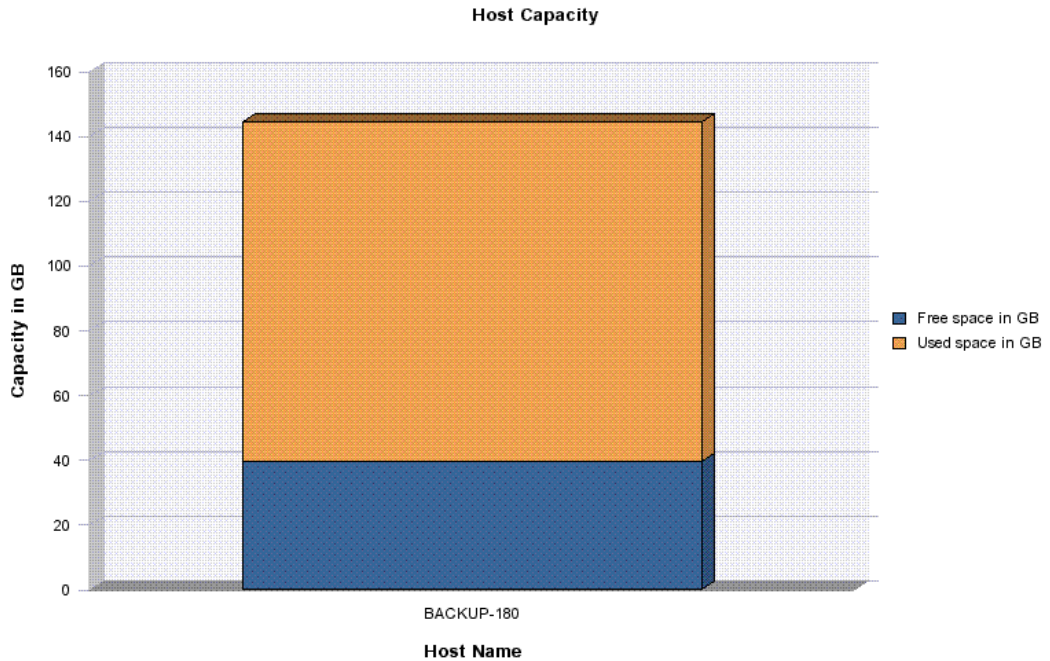The following figure shows a Host Capacity Report with drill-down to host logical volumes:

Host Capacity

1.

Logical Volume Name	Total space in GB	Used space in GB	Free space in GB
C:	14.99	5.94	9.06
Y:	74.56	44.21	30.35
Z:	55	54.9	0.09

Figure 13 Host Capacity with drill-down to host logical volumes

Use Case 10: Reporting Top N EVA Performance.

User Goal - Create a report showing performance statistics for the top HP EVA arrays.

To create this report:

1. To find EVA storage system statistics, select the following objects/filters from the SRM Report Optimizer universe, and drag them onto the Results Objects/Query Filters panel:

Class > Subclass(es)	Object/Filter
Storage System > Performance Statistics > EVA > EVA Storage System Statistics - Historical	Collection Time
Storage System > Performance Statistics > EVA > EVA Storage System Statistics - Historical	Statistics Type

| Class > Subclass(es)	Object/Filter
Storage System > Performance Statistics > EVA > EVA Storage System Statistics - Historical	Duration (Sec)
Storage System > Performance Statistics > EVA > EVA Storage System Statistics - Historical	Total Data Rate (bytes/sec)
Storage System > Performance Statistics > EVA > EVA Storage System Statistics - Historical	Total I/O rate (req/sec)
Storage System	Storage System Name
Storage System > Performance Statistics > EVA > EVA Storage System Statistics - Historical	Latest Collection Time for Each Statistics Type filter
Storage System > Performance Statistics > EVA > EVA Storage System Statistics - Historical	Select Collection Time Range filter
Storage System > Performance Statistics > EVA > EVA Storage System Statistics - Historical	Statistics Type filter

2. Drag Storage System > Performance Statistics EVA > EVA Storage System Statistics - Historical >Statistics Type to the Query Filter panel,

   a. Select **Equal to** from the first drop-down list.
   b. Select **Prompt** from the second drop-down list.

