

# HP OpenView Storage Area Manager Fundamentals

ESG4382LG0311





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ESG4382LG0311

HP Training

# Lab guide

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**HP OpenView Storage Area Manager Fundamentals**

Lab Guide

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The labs for this course consist of two types:

- **Hands-on practices** — Designed to familiarize you with the Storage Area Manager GUI and give you practical experiencing using key features and functionality. Practices require either real equipment, the Storage Area Manager demo/simulation, or both.
- **Customer scenario activities** — Developed to demonstrate and test your knowledge regarding how Storage Area Manager can be applied in real-life situations to solve actual business problems. These activities do not require any actual tasks to be performed but do require access to Storage Area Manager (actual installation or simulation) to refer to specific screens. Answers to the customer scenarios immediately follow the activities.



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# Recommending a solution

Lab 1

## Objectives

After completing this lab, you should be able to review a customer scenario and recommend an appropriate solution based on HP OpenView Storage Area Manager.

## Requirements

This exercise requires *HP OpenView Storage Area Manager Fundamentals*, Module 1, “Introduction”.

## Customer scenario activity: ACME Corporation

The ACME Corporation is an insurance broker with hundreds of partner offices (franchise agencies). They have several organizations to support.

Organization	Size	Purpose
Corporate management	0.5 TB	Decision support and contractual data
Finance	2 TB	Enterprise Resource Planning and insurance tariff database
Marketing	2.5 TB	Decision support (data warehouse) and centralized customer database
Web services	0.3 TB	B2C and B2B gateways and database front end
Accounting and controlling	1.8 TB	Partner (insurance companies and agencies) and customer contract and account information
Agency support (back office)	0.9 TB	Agency support and software maintenance and distribution
Messaging	2.8 TB	Support of mailboxes and archive

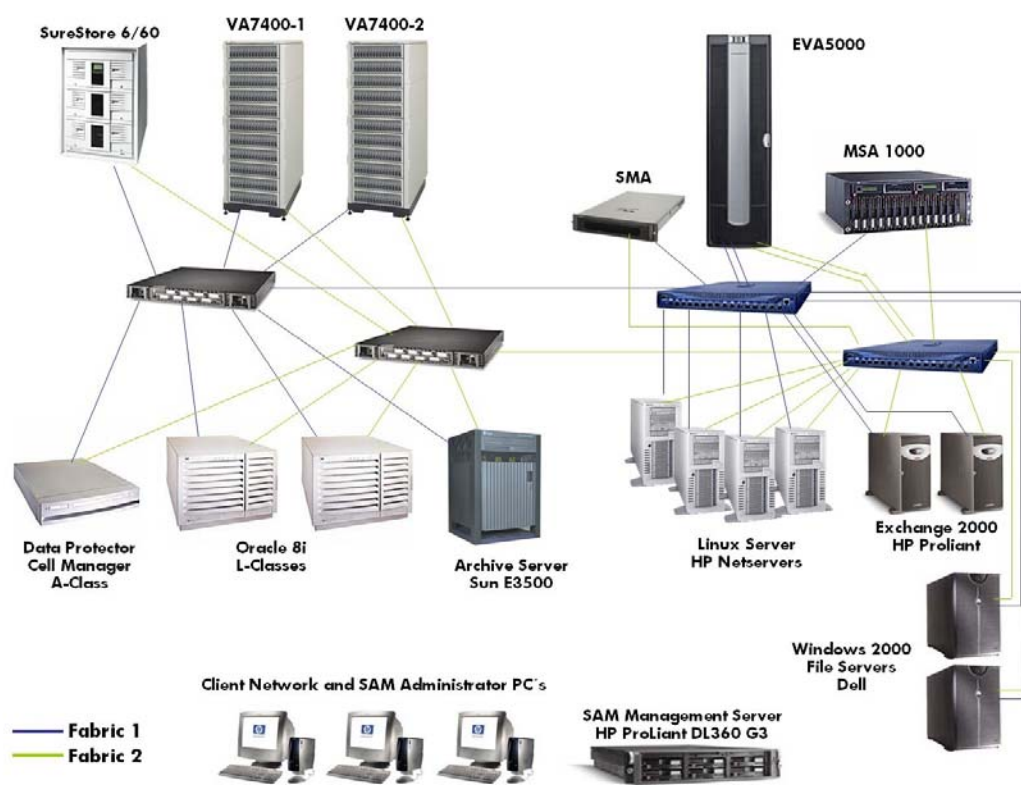
### Customer environment

ACME Corporation has recently purchased a SAN containing two VA74000s, an EVA5000 for storage consolidation, several MSA1000s for cluster storage, a SAN management appliance with Business Copy for creating snapclones for backups, and a secondary storage solution using Data Protector with Zero Downtime Backup. This installation was done into an environment with an existing EMC Symmetrix 3000 and Microsoft Windows 2000 servers.

Historically, all agencies (or geographies) were supported on dedicated Windows servers connected to the remote offices, resulting in a total of about 70 Windows 2000 file servers. Most of them are still running direct attached storage (DAS). ACME Corporation has plans for storage consolidation and migration to the SAN environment.

The business critical systems like Oracle 8i, MS Exchange 2000, Web Services, and some of the larger file servers have already been migrated to the SAN environment to improve performance, availability, and backup speed.

Frequently used data or data with higher availability requirements resides on the EVA 5000, while less frequently used data is moved to the MSA1000 in order to reduce storage costs. Exchange is exclusively run on the EVA5000.



The ACME Corporations current SAN infrastructure

## Customer requirements

Because ACME Corporation is still running about 70 DAS systems in addition to the depicted SAN environment, one of the key requirements is centralized monitoring of all storage and storage related components in use, regardless of the type of attachment.

ACME Corporation wants to capitalize on the more cost-effective use of storage provided by SAN environments. As such, ACME Corporation must gather capacity and performance information that facilitate decision-making about the order that the DAS systems should be migrated to the SAN.

In the past, ACME Corporation has been very reactive regarding purchase decisions. They hope to change this trend by gaining knowledge about the performance bottlenecks and capacity issues in their environment and having a reliable way to predict future storage growth.

ACME Corporation is moving toward having a policy-based IT organization that acts as an independent profit center. Therefore, one of the main goals is the implementation of Service Level Agreements (SLAs) with uptime guarantees being one important factor. Staff and process efficiency and effectiveness are key elements in meeting this goal.



## The solution recommendation

Based the on the customer requirements, which Storage Area Manager applications would you recommend implementing? For each application you recommend, list a customer requirement or issue that is addressed.

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## Customer scenario activity: answer

Based on ACME Corporation requirements, the recommended Storage Area Manager applications are:

- Storage Node Manager
  - Centralized monitoring of the environment
  - Management application launching
- Storage Optimizer
  - Performance monitoring to facilitate to support SLA goals and more proactive purchase decisions
- Storage Builder
  - Capacity monitoring to facilitate decision making about the order hosts should be moved to the SAN
- Storage Accountant
  - Ability to bill for storage use enables the IT organization to act as a profit center

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# Verifying the environment

## Lab 2

### Objectives

After completing this lab, you should be able to:

- Review a customer scenario and verify that the SAN environment is properly prepared for a Storage Area Manager installation
- Identify aspects of the customer environment that can pose potential issues for Storage Area Manager installations
- Identify aspects of the customer environment that require additional setup tasks to be performed

### Requirements

This exercise requires the following resources:

- *HP OpenView Storage Area Manager Supported Components and Configurations Guide* (available with your course materials)
- HP OpenView DPI website: <http://www.openview.hp.com/products/SAM/>
- *HP OpenView Storage Area Manager Installation Guide*:  
[http://ovweb.external.hp.com/lpe/doc\\_serv/](http://ovweb.external.hp.com/lpe/doc_serv/)
- *HP OpenView Storage Area Manager Fundamentals*, Module 7: “Verifying the SAN Environment”

## Customer scenario activity: the ACME Corporation environment

You have been assigned to implement Storage Area Manager for ACME Corporation. The first step in the implementation process is to verify that Storage Area Manager supports the devices and configurations in the ACME Corporation environment. The final step is to identify aspects of ACME environment that require additional Storage Area Manager setup and configuration tasks.

### Activity directions

In this activity you will validate *portions* of the SAN Verification Worksheet that have been filled out for Acme Corporation. Validate the specific devices on each sheet that are listed in **bold**. To demonstrate some of the common issues that arise in customer implementations of Storage Area Manager, problems and compatibility issues have intentionally been included.

1. Choose **two** of the following worksheets to validate:
  - SAM Hosts
  - Hosts and Server
  - Attached Storage
  - Fabric Devices
  - Other Software
  - Network
2. Note any issues, incompatibilities, or red flags that should be addressed before proceeding with the implementation of Storage Area Manager. Record your notes on the issues list provided at the end of the exercise.
3. Use the “To Do” section of the issues list to comment on any additional items that go beyond software/firmware version and compatibility issues, such as:
  - Configuration items that require further investigation
  - Additional customer recommendations
4. Use the “Task List” section of the list to identify tasks that should be completed after the management server and Host Agent have been successfully installed.
5. When verification is complete, compare your issues list with the instructor and the other students.

## SAN verification worksheet: OV SAM hosts

Acme Corporation plans to use the following systems for a Storage Area Manager management server and management clients. Verify that Storage Area Manager supports the resources in **bold**.

- One management server: **MGR01**
- Three management clients: **CLIENT01**, CLIENT02, CLIENT03
- One storage management appliance (for CommandView EVA)

Section 1.0: SAM Management Server				
Instructions: Fill in the required information for each system that will act as an OV SAM management server				
Computer Name <b>MGR01</b>	OS Windows 2000	SP (W2K/NT) SP3	RAM 512Mb	Model HP Proliant DL380
NIC 1 (yes or no) Yes	NIC 2 (yes or no) Yes	SAM Modules Storage Node Manager	SAM Bridge Active (Yes/No) Yes	Disk 1, Size/Free 80Gb / 60Gb
NIC Type (Ethernet/FC) FC	NIC Type (Ethernet/FC) Ethernet	Storage Accountant	SAM Bridge Port 8041	Disk 2, Size/Free
IP Address	IP Address 156.16.7.99	Storage Builder	OV Integration Modules OVO for Windows	Disk 3, Size/Free
FC HBA 1    PCI_x   Other Agilent HHBA5220A	FC HBA 2    PCI_x   Other	Storage Optimizer	OVO Service Maps	Disk 4, Size/Free
HBA 1 Driver 3. 5. 15. 18	HBA 2 Driver		OV Reporter	
HBA 1 FW N/A	HBA 2 FW			SAM IP Discovery Range 156.16.7.49 - 156.16.7.99
				root/admin User id & Password Administrator / ovsam

Section 2.0: SAM Clients				
Instructions: Fill in the required information for each system that will act as an OV SAM client				
Computer Name <b>CLIENT01</b>	OS Windows XP Professional	SP (W2K/NT) SP 4	RAM 512MB	Model Unknown
NIC 1 (yes or no) Yes	NIC 2 (yes or no)			Disk 1, Size/Free 80Gb / 40Gb
NIC Type (Ethernet/FC) Ethernet	NIC Type (Ethernet/FC)			
IP Address Unknown	IP Address			

Validate information on the worksheet against the *HP OpenView Storage Area Manager Supported Components and Configuration Guide*. Use the following sections:

- 3.1 - Management Servers and Clients
- 3.2 - SAN Hosts

Validate system requirements, operating system, patch versions, disk and memory requirements, as well as the Fibre channel HBA model, driver, and firmware.

The IP discovery range should include the IP subnets that have SAN devices (SAN-attached disk and tape storage). It should not normally include the subnets for SAN host systems.

## SAN verification worksheet: Hosts & servers

Acme Corporation has the following systems connected as hosts in the SAN.  
Verify that Storage Area Manager supports the resources in **bold**.

- Two HP9000 L-class servers running HP-UX 11.0 and Oracle 8i: **HPUX01**, **HPUX02**
- One Sun Enterprise E3500 running Solaris 2.7 as archive server: **ULTRA01**
- Two HP ProLiant servers running Exchange 2000 on Windows 2000
- One HP9000 A-Class server running HP-UX 11.0i, acting as HP OpenView Data Protector cell manager and also running Command View SDM
- Four HP NetServers running Red Hat Linux, acting as web server farm
- Two Dell servers running Windows 2000 file servers (one running the MSA 1000 ACU)

Section 4.0: Hosts & Servers				
Instructions: Fill in the required information for each Host, Server member of the SAN to be certified.				
Computer Name <b>HPUX01</b>	OS HP-UX 11.00	SP (W2K/NT)	RAM 3.25GB	Model T600 Class
NIC 1 (yes or no) Yes	NIC 2 (yes or no) No	NIC 3 (yes or no) No	Patches PHKL_23939, All JRE Patches	OVPA / MVA Agent (yes/no) Yes
NIC Type (Ethernet/FC) FC	NIC Type (Ethernet/FC)	NIC Type (Ethernet/FC)		OVPA / MVA Version C.03.35
IP Address	IP Address	IP Address		OVPA / MVA Install Directory /opt/perf
FC HBA 1 PCI__x__Othr__ A3740A	FC HBA 2 PCI__Other__	FC HBA 3 PCI__Other__		root/admin User id & Password
HBA 1 Driver B.11.11.03	HBA 2 Driver	HBA 3 Driver		
HBA 1 FW N/A	HBA 2 FW	HBA 3 FW		

Computer Name <b>HPUX02</b>	OS HP-UX 11.11	SP (W2K/NT)	RAM 3.25GB	Model C3000
NIC 1 (yes or no) Yes	NIC 2 (yes or no) No	NIC 3 (yes or no) No	Patches All JRE Patches	OVPA / MVA Agent (yes/no) Yes
NIC Type (Ethernet/FC) FC	NIC Type (Ethernet/FC)	NIC Type (Ethernet/FC)		OVPA / MVA Version C.03.35
IP Address	IP Address	IP Address		OVPA / MVA Install Directory /opt/perf
FC HBA 1 PCI__Other__ TACHYON A5158A	FC HBA 2 PCI_X__Other__	FC HBA 3 PCI_X__Other__		root/admin User id & Password
HBA 1 Driver B.11.30.10	HBA 2 Driver	HBA 3 Driver		
HBA 1 FW N/A	HBA 2 FW	HBA 3 FW		

Computer Name <b>ULTRA01</b>	OS Solaris 7	SP (W2K/NT)	RAM 3.25GB	Model Enterprise 3500
NIC 1 (yes or no) Yes	NIC 2 (yes or no) No	NIC 3 (yes or no) No	Patches J2SE Solaris 7 Patch cluster	OVPA / MVA Agent (yes/no) Yes
NIC Type (Ethernet/FC) FC	NIC Type (Ethernet/FC)	NIC Type (Ethernet/FC)		OVPA / MVA Version C.03.35
IP Address	IP Address	IP Address		OVPA / MVA Install Directory /opt/perf
FC HBA 1 PCI_X__Other__ Qlogic QLA2202F/66	FC HBA 2 PCI__Other__	FC HBA 3 PCI__Other__		root/admin User id & Password
HBA 1 Driver V3.16	HBA 2 Driver	HBA 3 Driver		
HBA 1 FW BIOS rev 1.17.1	HBA 2 FW	HBA 3 FW		

Validate the information on this worksheet against the following documents:

- *HP OpenView Storage Area Manager Supported Components and Configuration Guide*. Use the following sections:
  - 3 – Installation Platforms
  - 4 – Software Applications

## SAN verification worksheet: Attached storage

Acme Corporation is using the following storage and associated software in their environment. Verify that Storage Area Manager supports the resources in **bold**.

- SAN attached disk storage
  - **Two HP Virtual Array 7400 disk arrays (high availability of Oracle data provided by software mirroring using HP Mirror UX)**
  - **One HP Enterprise Virtual Array 5000**
  - One HP Modular SAN Array 1000
- EMC Symmetrix 3930
- SAN attached tape storage: One HP Tape Library 6/60 LTO for backup
- Direct Attached Devices: None
- Storage device software
  - CommandView SDM (Server & Host)
  - CommandView EVA
  - MSA1000 ACU-XE
  - Tape Library Manager

### Section 5.0: SAN Attached Disk Storage \*\*

Instructions: Fill in the information for all Disk Storage Devices attached to the SAN being certified

Disk Device Name VA7400-1	Vendor HP	Model A6189A	# LUNs & Mode: 12 / 0	Firmware HP12
	IP Address / Usage	IP Address / Usage		
Disk Device Name VA7400-2	Vendor HP	Model A6189A	# LUNs & Mode: 12 / 0	Firmware HP15
	IP Address / Usage	IP Address / Usage		
Disk Device Name EVA	Vendor HP	Model 5000	# LUNs & Mode:	Firmware vcs 2.0
	IP Address / Usage	IP Address / Usage		

### Section 9.0: Total LUNs and Storage

Instructions: Use the \_\_\_ to calculate the total number of LUNs. Also calculate total storage

Total LUNs	320
Total Storage	10.8TB



Validate the information on this worksheet against the following documents:

- *HP OpenView Storage Area Manager Supported Components and Configuration Guide*. Use the following sections:
  - 4 - Software Applications
  - 7 - Supported Devices
- *DPI Readme Documents*. These documents are included with each DPI and contain critical information regarding which Storage Area Manager applications are supported, which Storage Area Manager features are supported, the required driver/firmware revisions, and so on.

The DPI Readmes are available from the HP OpenView DPI website at **<http://www.openview.hp.com/products/SAM/>**.

## SAN verification worksheet: Fabric devices

Acme Corporation is using the following fabric devices in their environment. Verify that Storage Area Manager supports the devices in **bold**.

- Two Brocade Silkworm 2400, 1 Gb Fibre channel switches: **SAN1-24kA**, SAN2-24kA
- Two HP 16b, 2 Gb Fibre channel switches, SAN1-16bA, SAN2-16bA
- One MSA Fabric Switch 2/8 (embedded in MSA1000): MSA 1000
- **Zoning**: Implemented to support dual SANs for redundancy

### Section 10.0: Switch Setup

Instructions: Provide info for what is connected to each port on the switch. Also advise what GBIC type and cable type is used.

Switch #1 Name SAN1-24kA	Vendor HP	Model Silkworm 2400	Type edge, 1Gb	Firmware 2.4.1
Port 0 SureStore 6/60	Port 1 VA7400-1	Port 2 VA7400-2	Port 3 A-Class	Port 4 L-Class
Port 5 L-Class	Port 6 Sun E3500	Port 7 Silkworm 2400	Port 8 SAN1-16bA (fc switch)	Port 9 MSA 1000
Port 10	Port 11	Port 12	Port 13	Port 14
Port 15	Port 16	Port 17	Port 18	Port 19
Port 20	Port 21	Port 22	Port 23	Port 24
Port 25	Port 26	Port 27	Port 28	Port 29
Port 30	GBIC Type	Cable (fiber/copper/size)	Can a "SupportShow" log be provided to us for review? N/A	IP Address 156.17.7.21

### Section 11.0: Switch Zoning

Instructions: For each zone, indicate what elements are present in the zone.

Zone Name Exchange Zone	Zone Name Cluster Zone	Zone Name
Elements in the zone: Exchange Servers	Elements in the zone: Linux Systems	Elements in the zone:
SMA	20 LUNs - MSA 1000's	
30 LUNs - EVA 5000	40 LUNs - EMC3930	
	30 LUNs - VA74000's	
	Windows File Servers	
	HP 9000's	
	SureStore 6/60	
	Sun E3500	

Validate the information on this worksheet against the *HP OpenView Storage Area Manager Supported Components and Configuration Guide*. Use section 7.1 – Interconnect Devices.

## SAN verification worksheet: Other software

Acme Corporation is using the following software. Verify that Storage Area Manager supports the products and versions:

- **HP OpenView Reporter**
- **HP OpenView Data Protector**
- **Oracle 8i**
- **Microsoft Exchange 2000**

### Section 12.0: Other Software

Instructions: List all other software that is being used to manage or gather information about the SAN

Software Name	Revision	Purpose	System
Reporter	A.03.00	System & App Mgmt	OVWIN
Data Protector	A.05.00	Backup	OMNI <A-Class system>
Oracle 8i	8.1.7.4	Database	HP-UX L-Class systems
Microsoft Exchange 2000		Mail	Windows 2000 servers

Verify the information in this worksheet against the *HP OpenView Storage Area Manager Supported Components and Configuration Guide*. Use section 4 – Software Applications.

## SAN verification worksheet: network

Acme Corporation has their network set up according to the following information. Verify Storage Area Manager supports Acme Corporations firewall configuration.

### Section 13.0: Network Information

Instructions: Provide the following information concerning the networks associated with your SAN and SAN Host systems

#1 DNS Server Name ns1.jackson.nworks.net	#1 DNS Server IP Address 156.22.185.3	#1 IP Subnet Addr 156.22.185.0	#1 IP Subnet Mask 255.255.255.0	#1 IP Subnet Usage Jackson site
#2 DNS Server Name ns2.jackson.nworks.net	#2 DNS Server IP Address 156.22.132.2	#2 IP Subnet Addr 156.22.132.0	#2 IP Subnet Mask 255.255.255.0	#2 IP Subnet Usage Jackson site backup
DHCP Server Name ITPDC/156.22.185.1	DHCP Server IP Address	#3 IP Subnet Addr	#3 IP Subnet Mask	#3 IP Subnet Usage
#1 Windows Domain nworks	#1 Windows Domain PDC ITPDC/156.22.185.1	#1 Windows Domain Usage Company wide Domain		
#2 Windows Domain	#2 Windows Domain PDC	#2 Windows Domain Usage		

### Section 14.0: Firewalls

Instructions: Provide information concerning firewalls that could affect communication within the SAN or between the SAN and host systems

Firewall #1 Name firewall.acme.local	Firewall #1 IP Addresses	Make / Model Symantec Enterprise Firewall	Version 7.0	Type (Port Filtering / NAT) Port Filtering & NAT
Firewall #1 Role (Describe firewall role)				
Firewall #2 Name	Firewall #2 IP Addresses	Make / Model	Version	Type (Port Filtering / NAT)
Firewall #2 Role (Describe firewall role)				

Validate the information on this worksheet against the *Storage Area Manager 3.1 Installation Guide*.

## Issues and task lists

Use the space below to note the issues you found while performing the verification of ACME Corporations environment. Write your entries in the form: **<device name>: <problem description>**

### SAM hosts

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### Hosts and servers

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### Attached storage

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**Fabric devices**

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**Other software**

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**Network**

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## Customer scenario activity: answers

### **SAM hosts**

- MGR01: OV SAM management server memory shortage
- MGR01: Recommend separate disks for database performance
- MGR01: HBA card not supported. This card was supported on previous versions of Storage Area Manager
- MGR01: Discovery range does not include the FC switch

### **Hosts and servers**

- HPUX01: Patch PHKL\_23939 is required with HBA A3740A
- HPUX02: C3000 is not listed as a supported hardware platform
- HPUX02: HBA Driver version is not yet supported
- HPUX01, HPUX02, ULTRA01: OVPA agent needs to be updated for Optimizer

### **Attached storage**

- VA7400-1, VA7400-2: Firmware needs to be updated
- EVA: Firmware needs to be updated

### **Fabric devices**

- SAN1-24kA: Switch firmware revision not supported

### **Other software**

- None

### **Network**

- DHCP Server in Use (could be a problem if SAN host IP addresses are DHCP assigned)
- NAT, Need to insure that network address translation is not in use between the SAM management server and host agent systems.





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# Installing Storage Area Manager

## Lab 3

### Objectives

After completing this lab, you should be able to:

- Install the Storage Area Manager management server
- Deploy Host Agent software and perform setup tasks using the Setup Assistant
- Install Storage Area Manager patches, if applicable
- Install DPIs
- Install and authorize management clients

### Requirements

This exercise requires the following resources:

- Classroom lab equipment
- *HP OpenView Storage Area Manager Fundamentals*, Module 8, “Installation”
- *HP OpenView Storage Area Manager Fundamentals*, Module 9, “Device Plug-ins”

## Hands-on practice: installing Storage Area Manager

1. Log on to the system on which the Storage Area Manager management server will be installed.
2. Close all Microsoft Windows applications and disable any antivirus programs before continuing with the Storage Area Manager installation.
3. Insert the Storage Area Manager CD-ROM in the drive.
  - If autorun is enabled, the Installation wizard automatically starts and the Introduction window displays.
  - If autorun is disabled, run `Setup.exe` from the CD-ROM. This file is located in the root directory of the CD-ROM. The Introduction window displays.

---

### Note

You must have administrator privileges for this system to install and start Storage Area Manager.

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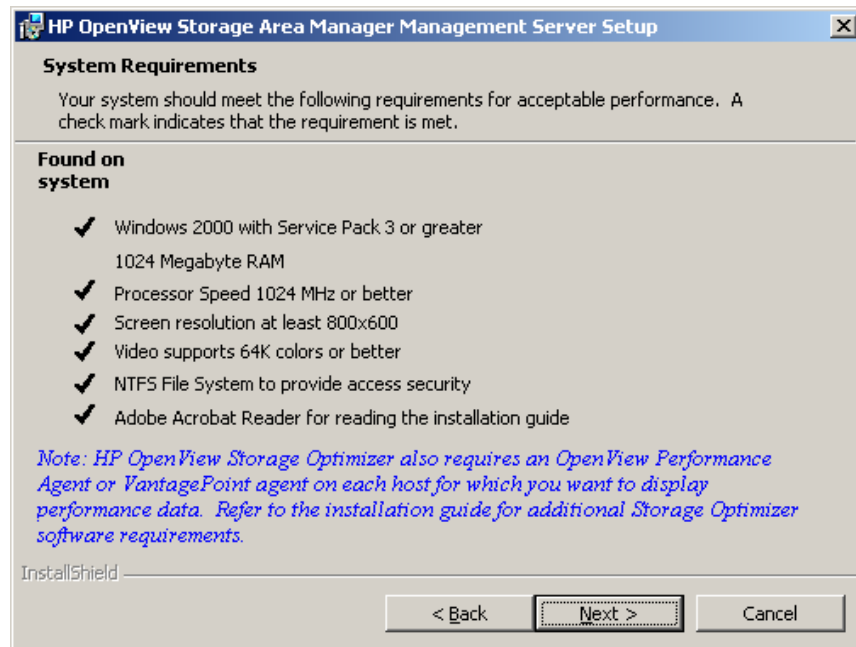
4. Click the *Install OpenView Storage Area Manager* link. The Welcome screen displays.



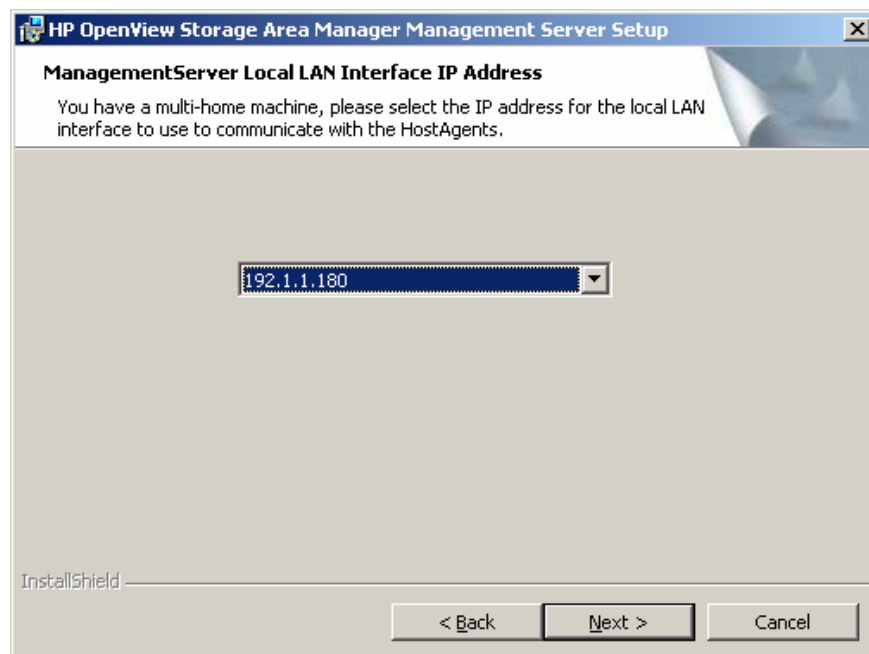
5. Click the *Next* button to continue. The License Agreement window displays.



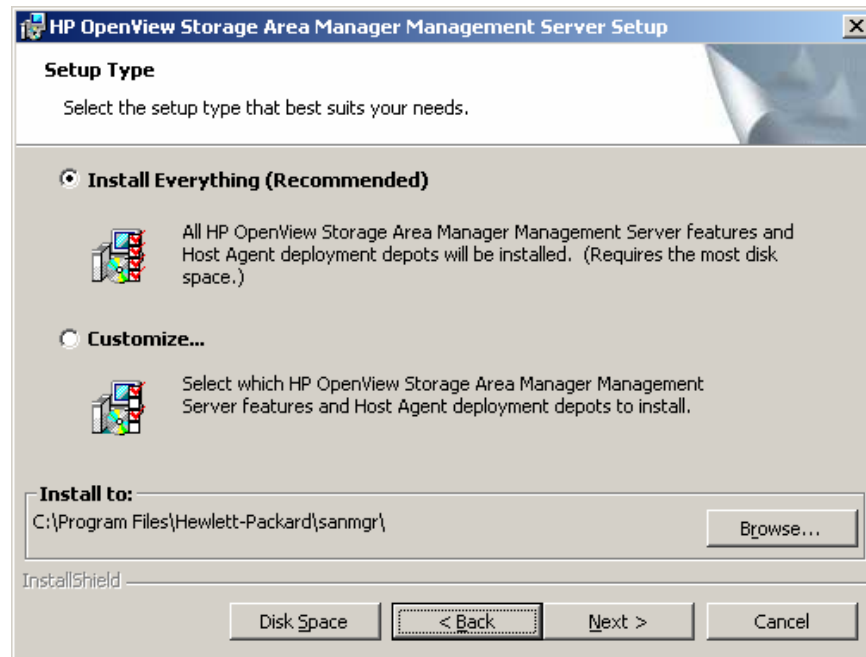
6. Select *I accept the terms in the license agreement* and click *Next* button. The System Requirements windows displays.



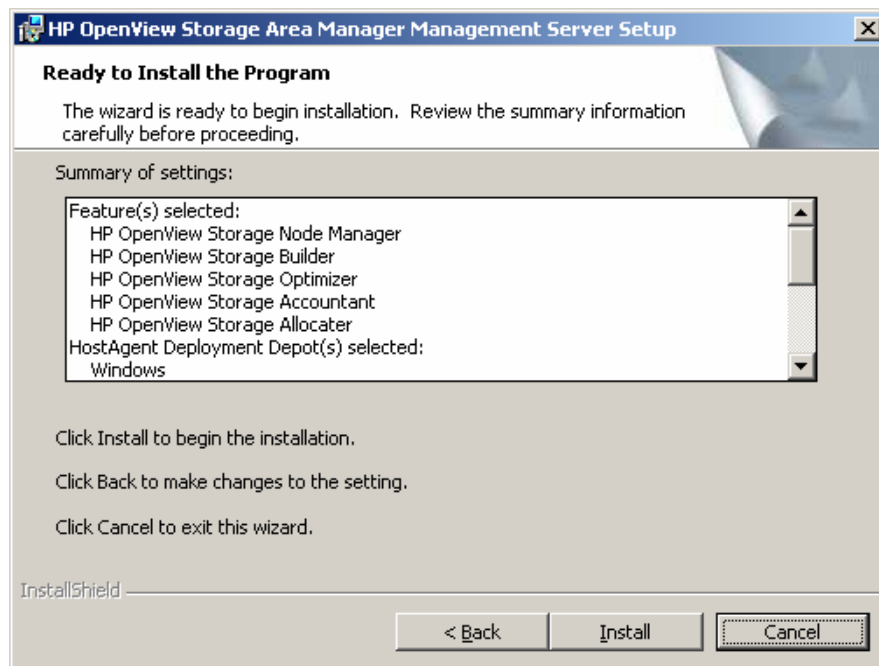
7. Click the *Next* button to continue. If the machine on which you are installing Storage Area Manager is multi-homed, the Local LAN Interface IP Address window displays.



8. Select the IP address to use as the local LAN interface for communicating with Storage Area Manager Host Agents.
9. Click the *Next* button to continue. The Management Server Setup window displays.



10. Investigate the custom install options but ultimately perform a typical install. Click the *Next* button. The Ready to Install Program window displays.

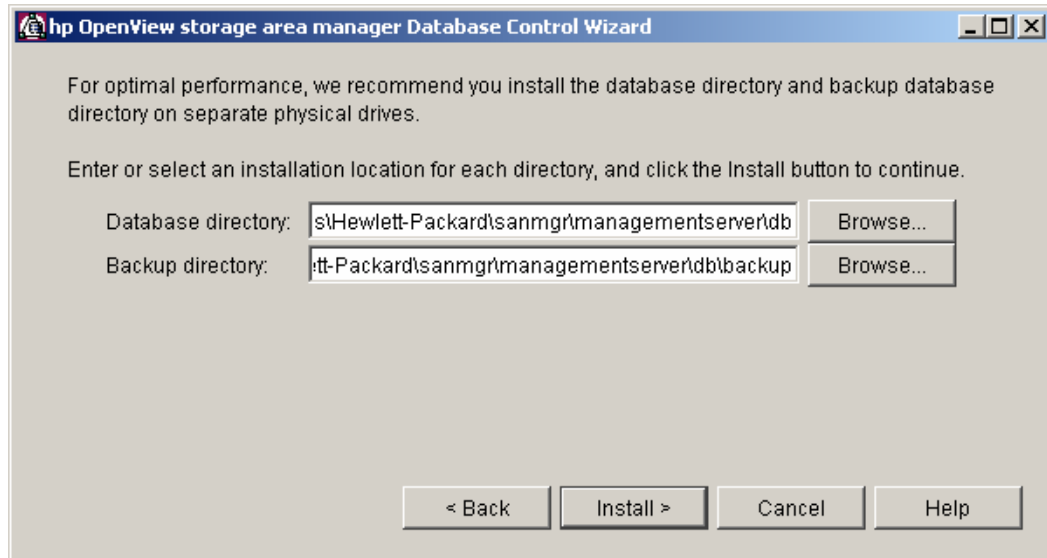


11. Review the summary information and click the *Install* button to begin installation.
12. When prompted, insert the next Storage Area Manager CD into the drive to complete the installation.

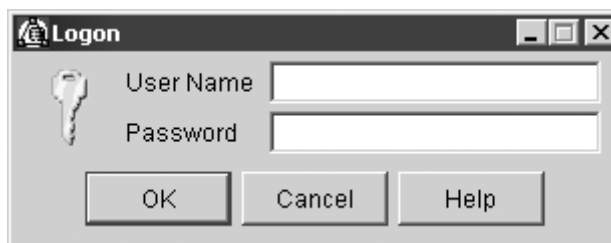
At the end of the Storage Area Manager installation process, the Database Control wizard Welcome window displays.

HP recommends installing the database and backup directories on separate physical drives. For the purposes of this class, accept the default locations.

13. When the Welcome window displays, click the *Next* button. A window displays showing the default database and backup directories.



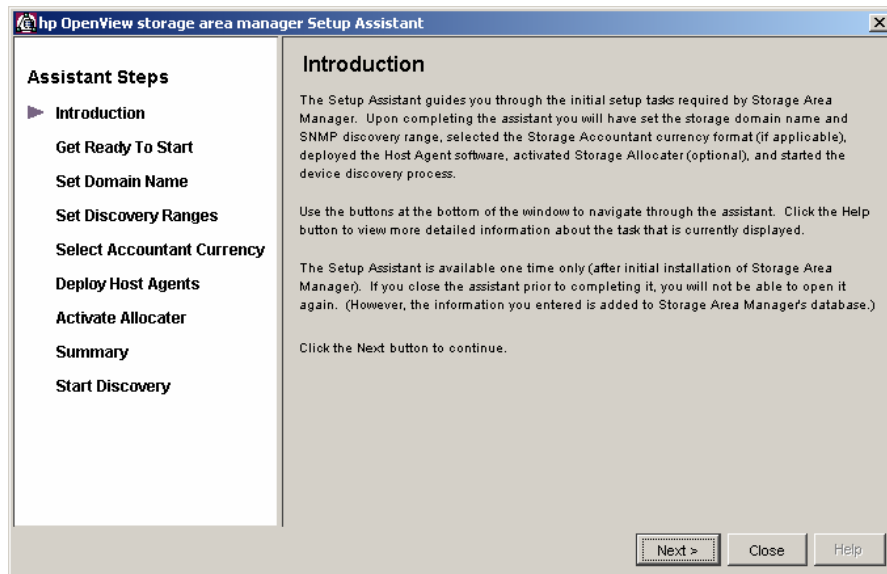
14. Click the *Install* button to accept the default locations. A window confirming the locations of the database and backup directories displays.
15. Click the *Finish* button to close the Database Control wizard. After the database is created, Storage Area Manager starts and prompts you to log on.



16. Enter the default user name (Administrator) and password (Administrator), and click *OK*. The Expiring license warning window opens and lists the expiration date for the 60-day instant on license.
17. Click *No* to skip license installation and continue using the instant on license.

## Hands-on practice: setting up Storage Area Manager

After installing Storage Area Manager, running the Database Control wizard to create a new database and adding permanent licenses (optional), the user interface automatically starts and the Setup Assistant Introduction window displays.



After installing Storage Area Manager, running the Database Control wizard to create a new database, and adding permanent licenses (optional), the user interface automatically starts and the Setup Assistant Introduction window displays.

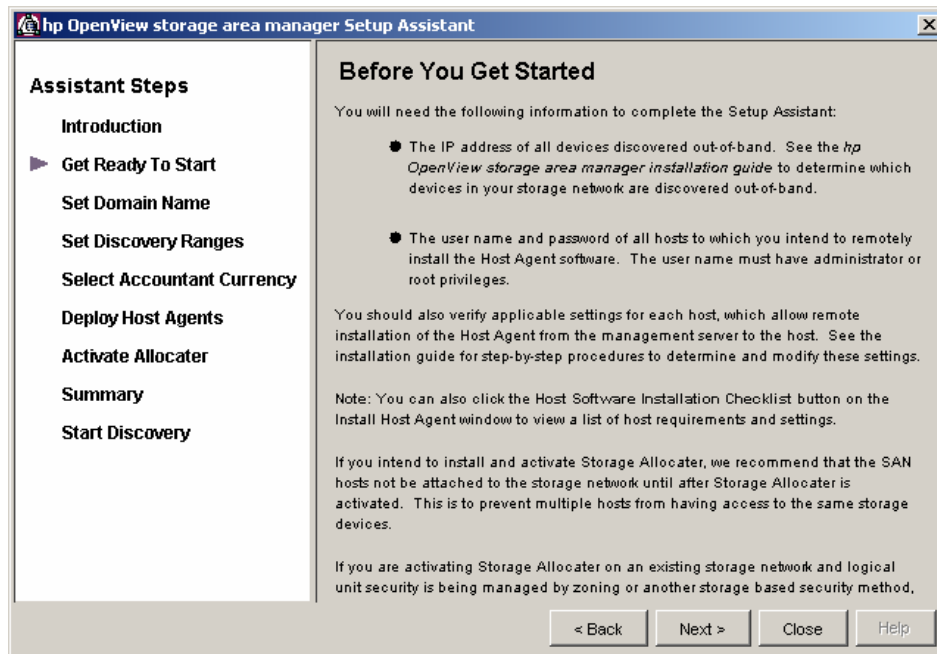
Use the Setup Assistant to complete the following tasks:

- Set the storage domain name
- Set the device discovery range(s)
- Set the Storage Accountant currency type (if applicable)
- Install the Host Agent software on all SAN hosts
- Activate Storage Allocator on all SAN hosts (if applicable)
- Start the device discovery process

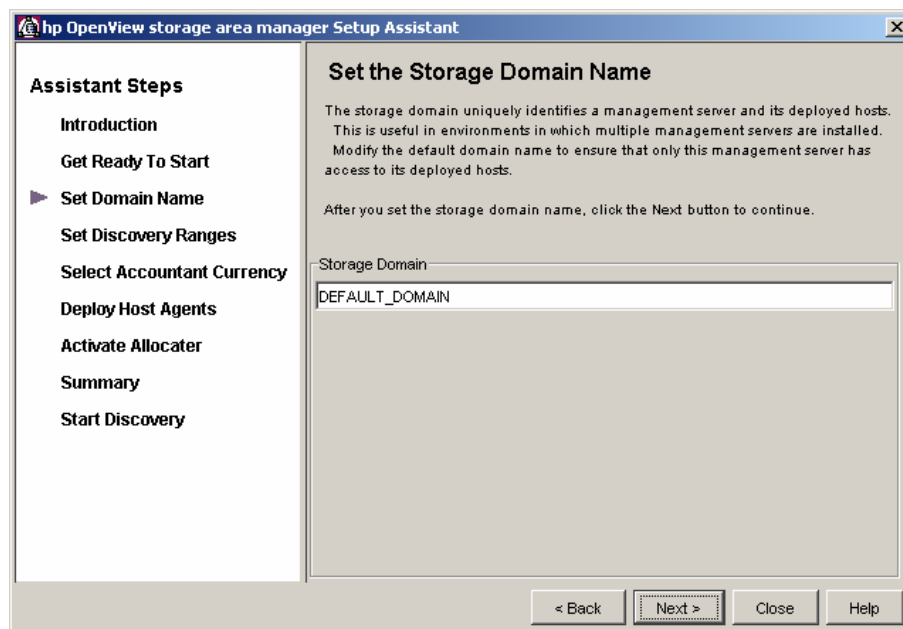
Depending on the environment, additional setup tasks might be required, for example:

- Adding undiscovered hosts
- Associating unknown devices
- Associating inferred hubs
- Renaming devices

1. Click the *Next* button to continue. The Before You Get Started window displays.



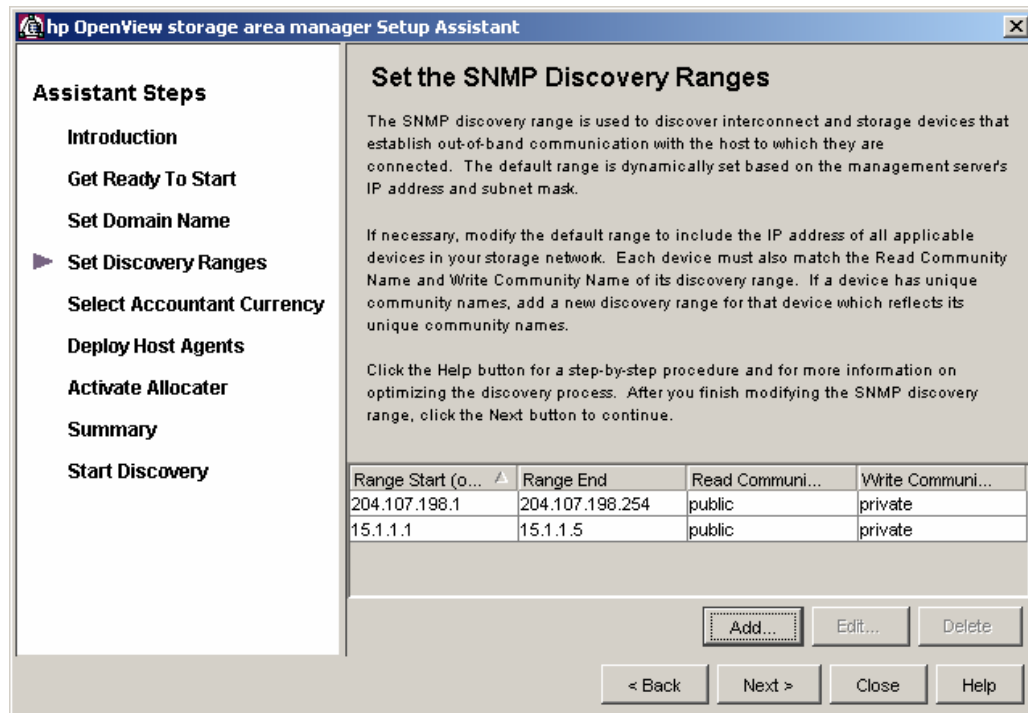
2. Read the contents of the window to determine the information you need to complete the Setup Assistant.
3. Click the *Next* button to continue. The Set the Storage Domain window displays.



4. Enter the new storage domain name in the Storage Domain box.

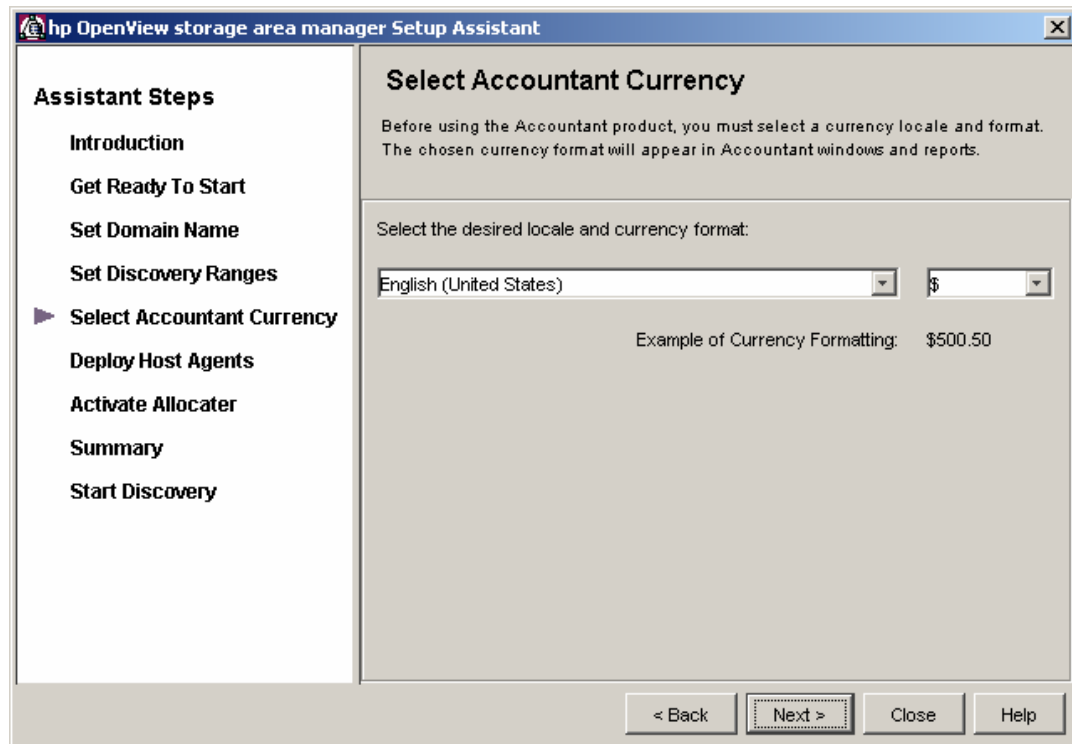


5. Click the *Next* button. A confirmation message displays.
6. Click the *Yes* button to continue. The Set the SNMP Discovery Ranges window displays.

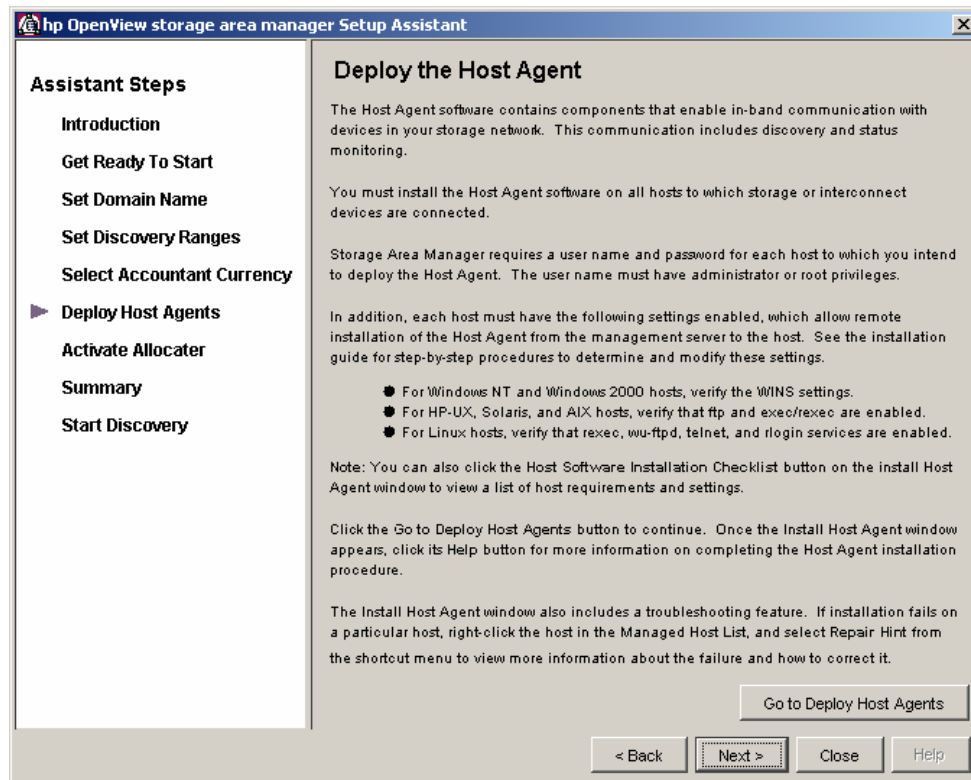


7. Set the SNMP discovery ranges appropriately for your environment.
8. Verify that the default Read Community Name and Write Community Name values exactly match those of the devices represented within this discovery range. If necessary, modify these values. The community names are case sensitive.
9. After setting the SNMP discovery ranges, click the *Next* button to continue. The Select Accountant Currency window displays.