3. Create a ranking prompt to allow users to enter the value:

   a. Click **Add a database Ranking**.
   b. Drag Storage System Name from the Storage System class to the "Drop a dimension here" field.
   c. Select **Prompt** from the first drop-down list.
   d. Drag Total Data Rate (Bytes/Sec) to the "Drop a measure here" field.
   e. Click the arrow at the end of the query filter frame.
   f. Drag Storage System Name, Statistics Type, and Collection Time to the "Drop a dimension here" field.
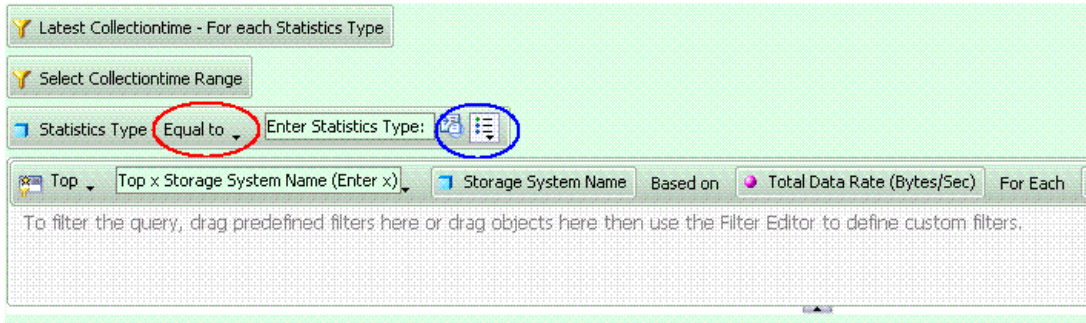
4. Create the necessary variables using the following formulas:

Variable Name	Formula
UserResponse	=ToNumber(UserResponse("Top x Storage System Name (Enter x)"))
Rank_dataRate	Rank([Total Data Rate (Bytes/Sec)];([Storage System Name];[Statistics Type]);([Statistics Type]))
Rank_Condition	If([Rank_dataRate]<=[UserResponse] ForAll([Storage System Name]) ;1;0)

5. Create a ranking condition in the report:
   a. Click **Show/Hide Filter pane**.
   b. Drag the Rank_Condition variable to the Report Filters panel.
   c. Select **Not equal to** from the "Operator" drop-down list and set its value to 0 in the "Type a value" text field.
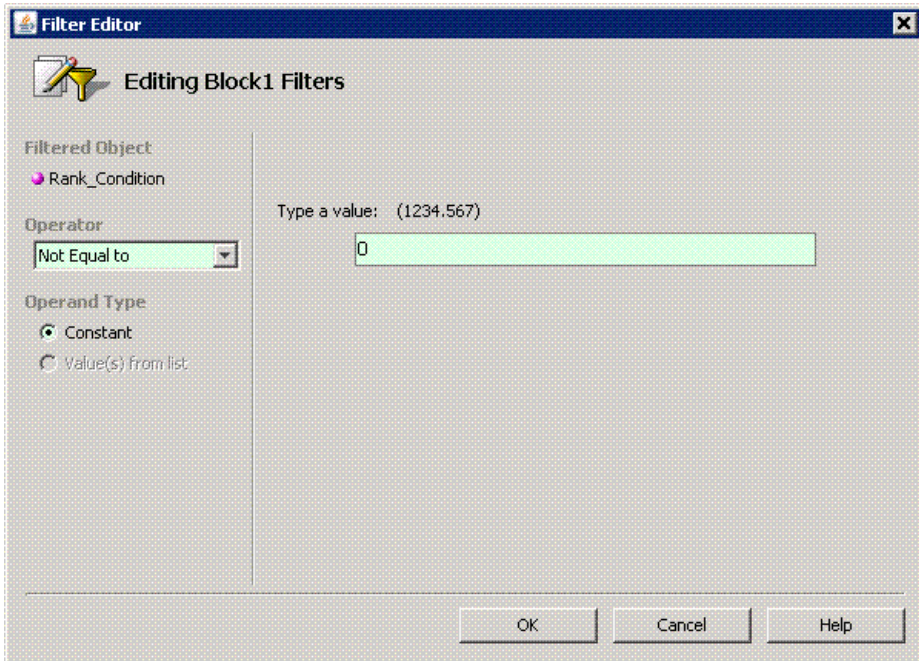
6. Run the report.

The following figure shows a Top N EVA Performance Report:

Top 10 EVA Performance

Storage System Name	Statistics Type	Duration (Sec)	Total Data Rate (Bytes/Sec)	Total IO Rate (Req/Sec)
eva4k-hyd	Raw	598,812	0	0
HYD_EVA_3000	Raw	3,600,000	68,013,056	1,007

Figure 14 Top N EVA Performance Report