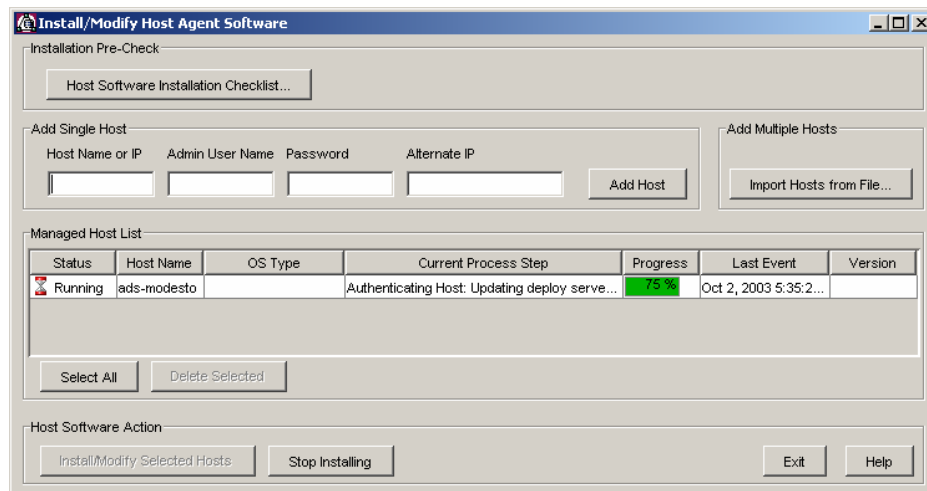
Storage Accountant is able to display its financial data in many different locales and currency formats. However, you must select the currency setting before Storage Accountant can store information in the database. You cannot modify the currency format setting after completing the Setup Assistant. The default settings are based on the locale setting of the management server.



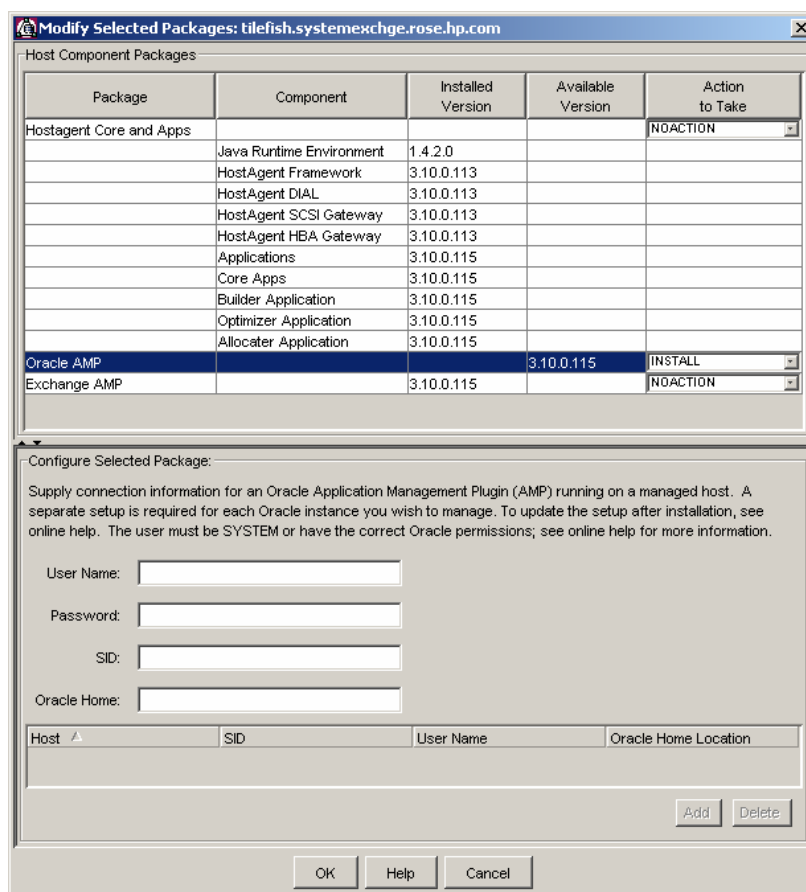
10. To modify the default settings, select the setting you want from the list of locales, and select the currency format you want from the list of formats.  
Available currency formats include the appropriate format for the selected locale. The dollar and euro are included in the currency format list, regardless of the locale you selected.
11. Click the *Next* button. A confirmation message displays.
12. Click the *Yes* button to continue with the Setup Assistant. The Deploy the Host Agent window displays.



- Click the *Go to Deploy Host Agents* button to continue with remotely installing the Host Agent software. The Install/Modify Host Agent Software window displays.

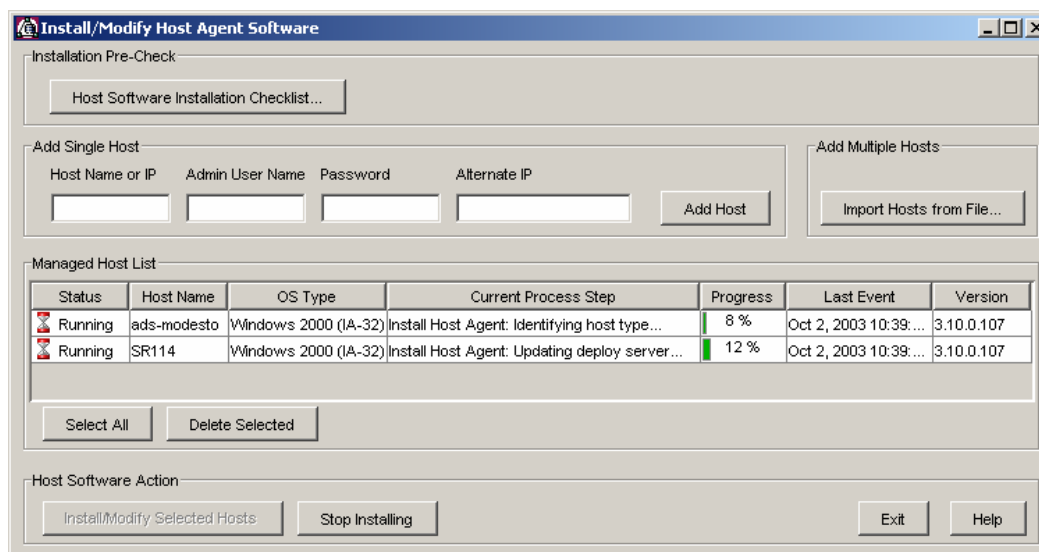


14. Add the hosts to which you want to deploy Host Agent software, one at a time.
  - a. Enter the host name or the IP address of the host to which you want to install the Host Agent software in the Host Name or IP box. If this host is not within the network domain of the management server, enter its fully qualified DNS name.
  - b. Enter a user name for this host in the Admin User Name box. The user name must have administrator, root, or superuser privileges for the host.
  - c. Enter the password for this user name in the Password box.
  - d. Click the *Add Host* button. Storage Area Manager confirms the host name, user name, and password and adds the host to the managed host list if all are valid.
  - e. Repeat steps a through d for each host to which you want to remotely install the Host Agent software.
15. Right-click the host and select *Modify Host Packages Selection* from the shortcut menu. The Modify Selection window displays listing the packages available. The list can change depending on the host operating system.

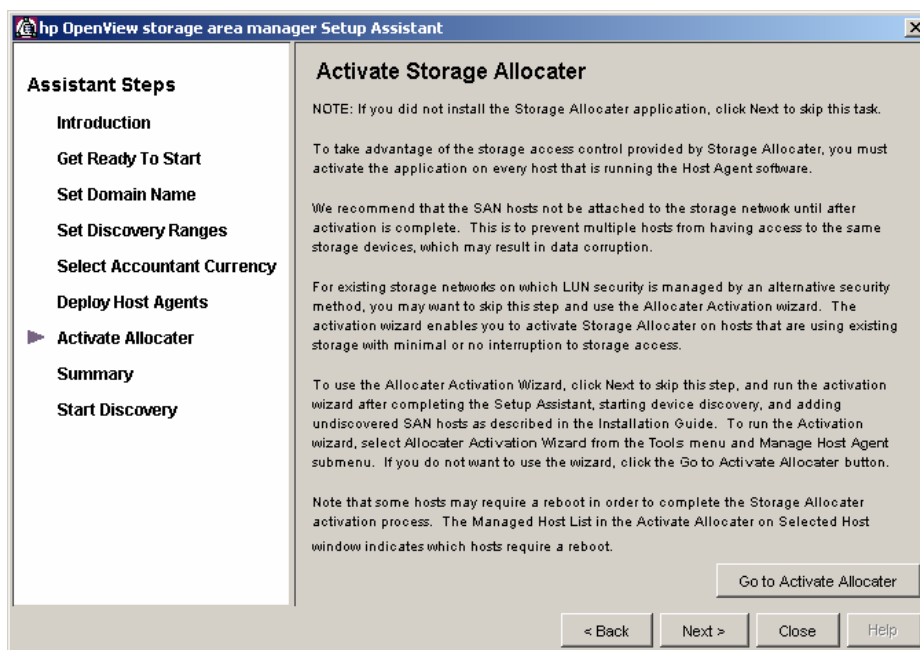


16. After investigating the options on this window, click the *OK* button to return to the Install/Modify Host Agent Software window.

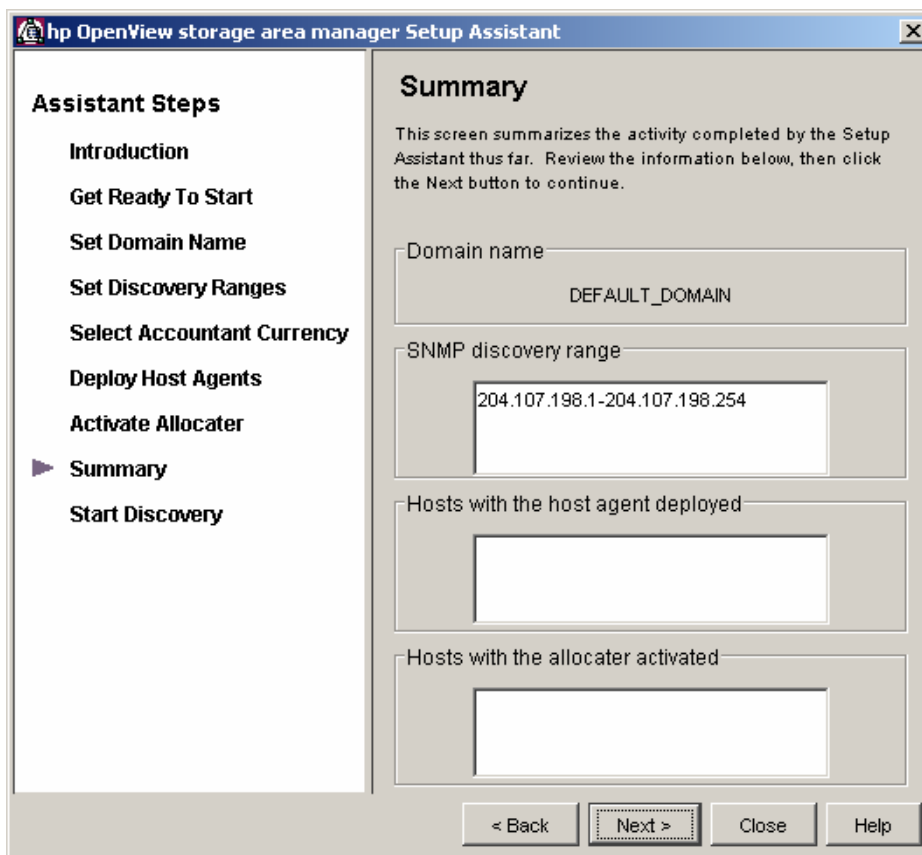
17. Select the hosts in the Managed Host List to which you want to remotely install the Host Agent.
18. Click the *Install/Modify Selected Hosts* button to begin the installation process. The Managed Host List displays the installation progress and status for each host you selected.



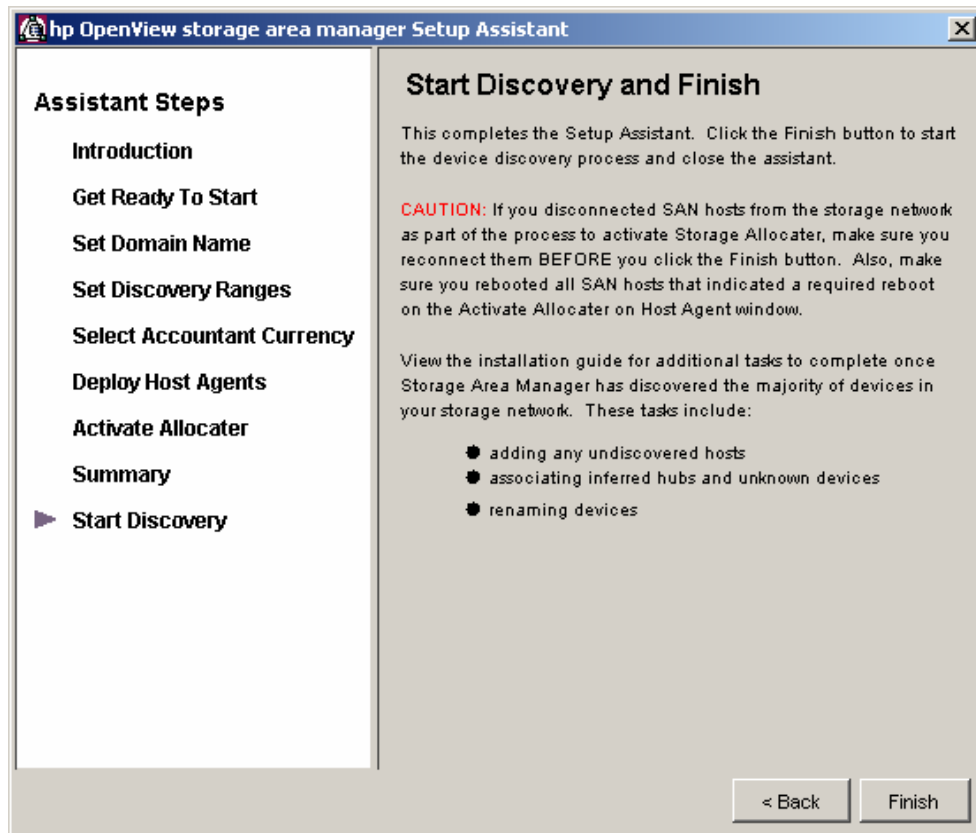
19. If a host fails installation, right-click the error message displayed in the Current Process Step column, and select *Repair Hint* from the shortcut menu to display troubleshooting information.
20. After installation is complete, click the *Exit* button to return to the Setup Assistant. The Activate Storage Allocator window displays.



21. Select the *Next* button to bypass Allocator activation. The Setup Assistant Summary window displays.



22. Review the summary information provided by the Setup Assistant. To make changes, click the *Back* button to return to previous windows. Click the *Next* button to continue the assistant. The Start Discovery and Finish window displays.



Initiating the discovery process is the last installation step. Once initiated, Storage Area Manager begins discovering devices based on the information entered in the SNMP Discovery Ranges and Install Host Agent windows.

23. Click the *Finish* button to initiate the device discovery process and exit the Setup Assistant.

## Hands-on practice: installing patches

1. Using a web browser, access the Storage Area Manager Patch site at:  
**<http://support.openview.hp.com/cpe/patches/sam/sam.jsp>**
2. If applicable, download and install the patch according to the instructions provided.



## Hands-on practice: DPI installation

Storage Area Manager provides new and enhanced device support asynchronous to product releases through DPIs available from the hp OpenView DPI website.

Always ensure that all the latest DPIs are installed.

### Preparing for installation

1. Determine, with guidance from your instructor, which DPIs must be installed.
2. Download the latest DPIs from the HP website:  
**<http://www.openview.hp.com/products/dpi>**
3. Read the DPI installation instructions included with each package and review the prerequisites. List any changes that must be made to your Storage Area Manager configuration, the management application, or device associated with the DPI.

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4. Install any additional software that is required for the DPI. Record the software and version number that was installed.

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5. List any environment-specific information that you need to know to implement this DPI, including device-related user names, passwords, IP addresses, and so on.

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6. Read the readme file associated with the DPI. Readme files are available by right-clicking the device in the Storage Area Manager map or tree. However, they can also be launched directly from the product directory structure.

The default location is C:\Program Files\Hewlett-Packard\sanmgr\managementserver\devices\properties. The readme files are usually in .html format.

List any additional requirements that you found in the device readme and changes to your environment as required.

.....

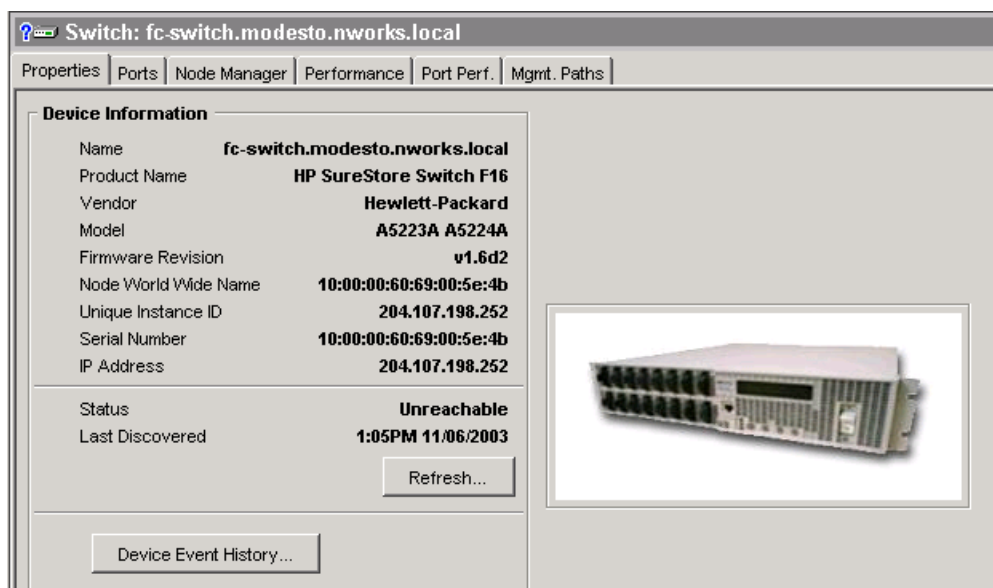
.....

## Installing the DPI

1. Install the DPI as described in the DPI installation instructions.
2. Based upon the DPI installation instructions, verify the installation. If necessary, start a comprehensive discovery cycle in Storage Area Manager by selecting *Tools → Start Comprehensive Discovery*.

Allow up to 30 minutes for the DPI to discover and collect performance information from the device.

3. Verify that device is discovered and information is being collected.
  - a. Right-click the device and select *View in New Window* to display information that Storage Area Manager has obtained for the device. For example:



- b. Investigate the various View panels associated with the device by clicking the tabs. For interconnect devices, review the *Ports*, *Performance*, *Port Perf.*, and *Mgmt. Paths* tabs. For storage devices, review the *LUN Allocation* and *Mgmt Paths* tabs.
4. Verify that performance information is being collected.
  - a. In the *Applications* tab, expand *Storage Optimizer* and select the node associated with the device (for example, *Interconnect Devices* or *Storage Devices*).
  - b. Double-click the device and verify that data appears in some of the standard charts available for the device.
  - c. Return to the *Storage Optimizer* node in the *Applications* tab and select the node associated with your device.
  - d. Select the device and click the *Properties* icon. The properties dialog box enables you to review and graph the available metrics for the device.

**Properties**

**Select Time Period for Data Display**

☒ Relative  
Time Period: 1 Day(s)

☐ Absolute  
Start Date: 10/06/2003 Start Time: 16:00  
End Date: 11/06/2003 End Time: 16:00

**Select Metric**

DeviceInvalidCRCs  
DeviceInvalidTransmissionWords  
DeviceLinkFailures  
DevicePrimitiveSequenceProtocolErrors  
DeviceReceivedBytes

**Top-N Query**

Return: All Sort Order: Descending

OK Cancel Help

- e. Select some of the device-specific metrics for your device and click *OK* to display the data collected by the DPI.

## Hands-on practice: management client installation

If you have additional Windows PCs in your environment (or personal laptops), with LAN connectivity that are available, practice installing a management client. Refer to the *Storage Area Manager Installation Guide* for detailed steps on installing clients on operating systems other than Windows.

1. Using a web browser, connect to the management server by entering the following address: `http://<hostname>:8040` where `<hostname>` is the host name or IP address of the management server.  
The hp OpenView storage area manager – GUI downloads page displays.
2. Click *Download Windows Remote Client GUI*.
3. Save the file to a directory.
4. Go to the directory where you downloaded the files and double-click *clientsetup.exe*.
5. Follow the on-screen installation instructions and click the *Finish* button when the Installation Wizard Completed window displays.
6. Using a web browser, return to the hp OpenView storage area manager – GUI downloads page.
7. Click the *Add your client's IP address (or fully qualified Hostname) to the authorized Client access list* link. The hp OpenView storage area manager – GUI authentication list window displays.
8. Enter the client IP address in the IP Address field.
9. Enter the Storage Area Manager user name in the User Name field.
10. Enter the Storage Are Manager password in the Password field.
11. Click the *Submit* button. A window displays, confirming that you have successfully added the IP address to the authorized client list.
12. To add another address, click *Add another address*, and repeat steps 8 through 11. Otherwise, close the window.

### Objectives

After completing this lab, you should be able to:

- View device information in the Resource tree, map, and View panels
- Manage events
- Launch and configure device management application
- Create users
- Add contacts
- Start the Storage Area Manager CLUI and execute Core Services- and Storage Node Manager-related commands
- Customize a Storage Area Manager configuration to meet customer requirements.

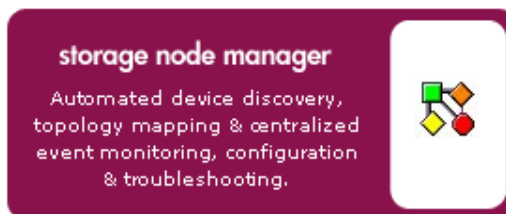
### Requirements

This exercise requires the following resources:

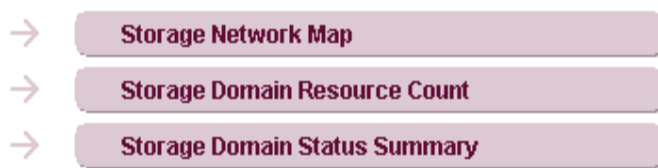
- Classroom lab equipment or for some practices (as noted) the Storage Area Manager demo/simulation.
- *HP OpenView Storage Area Manager Fundamentals*, Module 2, “Storage Area Manager Environment”
- *HP OpenView Storage Area Manager Fundamentals*, Module 4, “Event Management”
- *HP OpenView Storage Area Manager Fundamentals*, Module 5, “Device Maps”
- *HP OpenView Storage Area Manager Fundamentals*, Module 6, “Application Links”
- *HP OpenView Storage Area Manager Fundamentals*, Module 8, “Installation”

## Hands-on practice: viewing devices in the map

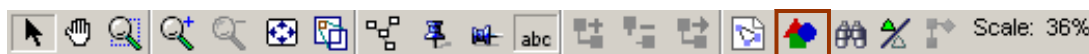
This practice can be performed with classroom lab equipment or the Storage Area Manager demo/simulation.



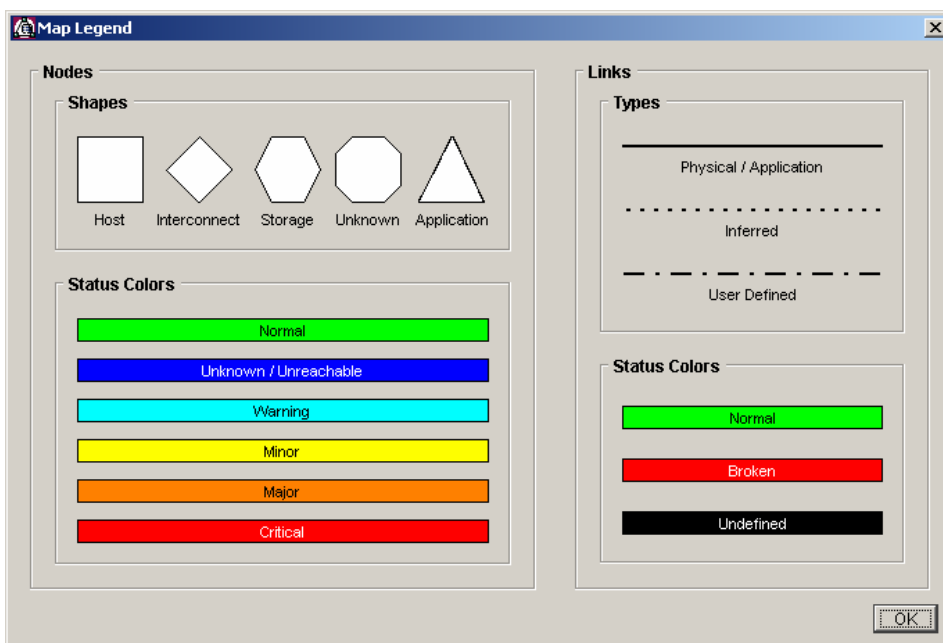
1. From the Storage Area Manager home page, navigate to the Storage Node Manager home page by clicking the Storage Node Manager graphic.



2. Click *Storage Network Map*. A Domain View of the device map will display. Note that:
  - Storage Networks is selected in the Resources tree.
  - The View panel displays the Domain View of the device map, displaying all the managed SANS within the domain.
3. Right-click in the View panel and select *Expand All Storage Networks* to view all SANs in a common panel.
4. Right-click in the View panel and select *Collapse All Storage Networks*.
5. Double-click one of the storage networks in the View panel. A device map for the specific collection of devices displays. The device map includes a toolbar.



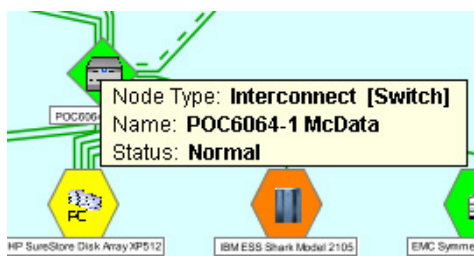
6. Click the *Map Legend* button.



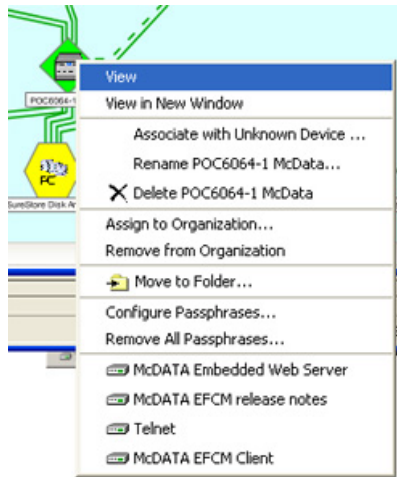
The map legend shows:

- Shapes of resources on the map and their meanings
- Colors used to represent status and link status levels and their meanings
- Line types used to represent device links

7. Click *OK* to close the legend.
8. Roll your mouse over several devices in your environment. Make note of the information that displays in the pop-up window.



9. Right-click several devices and links. A shortcut menu displays. Some of the features (view, rename, delete) are standard for all devices, while others are configurable.



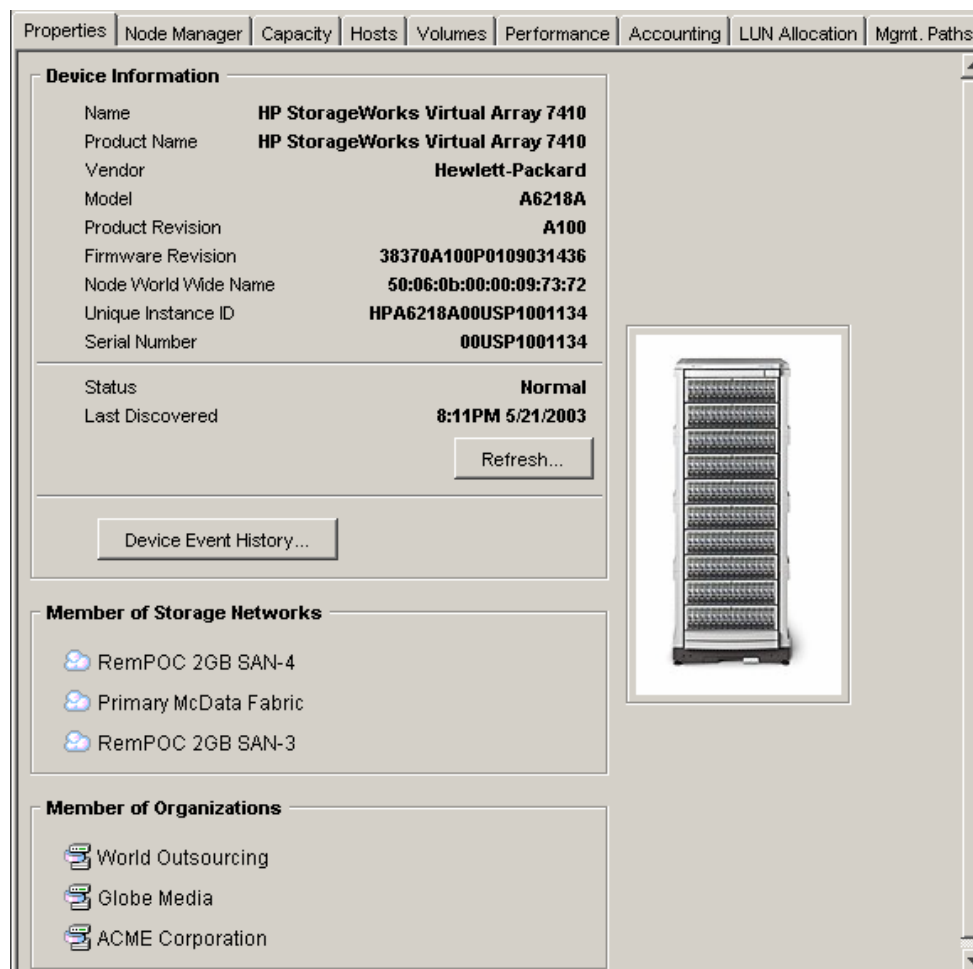
10. If available for the devices in your environment, select a device management application from the menu to launch it directly from Storage Area Manager.



## Hands-on practice: displaying device information

This practice can be performed with classroom lab equipment or the Storage Area Manager demo/simulation.

1. View detailed device information by double-clicking any device in the map or Resources tree.



The information displayed above is representative of what is available for a majority of devices supported by Storage Area Manager. However, for some devices, Storage Area Manager can only gather a subset of the information.

Tabs at the top of the window vary based on the Storage Area Manager applications installed and licensed and the device selected.

2. Investigate the detailed device information and the View panel tabs that Storage Area Manager provides for several other resources in your environment.

3. Display summary-level device information by selecting a folder (such as Hosts, Storage Devices, or a specific storage network) in the Resources tree and click the *Node Manager* tab. Note that an icon representing the status displays next to each individual resource. For example:

The screenshot displays the HP OpenView Storage Area Manager interface. The left pane shows a tree view of resources under the 'KINGVALE' node, with 'Storage Devices' selected. The right pane shows a table of storage devices with columns for status, organization, name, type, and status. The bottom pane shows a list of storage events with columns for severity, occurrence, source, category, event type, and message.

St...	Or...	Pr...	V...	M...	Pr...	Fir...	Se...	U...	Ty...	St...
EMC S...	EMC	8430	5567	5567	00018...	EMCS...	Disk A...	Normal		
Hewlet...	Hewlet...	E22D			E2700...	HPULtri...	Tape D...	Normal		
hp Sto...	Hewlet...	HSG80	E10	V86P-4	ZG028...	DECH...	Disk A...	Normal		
GI...	Storag...	Hewlet...	HSV110	ENT-V...	50001...	HSV-5...	Disk A...	Warning		
Storag...	Hewlet...	HSV110	ENT-V...	50001...	HSV-5...	Disk A...	Normal			
Storag...	Hewlet...	HSV110	ENT-V...	50001...	HSV-5...	Disk A...	Normal			
Storag...	Hewlet...	HSV110	ENT-V...	50001...	HSV-5...	Disk A...	Normal			
Storag...	Hewlet...	HSV110	ENT-V...	50001...	HSV-5...	Disk A...	Normal			
Storag...	Hewlet...	HSV110	ENT-V...	50001...	HSV-5...	Disk A...	Normal			
HP Sto...	Hewlet...	A6218A	A100	38370...	00USP...	HPA62...	Disk A...	Normal		
HP Sur...	Hewlet...	XP512	01-18...	01-18...	40150	HP XP...	Disk A...	Minor		
IBM ES...	IBM	2105			14666	IBM21...	Disk A...	Major		
Unkno...					42	Unkno...	Normal			

Severity	Occurred	Source	Category	Event Type	Message
Warning	May 20, 2003 2:00:34 AM PDT	S64Bott4	Performance	THRESHOLD_ALERT	Upper threshold exceeded - Metric: Devic
Warning	May 20, 2003 2:00:34 AM PDT	S64Bott4	Performance	THRESHOLD_ALERT	Upper threshold exceeded - Metric: Devic
Warning	May 20, 2003 2:00:34 AM PDT	S64Bott4	Performance	THRESHOLD_ALERT	Lower threshold exceeded - Port: 15, Met

## Hands-on practice: displaying zoning information

Depending on your environment, zoning information might or might not be available. If your environment does not use zoning, perform this practice using the Storage Area Manager demo/simulation.

Storage Area Manager identifies zone and zone sets and displays their properties and membership; however, Storage Area Manager does not provide zone configuration capabilities.

1. To display zone maps, expand a SAN in the Resources tree.
2. Expand the *Zones* node.
3. Select a zone to display. The View panel displays the Properties information for the selected zone. For example:



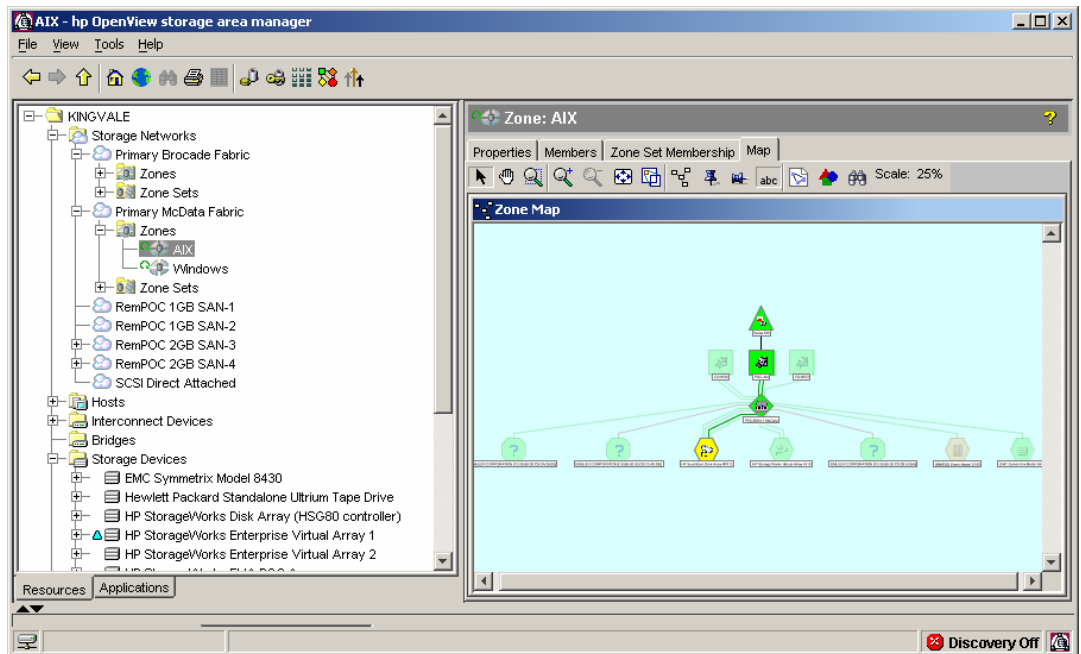
4. Click the *Members* tab to view the details of the members of this zone. Displayed for each zone are its members including the identifier type, related port, and related device or host. For example:

Zone: AIX

Properties | **Members** | Zone Set Membership | Map

Identifier	Identifier Type	Related Port	Related Device or H...
10:00:00:00:c9:2b:fb:14	Port WWN	Port: 1 on IBM of PO...	POC-AIX
10:00:00:00:c9:2b:fb:5d	Port WWN	Port: 1 on IBM of PO...	POC-AIX
50:00:60:e8:02:9c:d6:13	Port WWN	Port: CL2-D on Contr...	HP SureStore Disk ...

- Click the *Map* tab to display the zone map associated to the selected zone. Devices that appear dimmed are **not** members of the zone. For example:



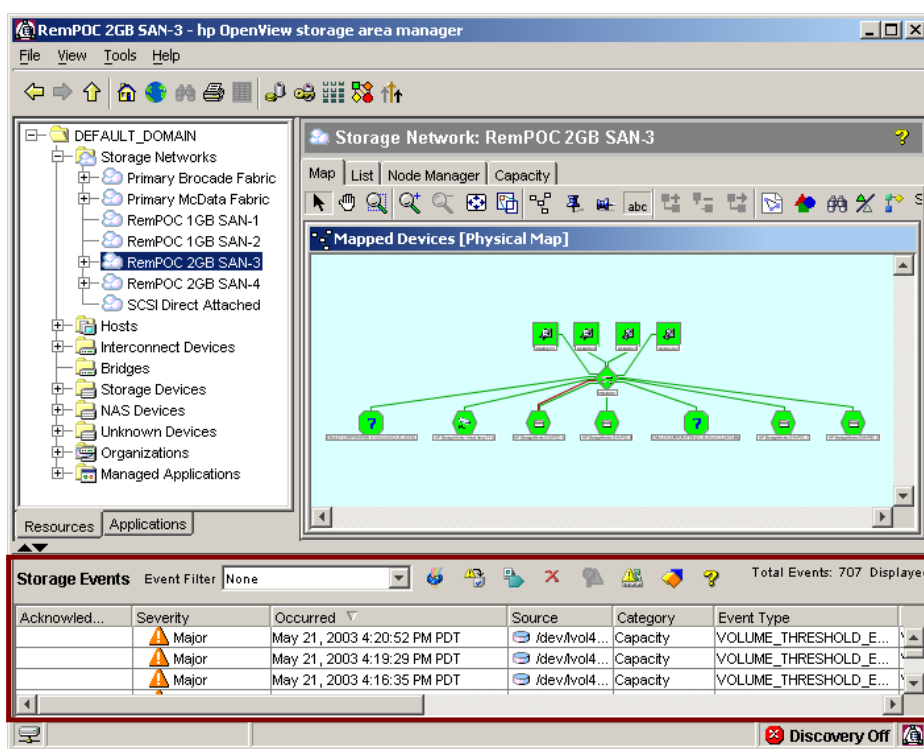
## Hands-on practice: Managing events

As Storage Area Manager monitors the storage network, it displays events in the event panel. When events are displayed in the event panel, Storage Area Manager offers many features that enable you to work with the information displayed. Additionally, event triggers enable you assign actions to events that meet criteria you specify.

This practice can be performed with classroom lab equipment or the Storage Area Manager demo/simulation.

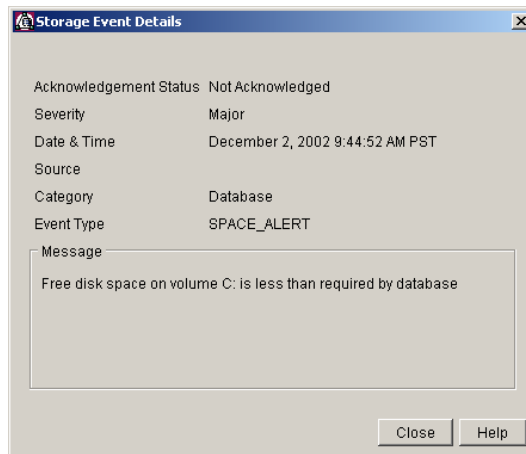
### Viewing events

1. View the most recent events in the environment.



2. Use one of the default filters to view only the critical events. Are there any?
3. Double-click the *Source* column on one of the events. The affected device displays in the View panel and is selected in the Resources tree.

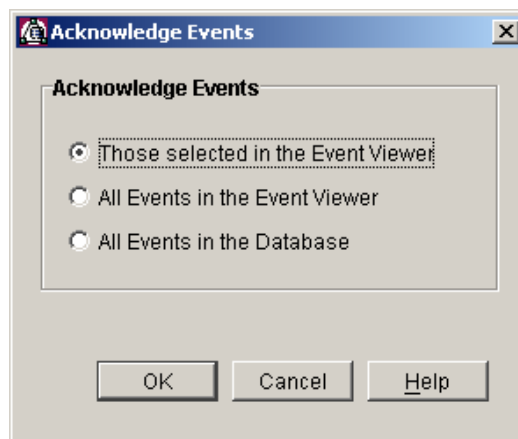
4. Double-click one of the events (somewhere other than the Source column). A dialog box displays with detailed information on the event selected.



## Acknowledging events

### Acknowledge an event.

1. Select an event and click the *Acknowledge* icon.
2. Select the Those selected in the Event Viewer option button.



An icon now appears in the Acknowledge column next to the selected event.

## Exporting events

### Export an event to a text file.

1. Select an event and click the *Export Selected Event to File* icon.
2. Save the file to the default location, C:\Program Files\Hewlett-Packard\sanmgr\client\events.txt.
3. Select .txt as the export file format.
4. View the saved file using Wordpad.

## Creating triggers

### Create a trigger to monitor for management client logons.

1. Click the *Configure Event Triggers* icon from the Event toolbar.
2. Click the *Add* button. The Add Trigger window displays.

**Add Trigger**

Name:

**Event Configuration**

Category:

Threshold:

Events:

- ☐ ACTIVATION\_WIZARD\_CONFIGURE\_REQUEST
- ☐ CONFIGURE\_REQUEST\_STATUS
- ☐ CONFIGURE\_REQUEST\_SUB\_STATUS
- ☐ CONVERT\_SEVENTO\_STORAGE\_EVENT
- ☐ HOST\_COMMAND\_SET\_COMPLETED
- ☐ HOST\_DELETION

**Action Configuration**

Action:

Parameter	Value
HOSTS	

Trigger Constraints:

3. Enter a unique name for the trigger.
4. Select *Framework* as the Category.
5. Select *Informational* as the Severity.

6. Under the Events section, select the *Client Login* check box.
7. Under the Action Configuration section, select *StoreAction* to send the event to the Event panel.
8. Click the *OK* button.
9. Close the management client session and then restart.
10. The configured event displays the Event panel.

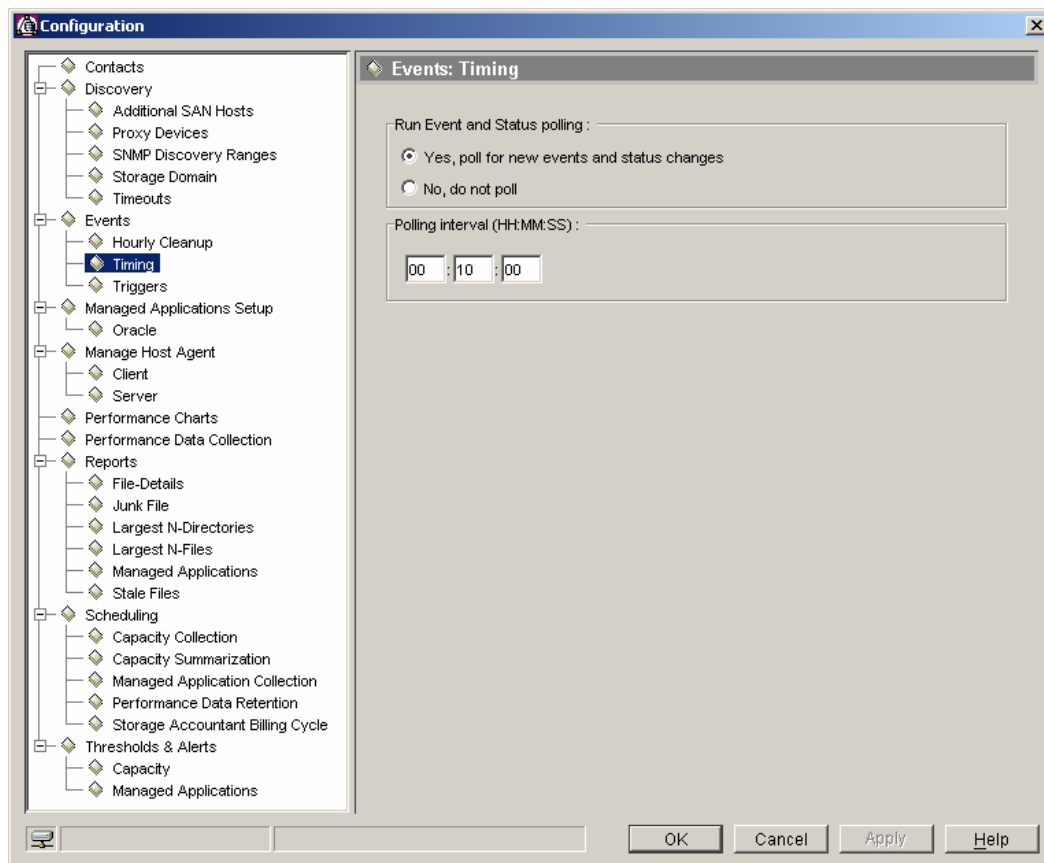
Hint: If you do not see an event for the client login, be sure the Event Filter at the top of the Event panel is set to *None*.



## Configuring event polling

**Configure Storage Area Manager to poll for events every 15 minutes.**

1. Select *Tools* → *Configure*.
2. Under Events, select *Timing*.
3. Change the polling interval to *00:15:00* and click the *OK* button.



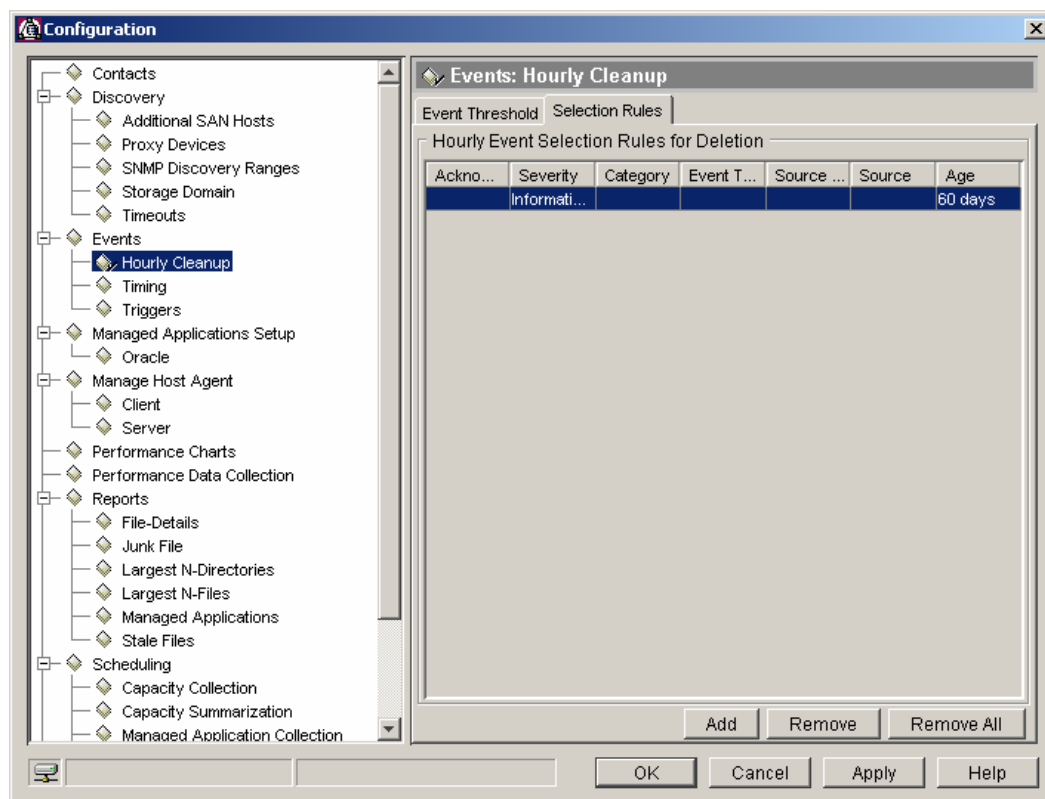
## Configuring automatic deletion of events

**Configure Storage Area Manager to automatically delete all information events after 60 days.**

1. Select *Tools* → *Configure*.
2. Select *Hourly Cleanup* under the Events node.
3. Click the *Selection Rules* tab.
4. Click the *Add* button to add a row to the Hourly Event Selection Rules for Deletion list. Each entry represents an event cleanup rule. The cells in each entry define the rule's criteria.
5. In the Severity column, select *Informational*.
6. Click in the *Age* column. The Minimum age filter window displays.



7. Select the *Enable filtering based on age* checkbox.
8. Enter *60* in the Minimum age, in days: box.
9. Click the *OK* button on the Minimum age filter window.



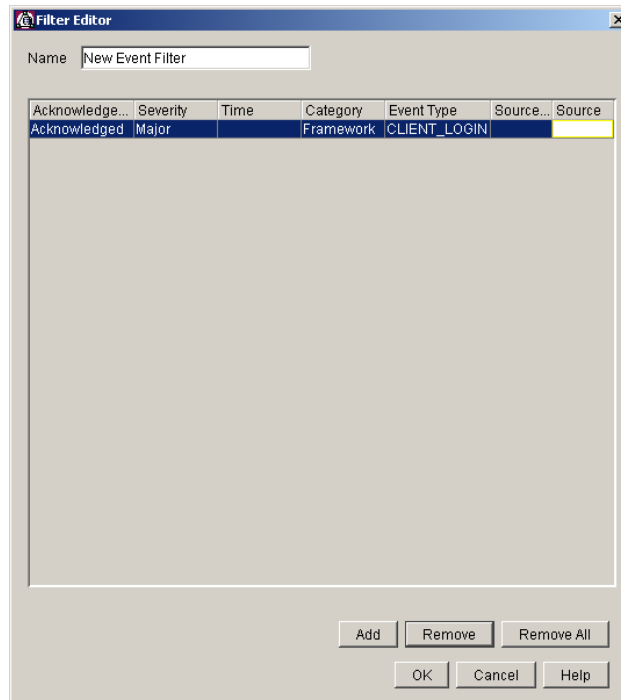
The new row displays.

10. Click the *OK* button to save the selection rule.

## Creating event filters

**Create a custom filter to limit events displayed to events related to management client logins.**

1. From the Event panel toolbar, click the *Add, Remove, or Modify Event Filters* icon. The Event Filters window displays.
2. Click the *Add* button. The Filter Editor window displays.



3. Enter a unique name for the filter.
4. Under the Category column, select *Framework*.
5. Under the Event Type column, select *CLIENT\_LOGIN*.  
Hint: If you cannot read the drop-down menu, expand the column width.
6. Click the *OK* button to save.
7. Click the *Close* button on the Event Filters dialog box.
8. Select the filter you created from the Event Filter drop-down menu.

## Hands-on practice: managing devices

The examples in this practice use a Brocade switch. If your environment does not include Brocade switches, your instructor might need to modify these instructions slightly.

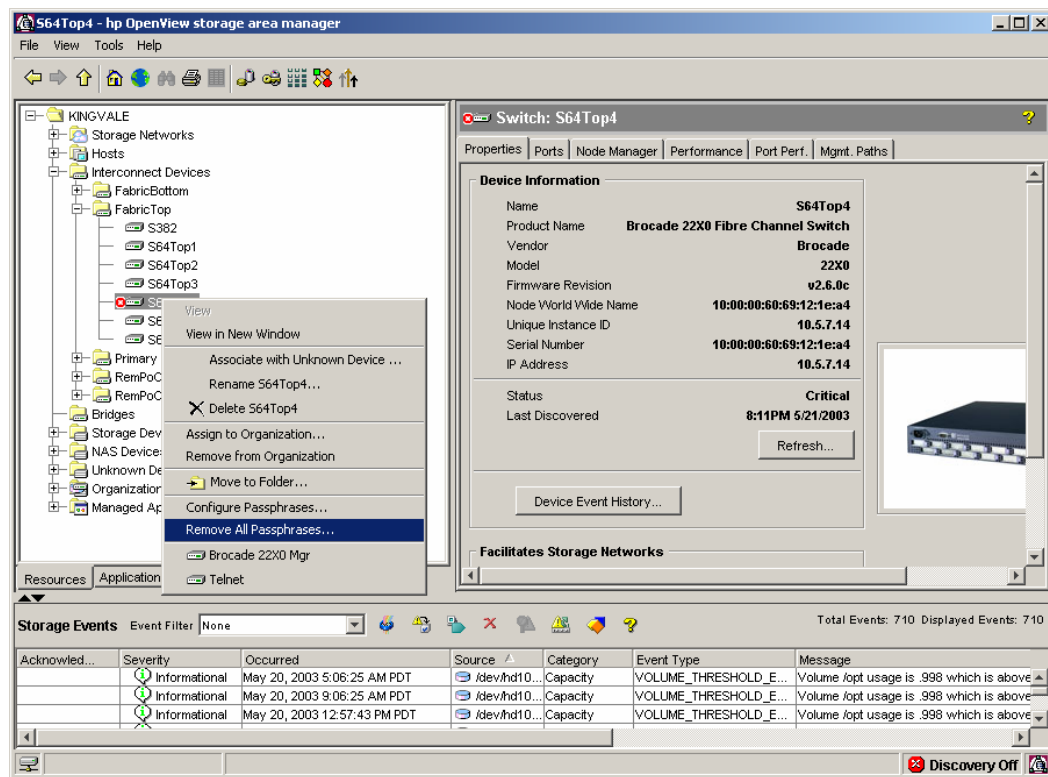
This practice requires classroom lab equipment. The device management capabilities are not available in the Storage Area Manager demo/simulation.

### Launch a device manager.

1. Select a Brocade switch under the Interconnect Devices node in the Resources Tree.
2. Right-click the selected switch and select the device manager (for example, *Brocade xxxx Manager*) from the shortcut menu.

### Note

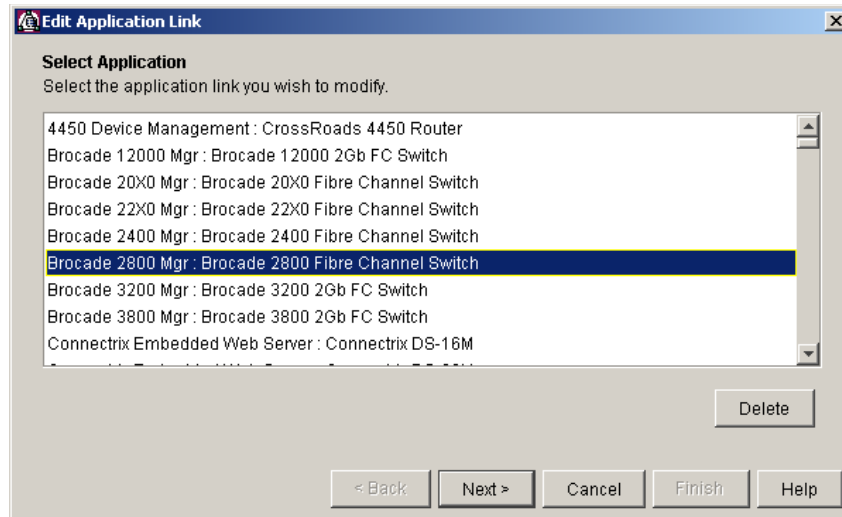
Please do not change any of the switch configurations.



## Viewing a device-specific application link

**View a device-specific application link.**

1. Select *Tools* → *Storage Node Manager* → *Edit Application Link*.
2. Select *Brocade 2800 Manager: Brocade 2800 Fibre Channel Switch*.
3. Click the *Next* button.



4. View the Application Name and Application Type.
5. Click the *Next* button to continue.
6. Note the Application Command and click the *Finish* button to exit the Edit Application Link window.

## Creating a device-specific application link

For the purpose of this practice, you will create a link to launch the standard web-based, Brocade switch management application. Though, as previously noted, Storage Area Manager creates a link to these applications by default.

### Create a device-specific application link for a Brocade switch.

1. From the Tools menu, select *Storage Node Manager* → *Add Application Link*.
2. Click the *Next* button. Choose to create the link for all devices of the same type.
3. Select the *Device Type* radio button and click the *Next* button.
4. Select one of the Brocade switches from the available list and click the *Next* button.
5. Specify the Application Link name.

Hint: Name the link something that will distinguish it from the factory default link for the switch.

6. Select the *Local Application* radio button.
7. Click the *Next* button.
8. In the Application Command window, enter *http://*.
9. Click the *Browser* button.

Hint: If the application is web-based, the parameter keyword “Browser” must always be used first.

10. Click the *IP Address* button.

**Add Application Link**

**Application Command**

Type the command used to start the application. Use the keyword buttons to include any variables that you want Storage Area Manager to substitute.

Application Parameter Keywords			
Local Host	Remote Host	Repository Host	Display
Device File	IP Address	DNS Name	Browser
Serial Number	Device ID		

Application Command:

http://%browser%ip\_address

< Back   Next >   Cancel   Finish   Help

11. Click the *Finish* button to complete the link.

12. Right-click the appropriate model of Brocade switch in the Resources tree.
13. Select the device link you created from the shortcut menu.

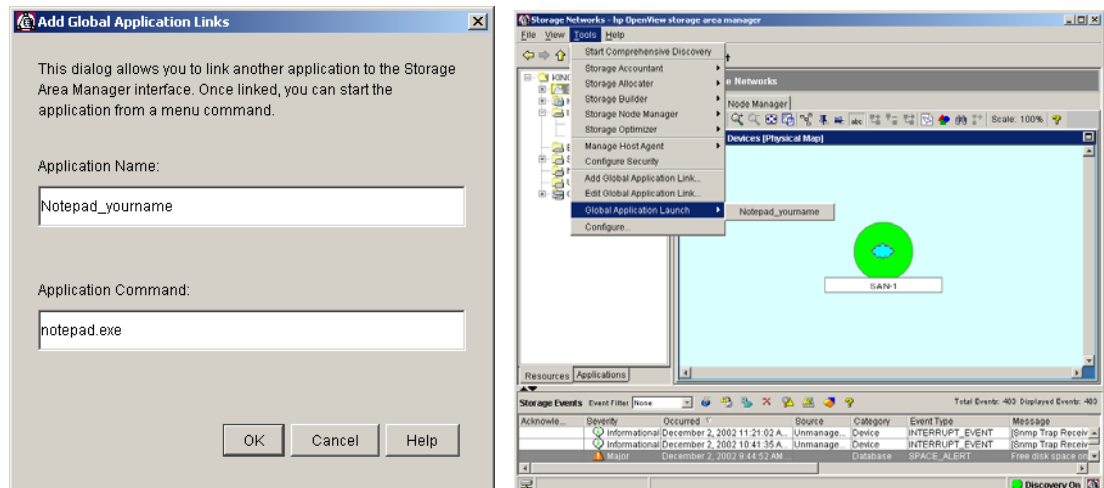
## Creating a global application link

To demonstrate Storage Area Manager's global application launching features, this practice uses a very simplistic example of launching Notepad. If you have enterprise framework applications or other tools in your environment that would be a more realistic use of these features, feel free to adapt the exercise.

This task can be performed using classroom lab equipment or the Storage Area Manager simulation/demo.

### Create a global application link to launch Notepad from Storage Area Manager.

1. Select *Tools* → *Add Global Application Link*.
2. In the Application Name box, enter *Notepad\_yourname* (this is the name you will see when you launch the global application link).
3. In the Application Command window, enter *notepad.exe*.
4. Click the *OK* button.
5. Select *Tools* → *Global Application Launch* to launch the application you created.





## Hands-on practice: working with device maps

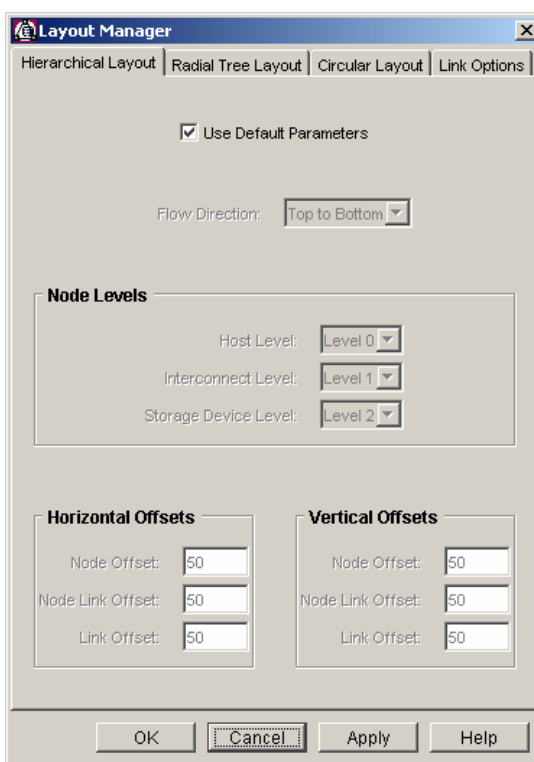
These practices can be performed using classroom lab equipment or the Storage Area Manager demo/simulation.

1. In the Resources tab, expand the *Storage Networks* node and select the most populated SAN (in the simulation environment, select the Primary Brocade Fabric).

The default layout is dynamically set based on the number of nodes.

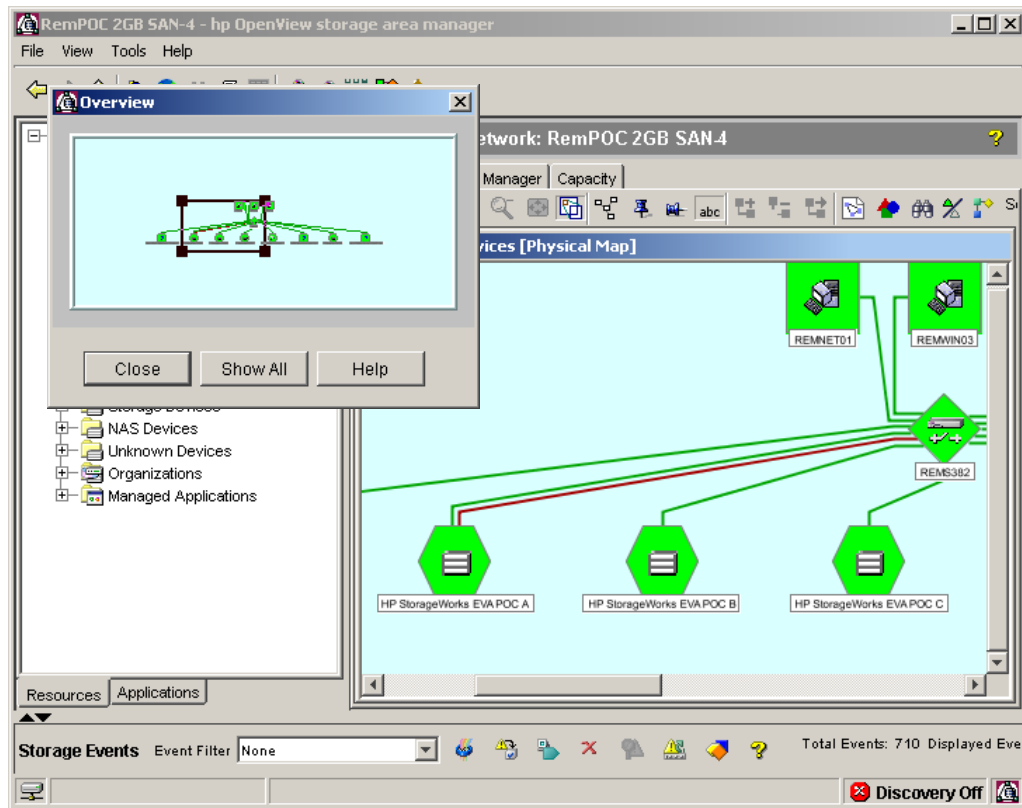
- Less than 25 nodes — Hierarchical
- 25 or more nodes — Radial Tree

2. Select the *Map Layout* button on the toolbar to display the *Layout Manager*.



3. Click the *Circular Layout* tab and then click *Apply* to view the map in this layout style.
4. Select the layout you like best and click the *OK* button.

5. Select the *Display Overview Window* button on the toolbar. This provides the ability to zoom in to selected regions of a map.
6. In the *Overview* window, draw a box around a region of the map of which you want a closer view. Move the box around the window with the mouse to view different portions of the map.

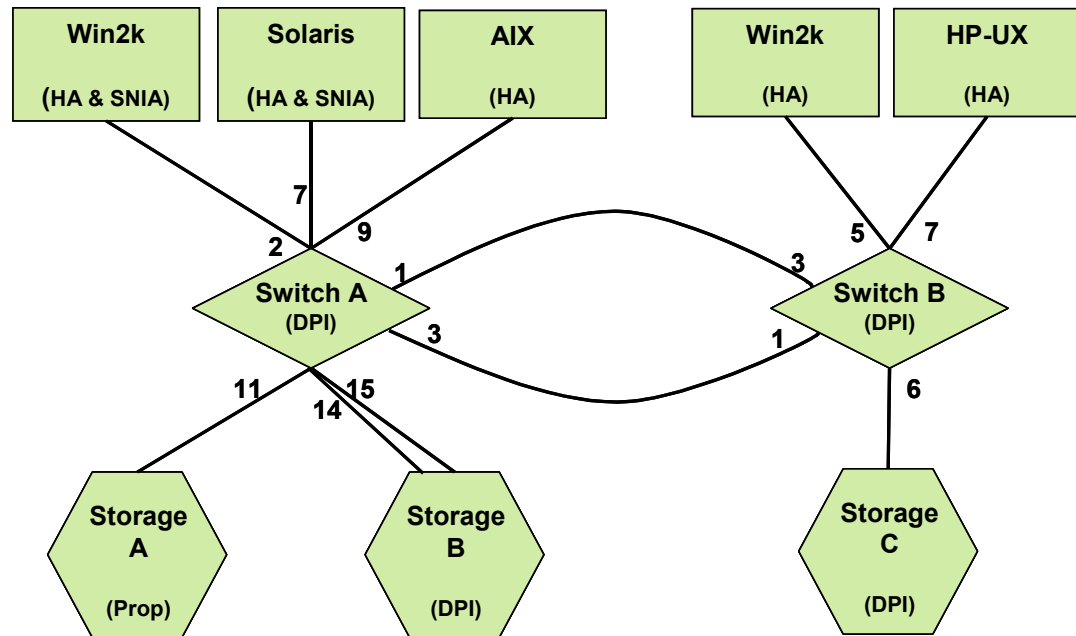


7. Given the following actual connectivity, draw (on the following page) both the physical map (including the contents of the Unmapped Devices panel) and the inferred map as they would appear in Storage Area Manager.

### Note

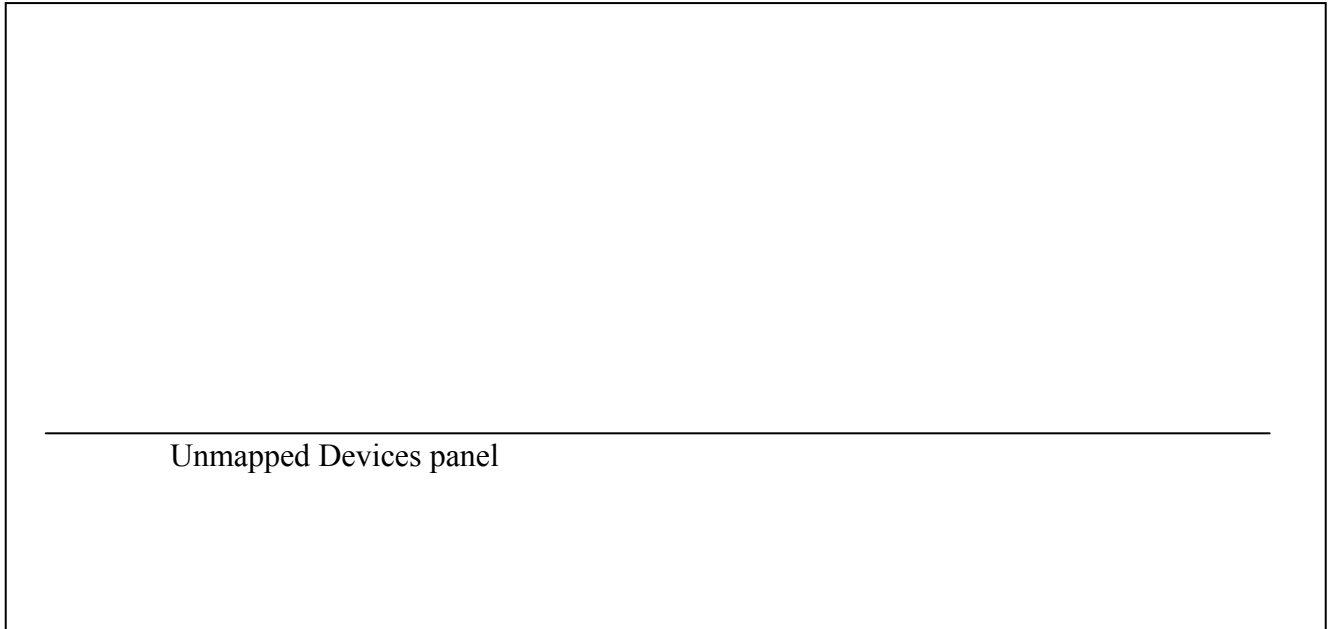
The textual descriptions provide information on LUN connections that are not represented in the graphics but can effect how the SAN is represented by Storage Area Manager.

### Actual connectivity

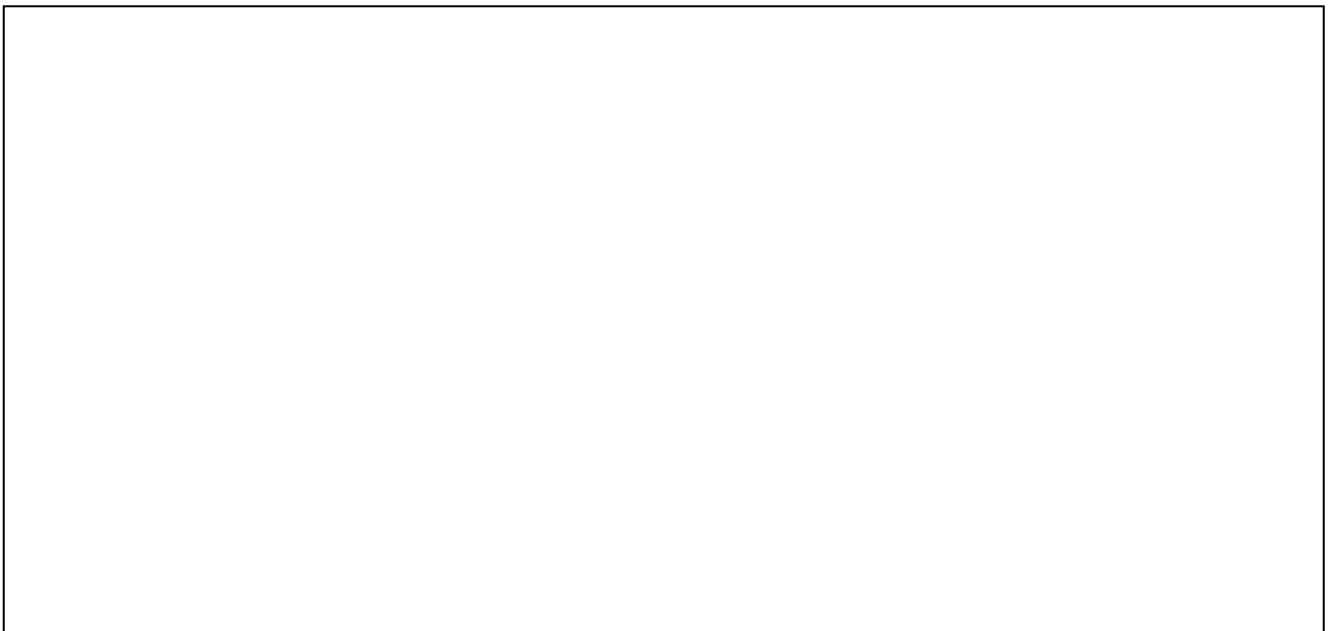


HA = Host Agent  
 SNIA = SNIA Library  
 DPI = Device Plug-In  
 PROP = Property File

**Physical map** (Be sure to also draw the Unmapped Devices panel.)



**Inferred map**



## Hands-on practice: creating users

This practice can be performed using classroom lab equipment or the Storage Area Manager demo/simulation.

### Create a new user with administrator privileges.

1. Select *Tool* → *Configure Security*.
2. In the resulting dialog box, click the *New User* button.
3. Enter the new user name in the User Name field.
4. Enter a description of the user in the Description field.
5. Enter the password associated with the user in the Password field.
6. Reenter the password to confirm in the Confirm field.
7. By default, all users are automatically assigned Users privileges. To assign Administrator privileges, select *Administrators* under the Not Member Of: section, and click the arrow button to move Administrators from the left panel to the right panel.
8. Click the *OK* button to save the new user.

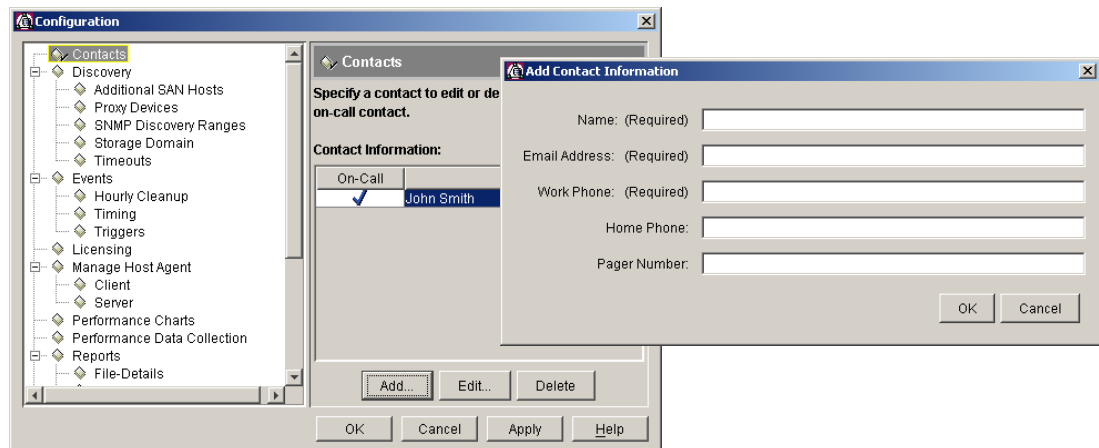


## Hands-on practice: adding contacts

This practice can be performed using classroom lab equipment or the Storage Area Manager demo/simulation.

### Add yourself as the SAN administrator on-call.

1. Select *Tools* → *Configure*.
2. Select the *Contacts*.
3. Click the *Add* button to add new contacts.
4. Enter the required parameters.
5. Click the *OK* button.
6. When multiple contacts are created, select the *On-Call* column to designate the contact oncall.



## Hands-on practice: using the CLUI

This practice requires classroom lab equipment.

1. From your client, select *Start* → *Run* and type `cmd` to open a command window.

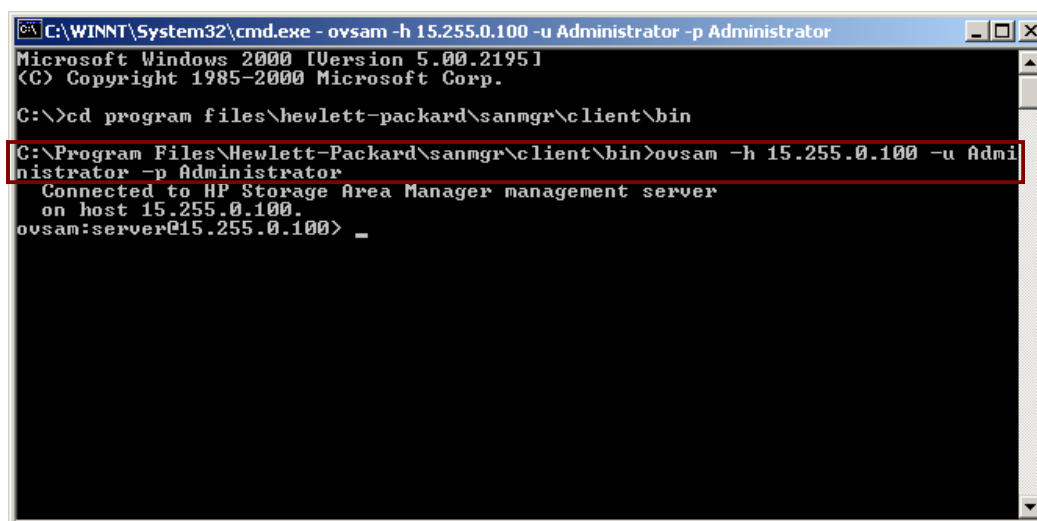
2. Go to the appropriate directory by entering:

```
cd \Program Files\Hewlett-Packard\sanmgr\client\bin
```

This path assumes that Storage Area Manager is installed in its default location.

3. Enter `ovsam -h <host> -u <user name> -p <password>` to connect to the management server, or SAN host, and start a CLUI session. Where `<host>` is the DNS name or IP address of the management server or SAN host, to which you want to connect and execute CLUI commands.

You do not have to enter a host if you are starting the CLUI on the management server.



```
C:\WINNT\System32\cmd.exe - ovsam -h 15.255.0.100 -u Administrator -p Administrator
Microsoft Windows 2000 [Version 5.00.2195]
(C) Copyright 1985-2000 Microsoft Corp.

C:\>cd program files\hewlett-packard\sanmgr\client\bin

C:\Program Files\Hewlett-Packard\sanmgr\client\bin>ovsam -h 15.255.0.100 -u Administrator -p Administrator
Connected to HP Storage Area Manager management server
on host 15.255.0.100.
ovsam:server@15.255.0.100> _
```

4. Initiate discovery on a specific SAN host by entering `core discover -n <host>` at the command prompt.
5. Display the device status polling interval by entering `core gvpp` at the command prompt.
6. Display the size of the database by entering `core getrepositorysize` at the command prompt.
7. Display the status of the management server by entering `core getstatus` at the command prompt.
8. Display the SNMP range that Storage Area Manager is using to discover devices by entering `core listdiscoverysnmpranges` at the command prompt.

## Customer scenario activity: customizing Storage Area Manager

You have been assigned to implement Storage Area Manager at ACME Corporation. You have just installed Storage Area Manager on the management server with the following specifications:

- Vendor/model — HP ProLiant DL380
- Operating system — Windows 2000 with SP3
- IP address — 156.16.7.99
- Server name — ACMESAM

Additionally, you have successfully deployed the Host Agent software to the SAN hosts.

As the first step in the implementation process, you have gathered the following information and verified that Storage Area Manager supports all hardware and software.

### Infrastructure device information

Switch name	Vendor	Model	Type	Firmware	IP address
SAN1-24kA	HP/Brocade	Silkworm 2400	edge, 1GB	2.4.1	156.17.7.21
SAN1-16bA	HP/Brocade	fc switch 16b	edge, 2GB	3.0.2f	156.17.7.21
SAN2-24kA	HP/Brocade	Silkworm 2400	edge, 1GB	2.4.1	156.17.7.21
SAN2-16bA	HP/Brocade	fc switch 16b	edge, 2GB	3.0.2f	156.17.7.32

All infrastructure devices are on the 255.255.248.0 subnet.

SNMP read community	SNMP write community	Admin name	Admin password
public	ACME	AdminACME	pw4mySAN

### Storage management appliance information

Device Name	Firmware	IP Address, Subnet	SNMP read community	SNMP write community	Admin name	Admin password
smad140fk34k129	v2.0 SP4	156.16.7.100, 255.255.248.0	public	ACME	administrator	admin34k129

ACME Corporation is using an HP Storage Management Appliance II.



## Storage system information

Model	Type	Firmware	# of Drives	Drive type	RAID level	Raw capacity	Usable capacity
Virtual Array 7400	Disk array	hp18	60	45 x 72GB, 10 x 36GB	Auto RAID	3.6TB	3.05TB
Virtual Array 7400	Disk array	hp18	60	45 x 72GB, 10 x 36GB	Auto RAID	3.6TB	3.05TB
Enterprise Virtual Array 5000	Disk array	vcs 2.0a	120	146GB	5, 1	17.5TB	13.0TB
Modular SAN Array 1000	Disk array	v2.38	22	72GB	5	1.5TB	1.3TB
SureStore Tape Library 6/60	Tape library	1.60	6	LTO Ultrium 1	NA	6TB/12 TB	NA

## Device management applications

Application	Type	Location	IP address	Admin name/ password
Command View SDM	Host-based	HP9000 A-Class	156.16.7.70	—
Command View EVA	Appliance-based	Management Appliance	156.16.7.100	Administrator/ admin34k129
MSA1000 ACU	Host-based	W2KFile1	156.15.7.11	—
Brocade Web Tools	Embedded	Switches	156.17.7.21 156.17.7.22 156.17.7.31 156.17.7.32	AdminACME/ pw4mySAN
Tape Library Manager	Embedded	Tape library 6/60 remote management board	156.17.7.200	Administrator/23235

## Device Manager URL information

Application	Launch commands
Command View SDM	<ul style="list-style-type: none"><li>■ <a href="http://156.16.7.70:4096/LauncherVA.html">http://156.16.7.70:4096/LauncherVA.html</a></li><li>■ <a href="http://156.16.7.70:4096/cmdviewVA.html?156.16.7.70:&lt;ArraySerialNumber&gt;">http://156.16.7.70:4096/cmdviewVA.html?156.16.7.70:&lt;ArraySerialNumber&gt;</a></li></ul>
mCommand View EVA	<ul style="list-style-type: none"><li>■ <a href="http://156.16.7.100:2301">http://156.16.7.100:2301</a></li></ul>
MSA1000 Array Configuration Utility (ACU)	<ul style="list-style-type: none"><li>■ <a href="https://156.15.7.11:2381">https://156.15.7.11:2381</a></li></ul>
Brocade Web Tools	<ul style="list-style-type: none"><li>■ <a href="http://156.17.7.21">http://156.17.7.21</a></li><li>■ <a href="http://156.17.7.22">http://156.17.7.22</a></li><li>■ <a href="http://156.17.7.31">http://156.17.7.31</a></li><li>■ <a href="http://156.17.7.32">http://156.17.7.32</a></li></ul>
TapeLibrary 6/60 Remote Management	<ul style="list-style-type: none"><li>■ <a href="http://156.17.7.200">http://156.17.7.200</a></li></ul>

## Other Application Information

To leverage benefits for consolidated application launch, ACME Corporation also wants to launch Microsoft Management Consoles (MMC), Data Protector Consoles, and ReflectionX from Storage Area Manager.

## Configuring user security

ACME Corporation wishes to restrict certain Storage Area Manager features to specific users as described in the following table.

Name	Department	Login name	Login password	Required rights	Account purpose
Wolfgang Weith	HP Services	WWeith	4service	Full configuration rights	Maintenance
Terry Banks	ACMEIT	TBanks	overn8	Full configuration rights	Full administration
Tony Gard	ACMEIT	TGard	Phantasy	Full rights except the ability to configure security	Storage management
Dennis Cooper	ACMEIT	DCooper	6thK97	Full rights except the ability to configure security	Storage management
Shaun Scott	IT Manager	SScott	none4all	View-only rights	Service level monitoring

1. To which user groups will you assign the users?

Wolfgang .....

Terry .....

Tony .....

Dennis .....

Shaun.....

## Discovering the environment

The first thing ACME Corporation wants to do is get a handle of the equipment in their environment, both in graphical and list format.

1. What must you do to ensure Storage Area Manager accurately discovers the SNMP devices in ACME Corporation's environment?

.....

.....

.....

### Infrastructure Device Information

Switch Name	Vendor	Model	Type	Firmware	IP Address
SAN1-24kA	HP/Brocade	Silkworm 2400	edge, 1GB	2.4.1	156.17.7.21
SAN1-16bA	HP/Brocade	fc switch 16b	edge, 2GB	3.0.2f	156.17.7.22
SAN2-24kA	HP/Brocade	Silkworm 2400	edge, 1GB	2.4.1	156.17.7.25
SAN2-16bA	HP/Brocade	fc switch 16b	edge, 2GB	3.0.2f	156.17.7.32

2. Given the previous information, what SNMP ranges will you enter to ensure the discovery process is as efficient as possible? All infrastructure devices are on the 255.255.248.0 subnet.

.....

3. When performing this configuration step, what else is required besides the SNMP address?

.....

4. How can you provide ACME Corporation with an inventory list of the equipment in their environment?

.....

.....

5. Upon reviewing the Inventory list, you notice that the EVA was not included. Upon closer inspection, you realize that Storage Area Manager did not discover it at all. What might be the cause of the problem?

.....

.....

.....

Hint: Refer to the Device Release notes if you do not know.

6. ACME Corporation also wants to print maps of the switch zoning information.  
What must be configured to retrieve this zoning information from the Brocade devices?

.....

7. What information is needed for this configuration?

.....

8. Where in the Storage Area Manager GUI do you perform this configuration step?

.....

## Configuring device management applications

Factory default device management links will work in a considerable number of scenarios. However, it might be necessary to modify factory default links to meet the specific needs of ACME Corporation.

1. How would you determine what the Storage Area Manager default launch commands are for device applications such as CommandView SDM, CommandView EVA, and the MSA1000 Array Configuration Utility?

.....

.....

.....

.....

2. If you determined that ACME Corporation's environment does require modification of some the factory default links, how would you make the changes?

.....

.....

## Configuring global applications

ACME Corporation also wants to launch MMC, Data Protector, and ReflectionX from Storage Area Manager.

1. Where must these applications reside?

.....

2. How do you configure Storage Area Manager to launch these applications?

.....

.....

3. When configured, can these launch commands be edited or if a change is required, must they be deleted and recreated?

.....

## Handling events

ACME Corporation has decided they want to monitor the following events and perform the corresponding actions.

Event	Actions to take
Single SAN link failure	<ul style="list-style-type: none"> <li>■ Store in database</li> <li>■ Acknowledge by operator</li> </ul>
Device unreachable	<ul style="list-style-type: none"> <li>■ Store in database</li> <li>■ “Net send” to operators</li> <li>■ SNMP forward to OpenView Network Node Manager</li> <li>■ Run automated ping/discovery script</li> </ul>
Critical EVA events	<ul style="list-style-type: none"> <li>■ Store in database</li> <li>■ Email operators</li> <li>■ Email IT Manager</li> <li>■ SNMP forward to OpenView Network Node Manager</li> <li>■ Export information for documentation purposes</li> </ul>

1. What steps must you take to ensure that the events listed are stored in the database?  
.....
2. Which event category do you specify when creating a trigger related to status changes?  
.....
3. Which action do you specify when configuring Storage Area Manager to alert operators using email that a switch has become unreachable?  
.....
4. Which action do you specify when configuring Storage Area Manager to alert operations using “net send” that a storage device has become unreachable?  
.....
5. What parameter on the ForwardTrapAction action must you specify to configure Storage Area Manager to forward an SNMP trap to Network Node Manager?  
.....



## Customer scenario activity: answers

The answers to the Managing the SAN Environment customer scenario activity follow.

### Configuring user security

1. Wolfgang (Administrator), Terry (Administrator), Tony (Operator), Dennis (Operator), Shaun (User)

### Discovering the environment

1. Configure the SNMP range. This can be done at initial installation using the Setup Assistant or from the Tools → Configure menu.
2. 156.17.7.21-156.17.7.25, 156.17.7.32
3. Read/write community names
4. In the Resources tree, select the domain. Click the *Node Manager* tab. Print or export the resulting inventory table.
5. The Storage Management Appliance might not have been configured as a proxy device.
6. Passphrases must be configured for Brocade devices to view zoning information.
7. Configuring passphrases requires the switch login and password.
8. In the Resources tree, right click either the *Interconnect Devices* node or a specific switch node and select *Configure Passphrases* from the shortcut menu.

### Configuring device management applications

1. Device-specific application launch requirements are often documented in the device release notes which are available by right-clicking a device and selecting the release notes from the shortcut menu. Additionally, you can view launch commands by looking in a device's property file at the "on manage" command.
2. Select *Tools* → *Storage Node Manager* → *Edit Application Link* and follow the steps provided by the Application Link wizard.

### Configuring global applications

1. To create global application links to these applications, they must reside on the management server.
2. Select *Tools* → *Add Application Link*.
3. To edit global application links, select *Tools* → *Edit Application Link*

## Handling events

1. No actions are required. The events are stored in the database by default.
2. To create a trigger to monitor for status changes, select the *Device* category.
3. To send an email alert, use *SendMailAction*.
4. To create a trigger that performs an action such as a “net send,” use the *RunCommandAction*.
5. When using *ForwardTrapAction*, you must specify a host to receive the traps.

### Objectives

After completing this lab, you should be able to:

- View performance metrics
- View and modify performance charts
- Create custom performance charts
- Delete performance charts
- Configure baselines and autothresholding
- Execute Storage Optimizer-related CLUI commands
- Customize a Storage Area Manager configuration to meet customer requirements

### Requirements

This exercise requires the following resources:

- The Storage Area Manager Demo/Simulation
- *HP OpenView Storage Area Manager Fundamentals*, Module 10, “Storage Optimizer”

## Hands-on practice: viewing host disk performance metrics

1. Using the Resources tree, expand the *Hosts* folder.
2. Expand the *IBM AIX* folder.
3. Select *Disks*.
4. Click the *Performance* tab.

The metric displayed for the host is Disk Device Physical Read Rate.

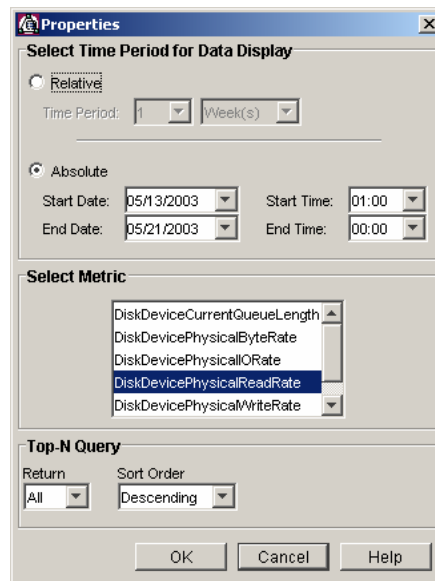
5. Click the *Properties* button.

The screenshot shows the HP OpenView Storage Area Manager interface. On the left, the 'Resources' tree is expanded to show 'Hosts' > 'IBM AIX' > 'POC-AIX' > 'Disks'. The main pane displays 'Disks on host POC-AIX' with the 'Performance' tab selected. A table lists disk performance metrics for various storage devices.

Storage Device	Device File	DiskDevicePhysicalRead...
Unknown LUN(s)	/dev/hdisk0	8,836.30
Unknown LUN(s)	/dev/safte0	4,382.92
HP SureStore Disk Arra...	/dev/hdisk8	2,898.02
HP SureStore Disk Arra...	/dev/hdisk7	2,155.22
HP SureStore Disk Arra...	/dev/hdisk5	1,747.15
HP SureStore Disk Arra...	/dev/hdisk2	1,479.46
HP SureStore Disk Arra...	/dev/hdisk1	1,248.58
HP SureStore Disk Arra...	/dev/hdisk23	1,096.38
HP SureStore Disk Arra...	/dev/hdisk22	972.52
HP SureStore Disk Arra...	/dev/hdisk4	884.43
HP SureStore Disk Arra...	/dev/hdisk3	794.03
HP SureStore Disk Arra...	/dev/hdisk6	736.98

At the bottom, the 'Storage Events' pane shows 'Event Filter: None' and 'Total Events: 710 Displayed Eve'. A 'Discovery Off' button is visible in the bottom right corner.

The Property window displays.

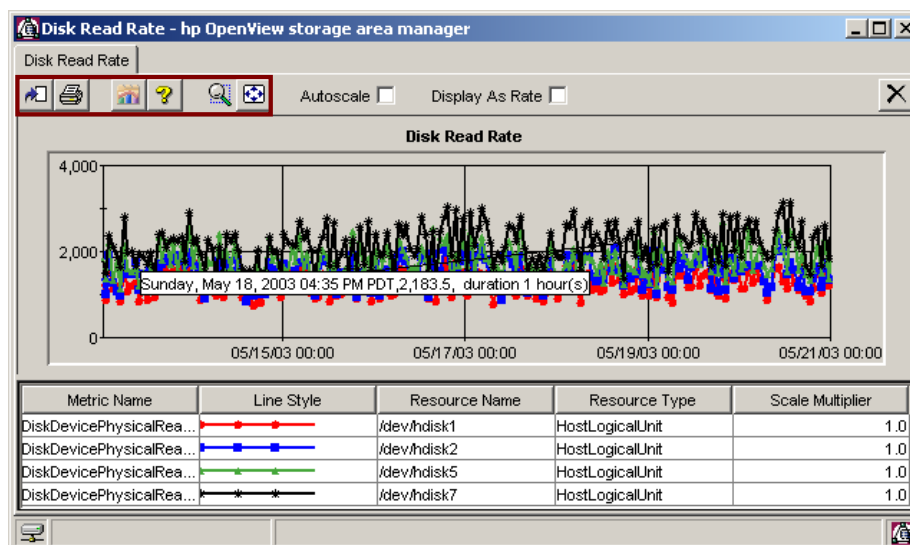


This window enables you to specify relative or absolute time frames for data and change the performance metric displayed. For the purposes of this practice, do not adjust the default values. All performance data for the Storage Area Manager simulation resides between the dates of 4/29/2003 and 5/22/2003.

6. Click the *Cancel* button.

## Hands-on practice: viewing and modifying performance charts

1. To graph the performance data in a simple chart, select several storage devices and click the *Display Selected Chart* button.
2. Click a specific data point to display details.



Notice that the chart includes a toolbar that enables you to export the chart, print the chart, edit chart properties, and zoom.

Trending allows you to apply different statistical models to predict the direction the data will take in the future. Analysis models improve the projection by taking into account the general characteristics of the data collected and the relative weight of specific characteristics. Additionally, you can gauge how accurate each forecasted point is by enabling the Show Range option.

3. Click the *Edit Chart Properties* button from the chart toolbar.

**Select Time Period for Data Display**

☐ Relative  
Time Period: 1 Week(s)

☒ Absolute  
Start Date: 05/13/2003 Start Time: 01:00  
End Date: 05/21/2003 End Time: 00:00

**Customize Chart Presentation**

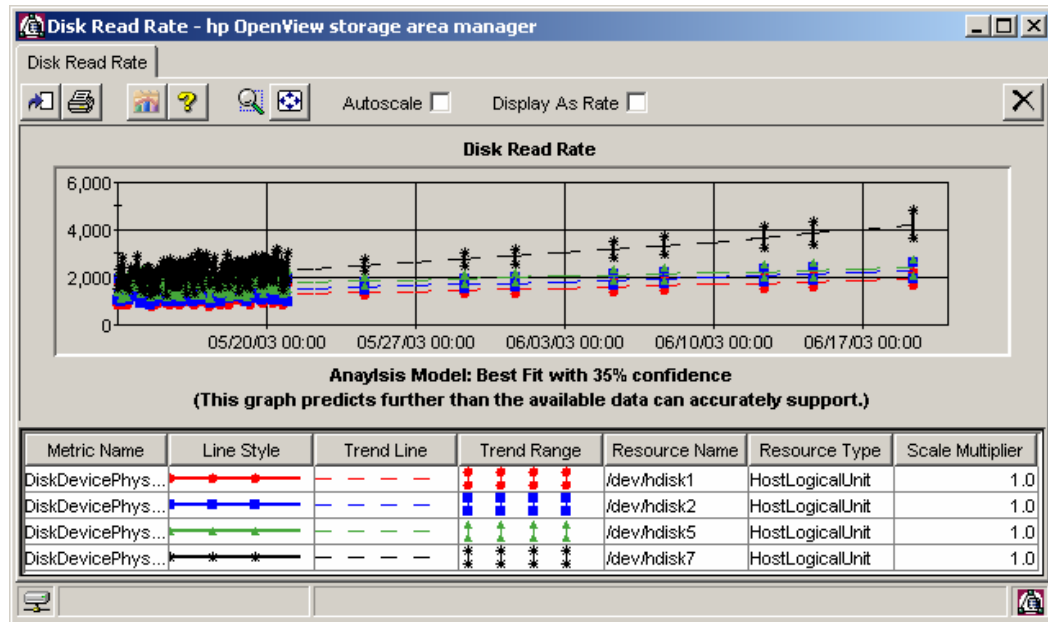
☒ Show X-Axis Grid Lines ☒ Show Y-Axis Grid Lines

**Trending / Baselineing**

☒ Show Trend ☐ Show Baseline ☐ None  
Analysis Model: Best Fit  
Analysis Model Parameters: None  
Projection: 1 Month(s)  
Confidence Parameters: ☒ Show Range Confidence %: 35

OK Cancel Help

4. Select the *Show Trend* radio button.
5. Set the projection period to *3 months* using the drop-down menu.
6. Select the *Show Range* check box.
7. Set the Confidence % to *35%* using the drop-down menu.
8. Click the *OK* button.



The chart displays again, this time with trend lines and a trend range. Greater confidence levels display greater ranges of possible values.

The same technique used to view performance data and work with associated charts can be applied to performance data associated with other types of devices as well.

9. Experiment with the Autoscale and Zoom features. Autoscale enables you to relate metrics more closely by putting them on the same scale.

## Hands-on practice: viewing a performance summary for storage devices

1. Navigate to the Storage Optimizer home page by clicking the *Storage Optimizer* icon on the main toolbar.
2. Click *Storage Devices Summary*.



The Storage Devices Summary screen provides a high-level view of all organizations and devices within those organizations.

Storage Device	Organization(s)	DeviceTotalOp...
HP StorageWorks EVA POC A	Globe Media, IT Operations	280,965,420.00
HP StorageWorks Virtual Arr...	ACME Corporation, Globe Medi...	261,445,111.00
HP StorageWorks EVA POC B	ACME Corporation, IT Operatio...	173,601,184.00
HP StorageWorks EVA POC C	ACME Corporation, IT Operatio...	172,048,635.00
HP StorageWorks Enterprise ...	Globe Media	158,053,247.00
HP StorageWorks Enterprise ...	ACME Corporation, Globe Medi...	156,435,290.00
HP StorageWorks Disk Array ...	ACME Corporation, Ecomdotne...	156,099,999.00
HP SureStore Disk Array XP5...	ACME Corporation, Ecomdotne...	66,970,916.00
HP StorageWorks EVA POC D	IT Operations, OpenView Univ...	50,456,633.00
EMC Symmetrix Model 8430	ACME Corporation, World Outs...	Not Supported
IBM ESS Shark Model 2105	OpenView University	Not Supported

To adjust the metric or time period displayed for this view panel, click the *Properties* button and make the desired changes.

3. Click the *Top-N query for LUNs over all storage devices* button.



Top-N LUN Query

Top-N LunWriteCacheHits

Display As Rate ☐

Show Organization

**Top-N Query Parameters**

Performance Metric: LunWriteCacheHits Return: 5 View: Largest Values

Select Time Period for Data Display

☒ Relative  
Time Period: 1 Year(s)

☐ Absolute  
Start Date: 10/07/2003 Start Time: 12:00  
End Date: 11/07/2003 End Time: 12:00

Parent Device	Organization(s)	LUN	Value
HP StorageWorks ...	ACME Corporation, E...	D6	45,203,938.00
HP StorageWorks ...	ACME Corporation, E...	D2	22,433,257.00
HP StorageWorks ...	ACME Corporation, ...	20	19,208,290.00
HP StorageWorks ...	ACME Corporation, E...	D5	15,069,659.00
HP StorageWorks ...	ACME Corporation, E...	D3	11,253,373.00

4. Change the relative time period to *1 Year(s)*.
5. Click the *Run Query* button.

Top-N LUN Query

Top-N LunWriteCacheHits

Display As Rate ☐

Show Organization

**Top-N Query Parameters**

Performance Metric: LunWriteCacheHits Return: 5 View: Largest Values

Select Time Period for Data Display

☒ Relative  
Time Period: 1 Year(s)

☐ Absolute  
Start Date: 10/07/2003 Start Time: 12:00  
End Date: 11/07/2003 End Time: 12:00

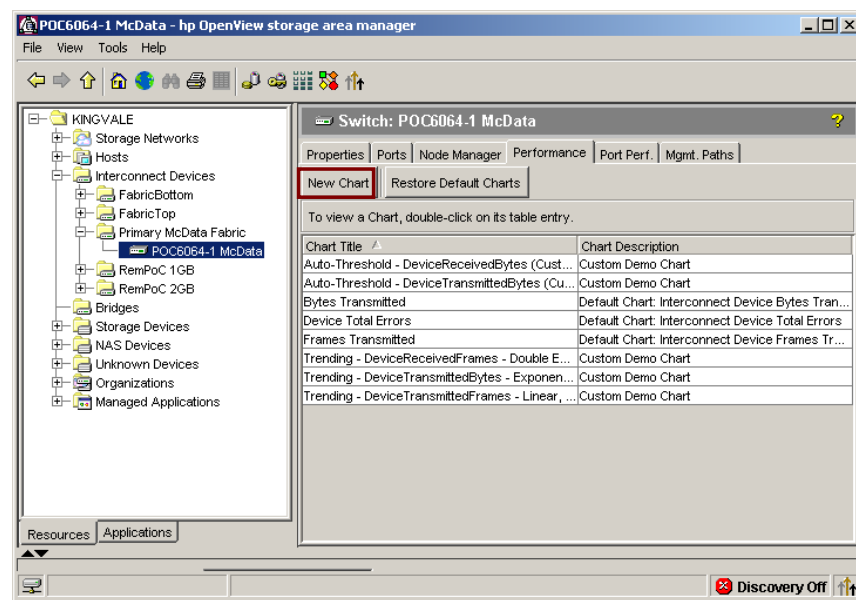
Parent Device	Organization(s)	LUN	Value
HP StorageWorks ...	ACME Corporation, E...	D6	45,203,938.00
HP StorageWorks ...	ACME Corporation, E...	D2	22,433,257.00
HP StorageWorks ...	ACME Corporation, ...	20	19,208,290.00
HP StorageWorks ...	ACME Corporation, E...	D5	15,069,659.00
HP StorageWorks ...	ACME Corporation, E...	D3	11,253,373.00

The query results include:

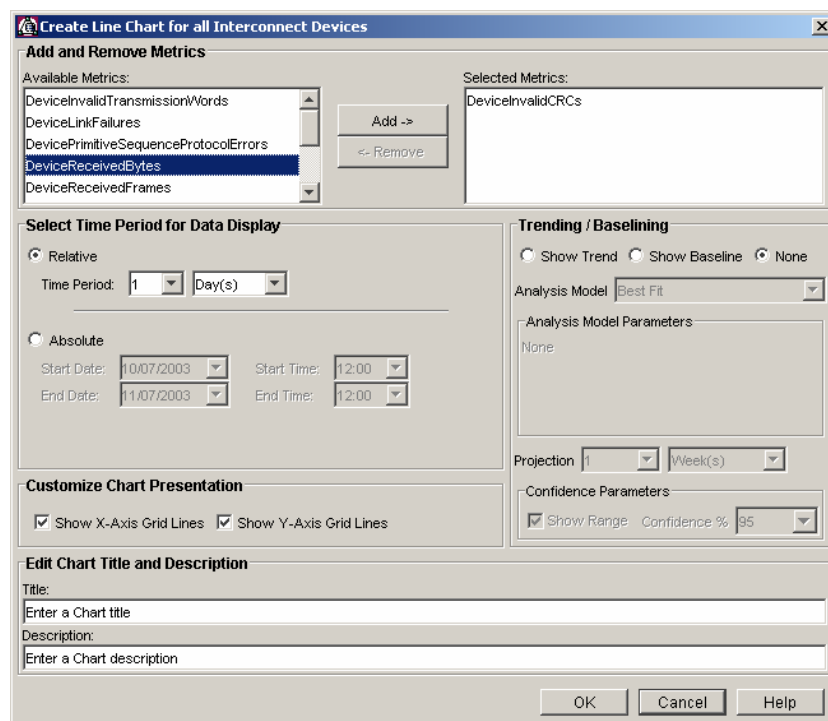
- **Parent device** — The name of the storage device that contains the LUN
- **Organization** — The name of the organization associated with the storage device, if any (to limit the query to the LUNs associated with a particular organization, click the *Select...* button next to Show Organization and select an organization from the drop-down menu)
- **LUN** — The LUN identifier, unique to the storage device
- **Value** — The averaged metric for the selected time period

## Hands-on practice: creating a custom performance chart

1. Select a specific storage device in the Resources tree.
2. Click the *Performance* tab.
3. Click the *New Chart* button.



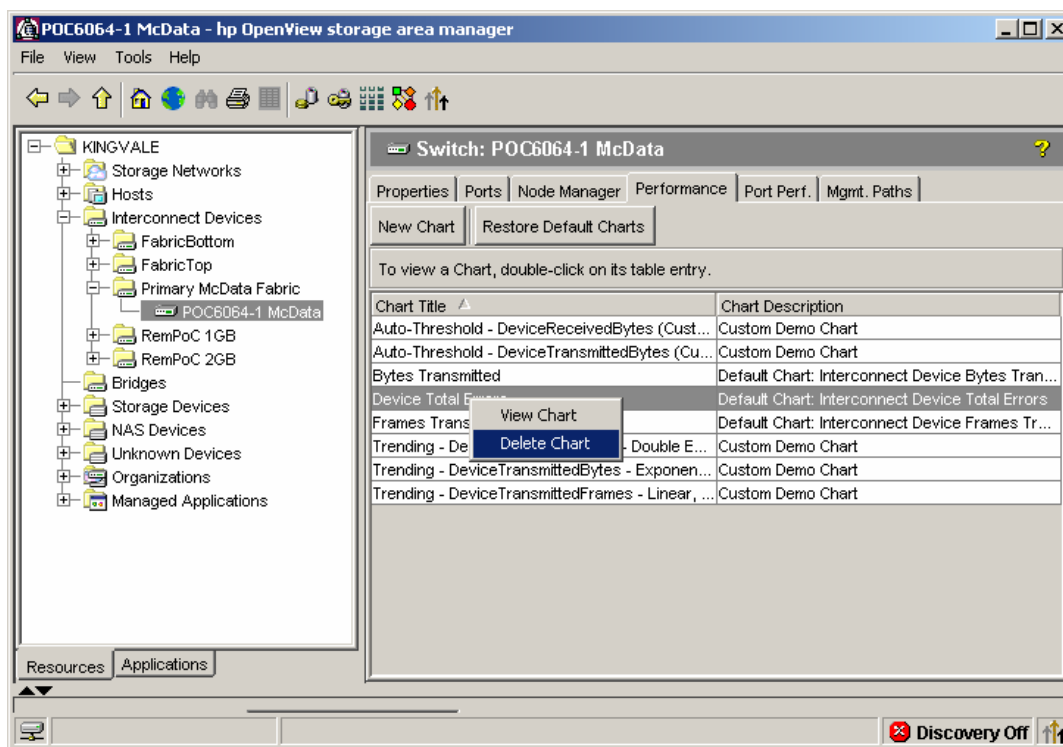
The Create Line Chart window displays.



4. Select the metrics to be added to the chart and click the *Add* button.
5. Select the time period to be displayed (either Relative or Absolute).
6. Select one of the Trending/Baselining options (Trending, Baselining, or None).
  - a. If Trending is selected, set the Analysis Model, Analysis Model Parameters, Projection, and Confidence Parameters.
  - b. Customize the chart presentation by selecting whether or not to show X- and Y-axis grid lines.
  - c. Enter the chart title and description.
  - d. Click the *OK* button to finish and view the chart.

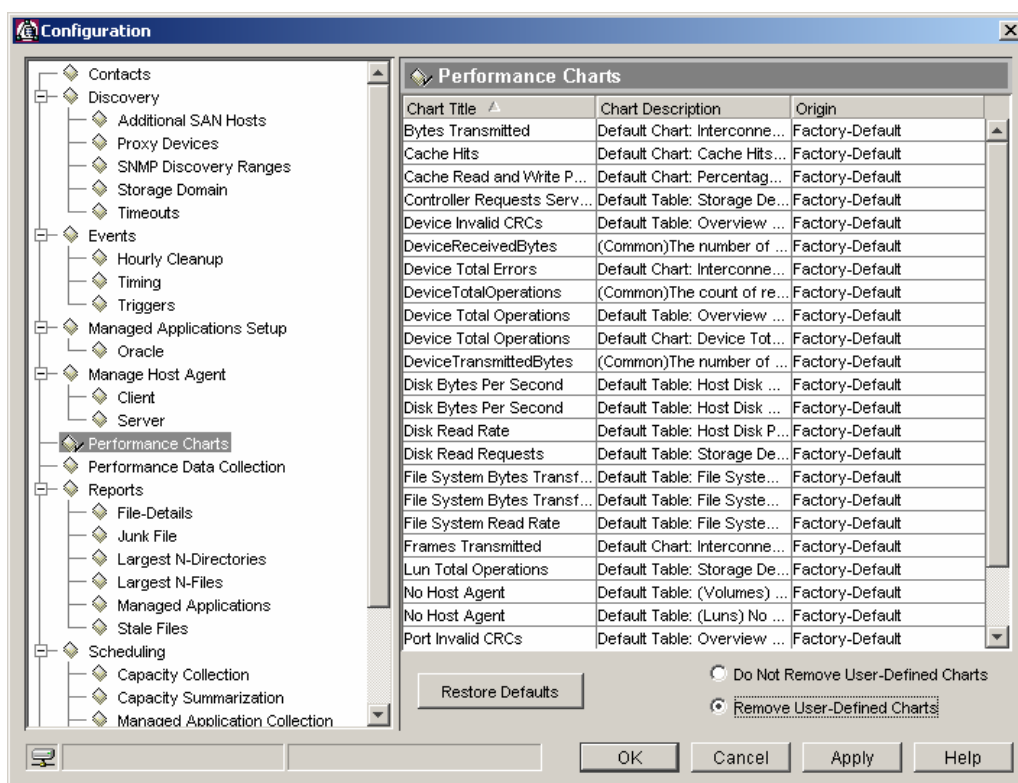
## Hands-on practice: deleting a chart

1. Select a specific storage device in the Resources tree.
2. Click the *Performance* tab.
3. Right-click the chart to be deleted and select *Delete Chart* from the shortcut menu.
4. Click the *Yes* button to confirm deletion of the chart.



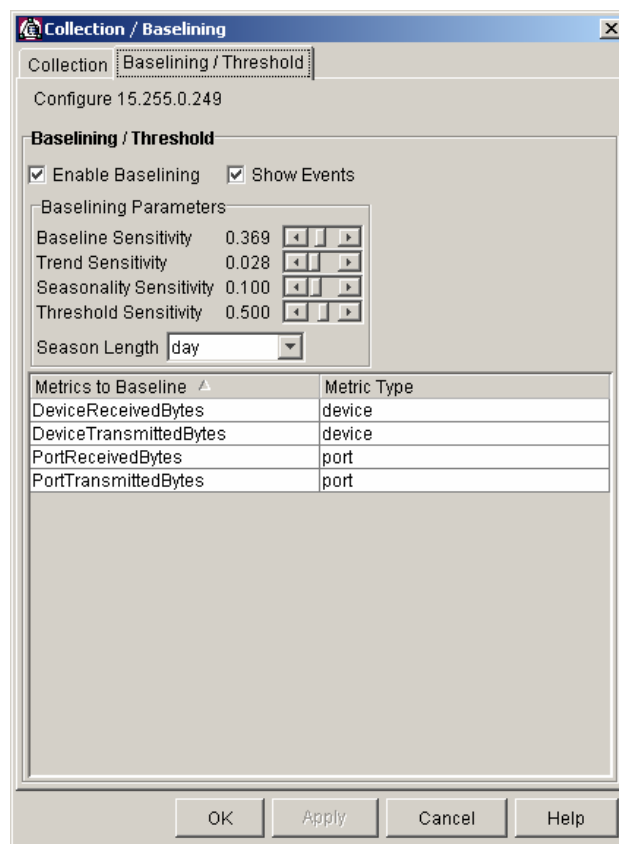
## Hands-on practice: deleting all user-defined charts

1. Select *Tools* → *Configure*.
2. Select *Performance Chart*.
3. Click the *Remove User-Defined Charts* option button.
4. Click the *Restore Defaults* button.



## Hands-on practice: configuring baselines and auto-thresholding

1. Select *Tools* → *Configure*.
2. In the Configuration dialog box, select the *Performance Data Collection* node.
3. From the list of available devices, double-click the Brocade switch.
4. At the Collection tab, select the *Collect Metrics* check box and select the *Collect All Metrics* option button.
5. Click the *Baselining/Threshold* tab.
6. Select the *Enable Baselining* check box and modify the various baselining parameters, including Threshold Sensitivity and Season Length.



7. Click the *OK* button to exit.

## Hands-on practice: using the CLUI

To view a list of Storage Optimizer-related commands, enter `optimizer` at the command prompt and a list of available commands displays. Replace the word `optimizer` with `optr` before any command to shorten the syntax.

1. To list storage devices that Storage Area Manager is aware of, enter `optr lsv` at the command prompt.

---

**Note**

Since both “disks” and “devices” start with the same letter, commands use “v” as the shortcut for devices. Storage Optimizer-supported devices include a tag indicating that they are supported. The far left column is the device name, identical to the name displayed in the GUI. The other columns list the device vendor and device type. Note that the “-v” option may be appended for “verbose” output, including column headers.

---

2. To display a list of supported metrics from a device, select a device name from the list of Storage Optimizer-supported devices and enter `optr lsvm <device name or device serial #>` at the command prompt. (For example: `optr lsvm 00SG202G0022 -D`.)

This displays only device-level metrics.

3. To enable or disable Optimizer data collection on a storage device, use the `ssvcs` command.
  - a. To enable collection, enter `optr ssvcs <device name> enabled`.
  - b. To disable collection, enter `optr ssvcs <device name> disabled`.

(Example: `optr ssvcs 00SG202G0022 enabled`.)

There is no confirmation message if the command is successful.

4. To enable or disable Optimizer auto-baselining on a storage device, use the `ssvbs` command.
  - a. To enable auto-baselining, enter `optr ssvbs <device name> enabled`.
  - b. To disable auto-baselining, enter `optr ssvbs <device name> disabled`.

(Example: `optr ssvbs 00SG202G0022 enabled`.)

These commands generate a confirmation message.

5. To change the number of days that Storage Optimizer stores data in the database, enter `optr sdra <days>`.

(Example: `optr sdra 20`.)

This command does not generate a message if it is successful.



## Hands-on practice: OpenView Performance Agent installation

The OpenView Performance Agent (OVPA), formerly known as MeasureWare, is used by Storage Optimizer to collect physical host disk and volume metrics. In this lab you will install OVPA on a windows system and enable collection of disk performance metrics to support Storage Optimizer.

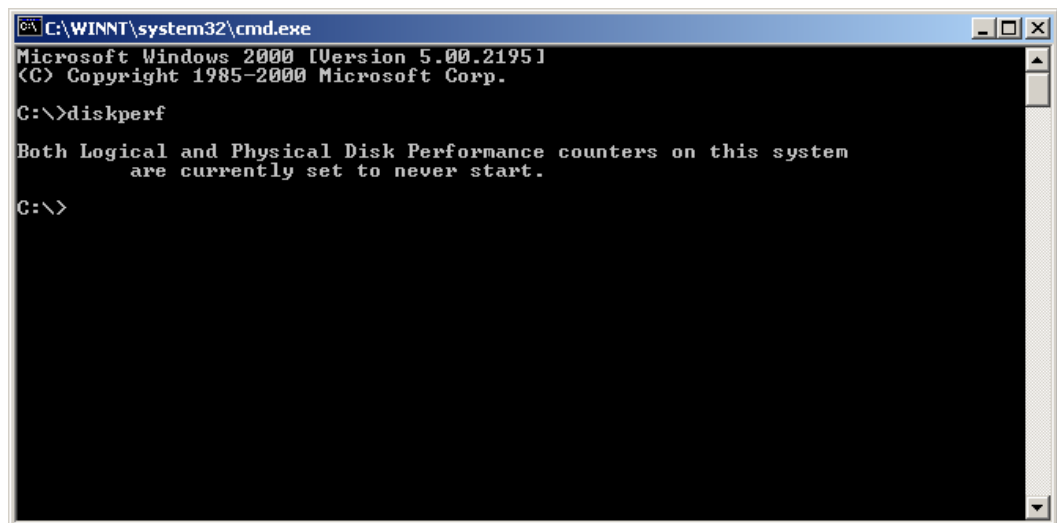
1. Download the latest copy of OVPA to a Windows system.

OVPA can be downloaded from

**<http://www.openview.hp.com/products/ovperf/download.html>**.

If the package is in zip format, you will need to un-zip the file with WinZIP.

2. Double-click *setup.exe*.
3. Follow the wizard by clicking the *Next* and *OK* button as appropriate except those listed below.
  - a. When you reach the prompt asking if you would like MeasureWare Agent services to be started, select *No*. Before starting the services, we need to make sure that Windows disk performance counters are enabled and make a change to the OVPA/MeasureWare configuration file.
4. Determine if the Windows disk performance counters are enabled. If not, enable them.
  - a. Start a command window and execute the *diskperf* command to determine if Windows disk performance counters are enabled.



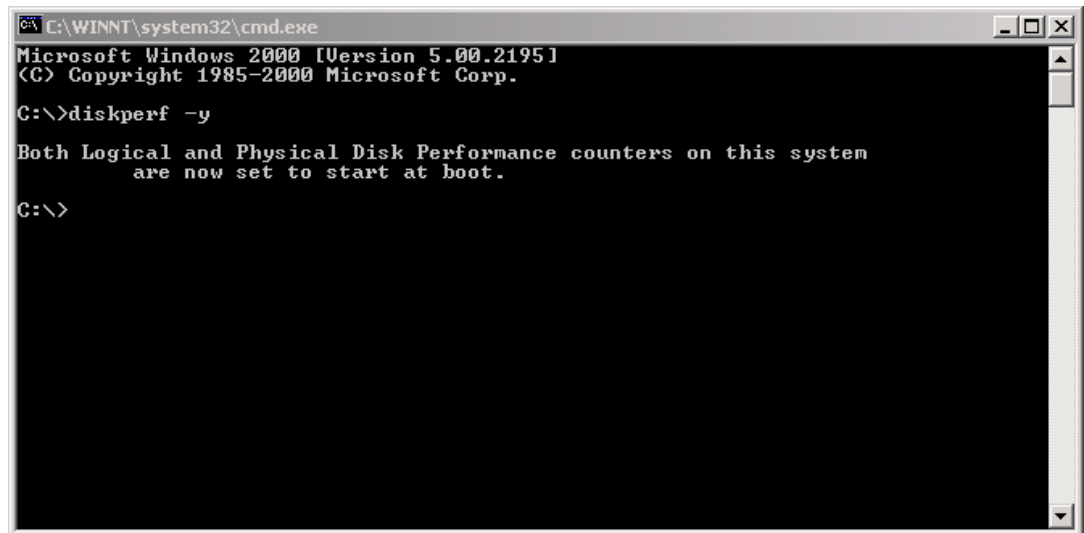
```
C:\WINNT\system32\cmd.exe
Microsoft Windows 2000 [Version 5.00.2195]
(C) Copyright 1985-2000 Microsoft Corp.

C:\>diskperf

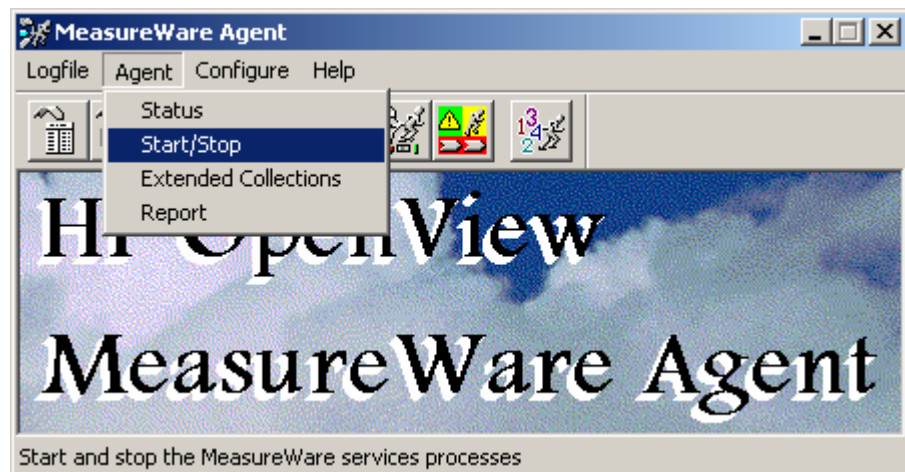
Both Logical and Physical Disk Performance counters on this system
are currently set to never start.

C:\>
```

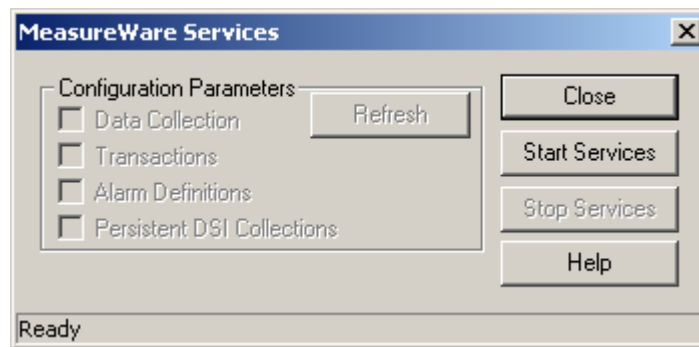
- b. If the counters are not enabled, execute *diskperf -y* to enable them.



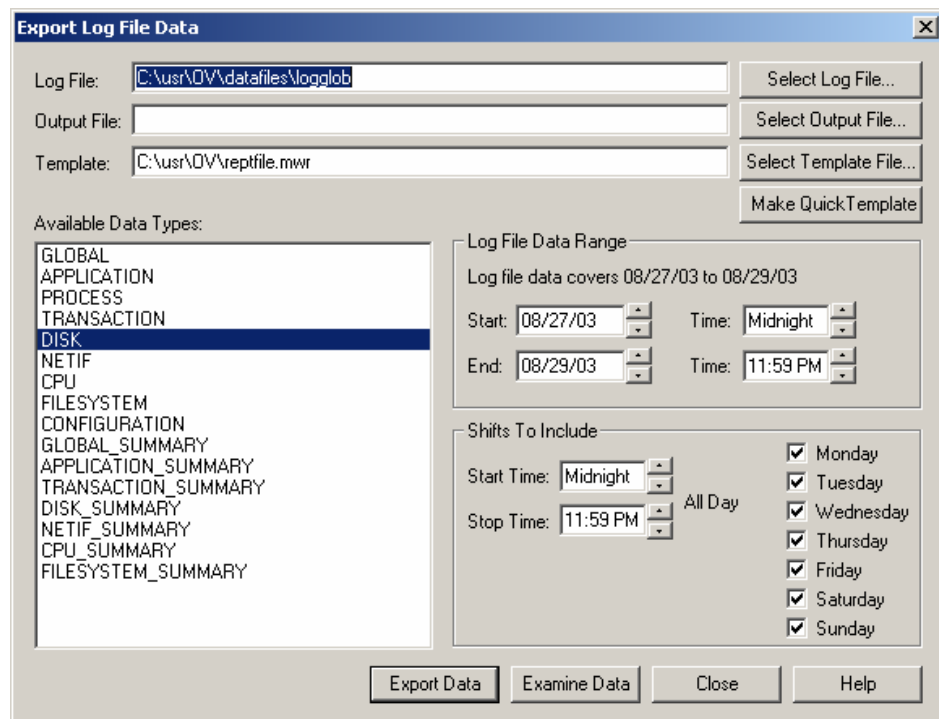
5. Configure OVPA to capture disk performance metrics from all disks.
- Using the Control Panel, make sure the MeasureWare Data Collection service is not running.
  - Use Notepad to edit the file C:\rpmtools\data\parm.mwc. Change the line  
log global process application transaction dev=disk  
to  
log global process application transaction  
dev=disk,lvm=all
6. Start OVPA using the OVPA GUI.
- Select *Start* → *Programs* → *HP OpenView* → *OV Performance Agent* → *Performance Agent*.
  - Select *Agent* → *Start/Stop* to start OVPA.



- c. Click the *Start Services* button.



7. Allow a few minutes for the OVPA to start and collect metrics and then view the collected disk metrics using the OVPA GUI export function.
- Within the OVPA GUI, select *Logfile* → *Export*.
  - In the resulting dialog box, select the *DISK* data type and enter the name of a file in the Output File field. Select *Export Data* and then open the resulting file with Notepad.



- c. Open your output file and review the data to confirm that it is being collected.

## Customer scenario activity: monitoring performance

ACME Corporation wishes to monitor the performance of their environment, specifically looking at LUN and port utilization. Additionally, they would like to evaluate the status of ports in their environment to ensure they are not experiencing any hardware problems.

### LUN utilization

1. ACME Corporation wants to determine the busiest LUN in their environment in order determine if there are any performance issues.

How can ACME Corporation use Storage Optimizer to make this determination?

.....

.....

.....

.....

### Port utilization

1. ACME Corporation wants to determine how congested each of their port is.

How can ACME Corporation use Storage Optimizer to make this determination?

.....

.....

.....

.....

### Port errors

1. ACME wants to determine the status of each of their port.

How can ACME Corporation use Storage Optimizer to make this determination?

.....

.....

.....

.....

## Customer scenario activity: answers

The answers to the Storage Optimizer customer scenario activity follow.

### LUN utilization

1. ACME Corporation wants to determine the busiest LUN in their environment in order determine if there are any performance issues.

How can ACME Corporation use Storage Optimizer to make this determination?

- a. **In the Applications tree, select the Storage Devices node.**
- b. **On the Performance tab, click the *Top-N* query button.**
- c. **From the Performance Metric drop-down menu, select LunTotalOperations, LunReadOperations, or LunWriteOperations**
- d. **Click the *Run Query* button.**

Alternatively, ACME Corporation can also look at this information from the host perspective.

- a. **In the Resources tree, expand the Hosts node.**
- b. **Expand a specific host node.**
- c. **Select the Disks node.**
- d. **Click the *Performance* tab.**
- e. **Click the *Properties* button.**
- f. **Select DiskDevicePhysicalReadRate or DiskDevicePhysicalWriteRate as the metric to display.**
- g. **Click the *OK* button.**
- h. **Click the metric name in the table header to sort in descending order.**

## Port utilization

1. ACME Corporation wants to determine how congested each of their port is. How can ACME Corporation use Storage Optimizer to make this determination?

**ACME Corporation first needs to determine the amount of I/O that is going through the port. Storage Optimizer supports looking at the throughput metrics on the host HBA and switch port levels.**

**To view throughput on the host HBA:**

- a. In the Resources tree, expand the Hosts node.
- b. Expand a specific host node.
- c. Select HBAs.
- d. Select *Performance* tab.
- e. Check the *Display as Rate* box.
- f. Click the Properties button.
- g. Display the PortTransmittedBytes and PortReceivedBytes metrics.

**To view throughput on a switch port:**

- a. In the Resources tree, expand the Interconnect Devices node.
- b. Select a switch.
- c. Select the *Port Perf.* tab.
- d. Check the *Display as Rate* box.
- e. Click the Properties button.
- f. Display the PortTransmittedBytes and PortReceivedBytes metrics.

**The values obtained will be in bytes per second. ACME Corporation's next step is to determine the link speed of the port. If this is 1 GB, the port can transmit at 100Mbps and receive at 100Mbps. Converting this to bytes we get  $100,000,000/8 = 12.5\text{MBps}$ . To determine utilization, ACME Corporation would take the values displayed the charts and divide them by 12500000 (for a 1 GB link).**

## Port errors

1. ACME wants to determine the status of each of their port.

How can ACME Corporation use Storage Optimizer to make this determination?

Optimizer allows for looking at port error metrics from host HBA and switch port level.

**To view view port error metrics on a host HBA:**

- a. In the Resources tree, expand the Hosts node.
- b. Expand a specific host node.
- c. Select HBAs.
- d. Select *Performance* tab.
- e. Check the *Display as Rate* box.
- f. Click the Properties button.
- g. Display PortInvalidCRCs, PortInvalidTransmissionWords, PortLinkFailure, PortPrimitiveSequenceProtocolErrors, PortSignalLoss, or PortSynchronizationLosses metrics.

**To view port error metrics on a switch port:**

- a. In the Resources tree, expand the Interconnect Devices node.
- b. Select a switch.
- c. Select the *Port Perf.* tab.
- d. Check the *Display as Rate* box.
- e. Click the Properties button.
- f. Display PortInvalidCRCs, PortInvalidTransmissionWords, PortLinkFailure, PortPrimitiveSequenceProtocolErrors, PortSignalLoss, or PortSynchronizationLosses metrics

**Most of the values should be 0 or at least close to it. If the numbers are any larger it would indicate some kind of hardware error such as bad GBICs.**





### Objectives

After completing this lab, you should be able to:

- View capacity-related panels, graphs, and reports
- Configure capacity-related thresholds
- View and configure managed directories
- Set collection schedules
- Execute Storage Builder-related CLUI commands

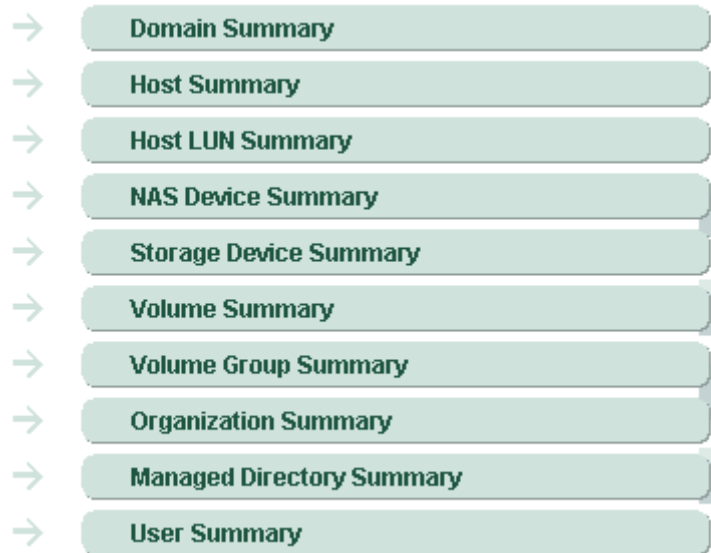
### Requirements

This exercise requires the following resources:

- The Storage Area Manager Demo/Simulation
- *HP OpenView Storage Area Manager Fundamentals*, Module 11, “Storage Builder”

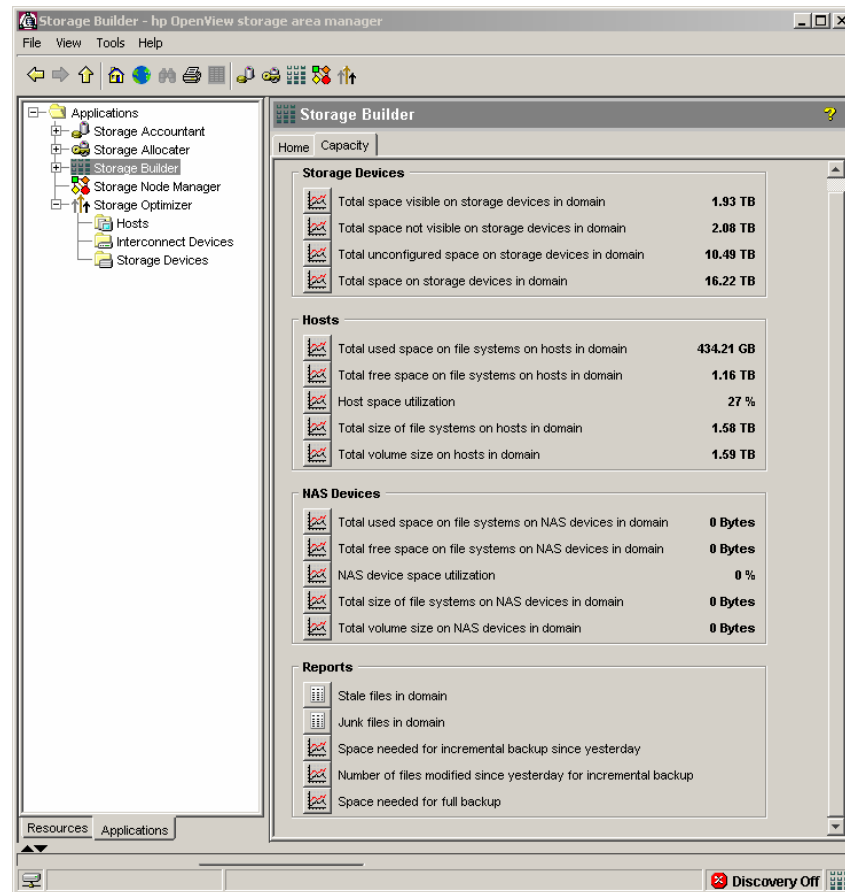
## Hands-on practice: viewing the domain summary

1. Navigate to the Storage Builder home page by clicking the *Storage Builder* icon on the main toolbar.



2. Click *Domain Summary*.

The Storage Domain Summary provides the most comprehensive view of storage capacity. The results show the total used and free space on all hosts and NAS devices in the domain, and the total visible, not visible, and unconfigured space on all storage devices in the domain. For this View panel, you can also view domain-level reports and capacity graphs.



3. View several of the charts for the domain. To view data, you might need to adjust the time period. The majority of capacity data for the Storage Area Manager Demo/Simulation resides between the dates of 4/29/2003 and 5/22/2003.
  - a. Click one of the chart or report buttons.
  - b. Click the *Edit Chart Properties* button.
  - c. Adjust the time period using either the Relative or Absolute options.

**View/Modify Chart Properties**

**Select Time Period for Data Display**

☒ Relative  
Time Period: 1 Month(s)

☐ Absolute  
Start Date: 10/07/2003 Start Time: 14:00  
End Date: 11/07/2003 End Time: 14:00

**Customize Chart Presentation**

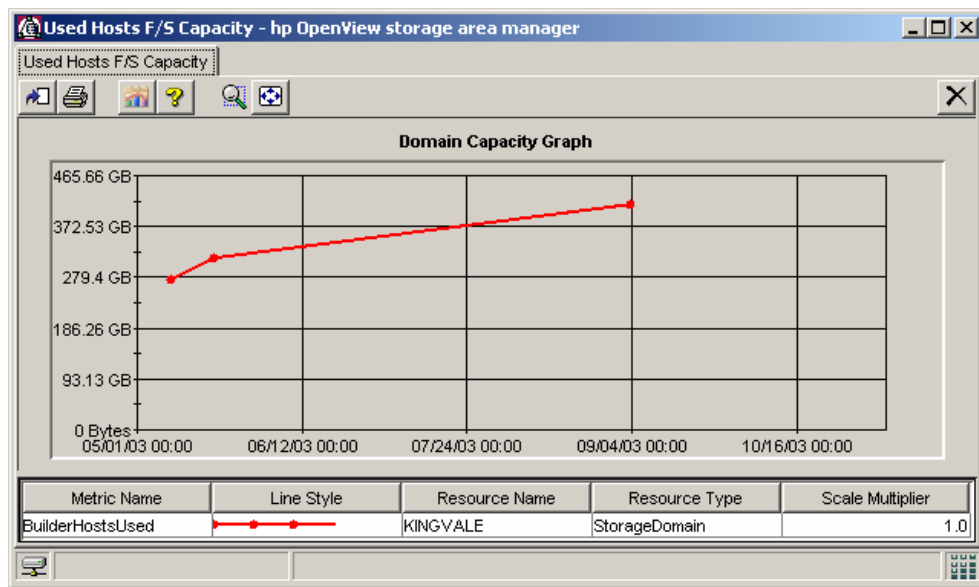
☒ Show X-Axis Grid Lines ☒ Show Y-Axis Grid Lines

**Trending**

☐ Show Trend Data  
Analysis Model: Best Fit  
Analysis Model Parameters: None  
Projection: 1 Week(s)  
Confidence Parameters: ☒ Show Range Confidence %: 95

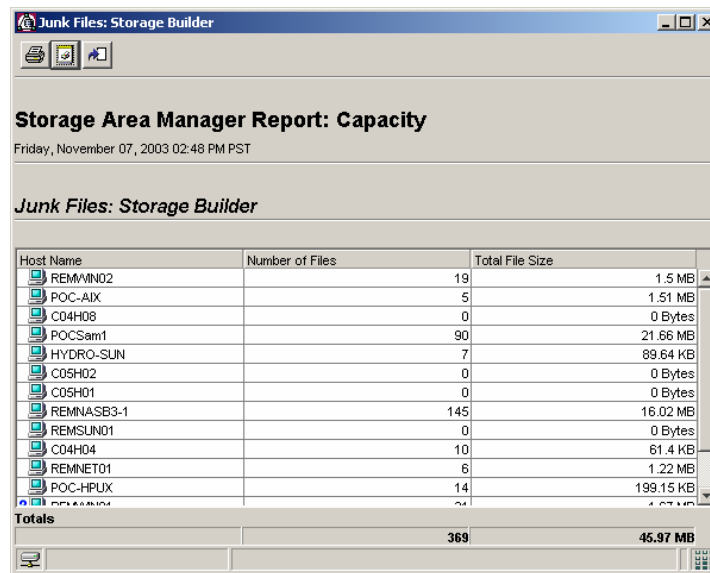
OK Cancel Help

d. Click the *OK* button.



## Hands-on practice: stale and junk files

1. From the Storage Domain Summary, select the *Junk Files in Domain* button.



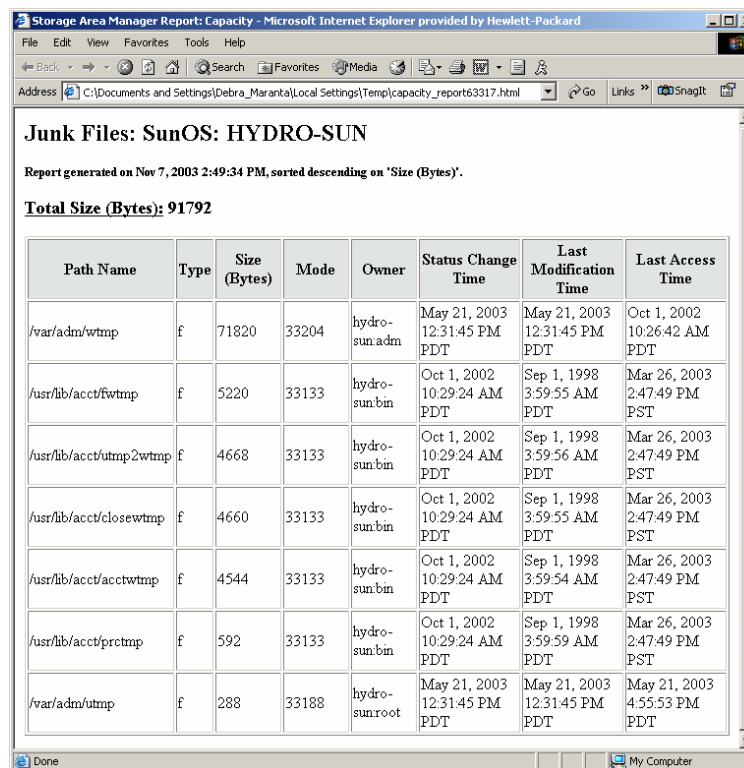
**Junk Files: Storage Builder**

Storage Area Manager Report: Capacity  
Friday, November 07, 2003 02:48 PM PST

**Junk Files: Storage Builder**

Host Name	Number of Files	Total File Size
REMMIN02	19	1.5 MB
POC-AIX	5	1.51 MB
C04H08	0	0 Bytes
POCSam1	90	21.66 MB
HYDRO-SUN	7	89.64 KB
C05H02	0	0 Bytes
C05H01	0	0 Bytes
REMNASB3-1	145	16.02 MB
REMSUN01	0	0 Bytes
C04H04	10	61.4 KB
REMNETO1	6	1.22 MB
POC-HPUX	14	199.15 KB
<b>Totals</b>	<b>369</b>	<b>45.97 MB</b>

2. Double-click one of the Hosts to view a detailed report of junk files.



**Junk Files: SunOS: HYDRO-SUN**

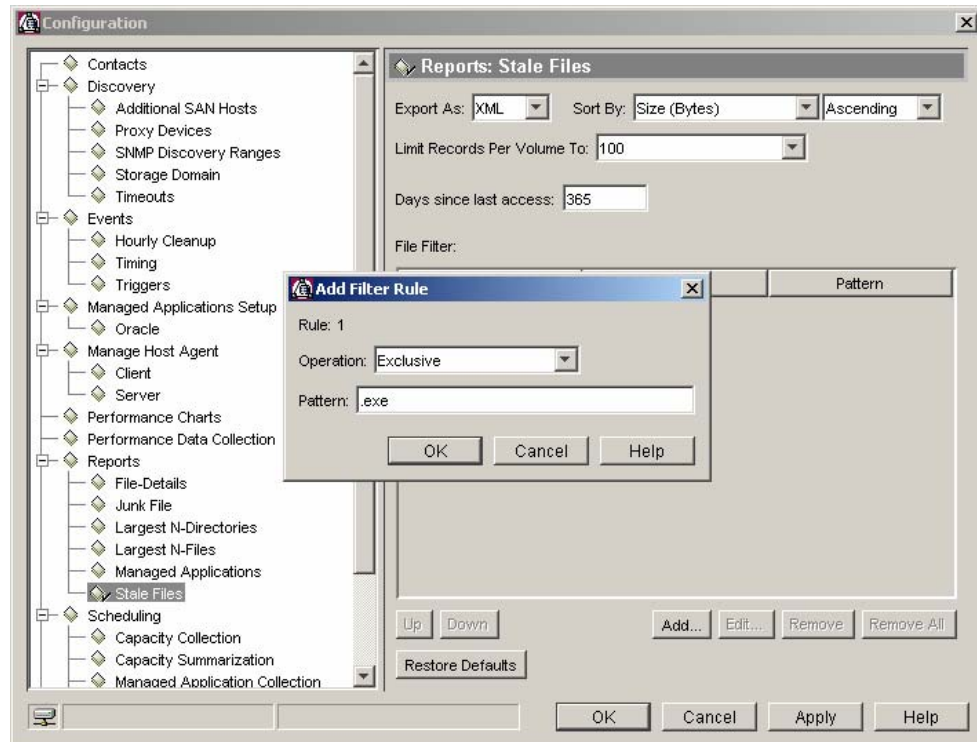
Report generated on Nov 7, 2003 2:49:34 PM, sorted descending on 'Size (Bytes)'.

**Total Size (Bytes): 91792**

Path Name	Type	Size (Bytes)	Mode	Owner	Status Change Time	Last Modification Time	Last Access Time
/var/adm/wtmp	f	71820	33204	hydro-sun.adm	May 21, 2003 12:31:45 PM PDT	May 21, 2003 12:31:45 PM PDT	Oct 1, 2002 10:26:42 AM PDT
/usr/lib/acct/fwtmp	f	5220	33133	hydro-sun.bin	Oct 1, 2002 10:29:24 AM PDT	Sep 1, 1998 3:59:55 AM PDT	Mar 26, 2003 2:47:49 PM PST
/usr/lib/acct/utmp2wtmp	f	4668	33133	hydro-sun.bin	Oct 1, 2002 10:29:24 AM PDT	Sep 1, 1998 3:59:56 AM PDT	Mar 26, 2003 2:47:49 PM PST
/usr/lib/acct/closewtmp	f	4660	33133	hydro-sun.bin	Oct 1, 2002 10:29:24 AM PDT	Sep 1, 1998 3:59:55 AM PDT	Mar 26, 2003 2:47:49 PM PST
/usr/lib/acct/acctwtmp	f	4544	33133	hydro-sun.bin	Oct 1, 2002 10:29:24 AM PDT	Sep 1, 1998 3:59:54 AM PDT	Mar 26, 2003 2:47:49 PM PST
/usr/lib/acct/prctmp	f	592	33133	hydro-sun.bin	Oct 1, 2002 10:29:24 AM PDT	Sep 1, 1998 3:59:59 AM PDT	Mar 26, 2003 2:47:49 PM PST
/var/adm/utmp	f	288	33188	hydro-sunroot	May 21, 2003 12:31:45 PM PDT	May 21, 2003 12:31:45 PM PDT	May 21, 2003 4:55:53 PM PDT

3. Select *Tools* → *Configure*.
  4. Under Reports, select *Junk File*.  
Junk files are currently defined as files of what type?
- .....

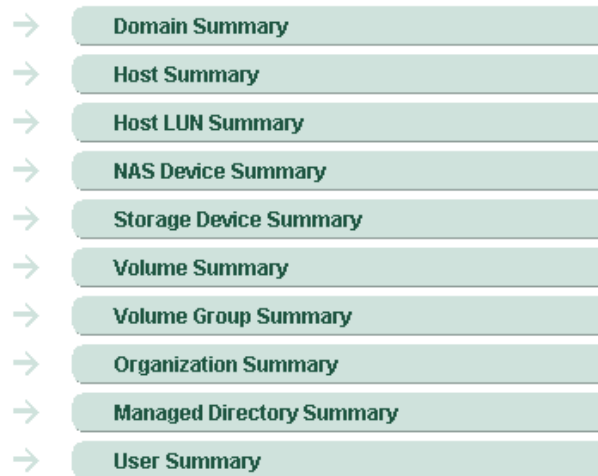
5. Click the *Cancel* button.
6. Under Reports, select *Stale Files*.
7. Configure the Stale File report as follows:
  - Export as XML
  - Sort by Ascending order
  - Exclude all .exe files



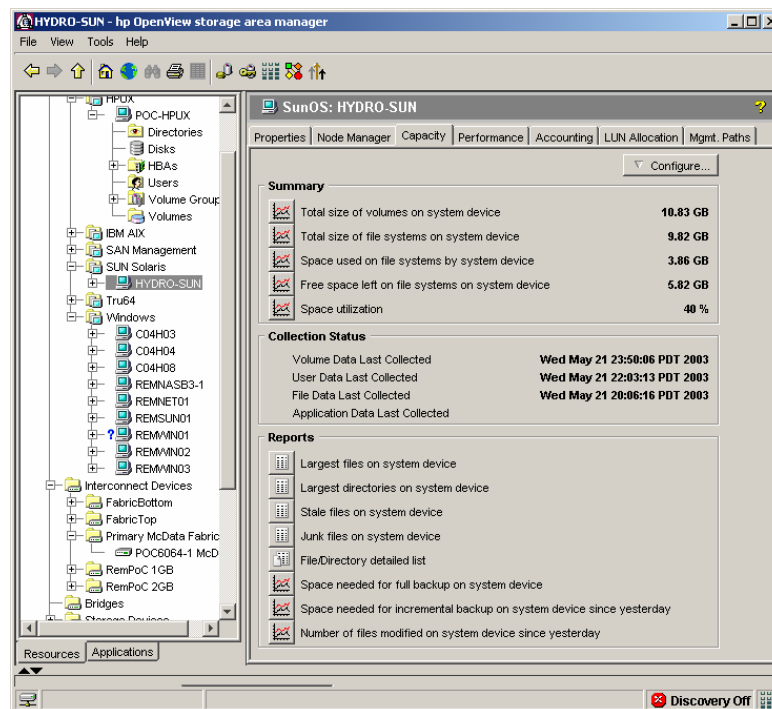
8. Click the *OK* button to save your configuration changes.

## Hands-on practice: viewing host and volume information

1. Return to the Storage Builder home page.

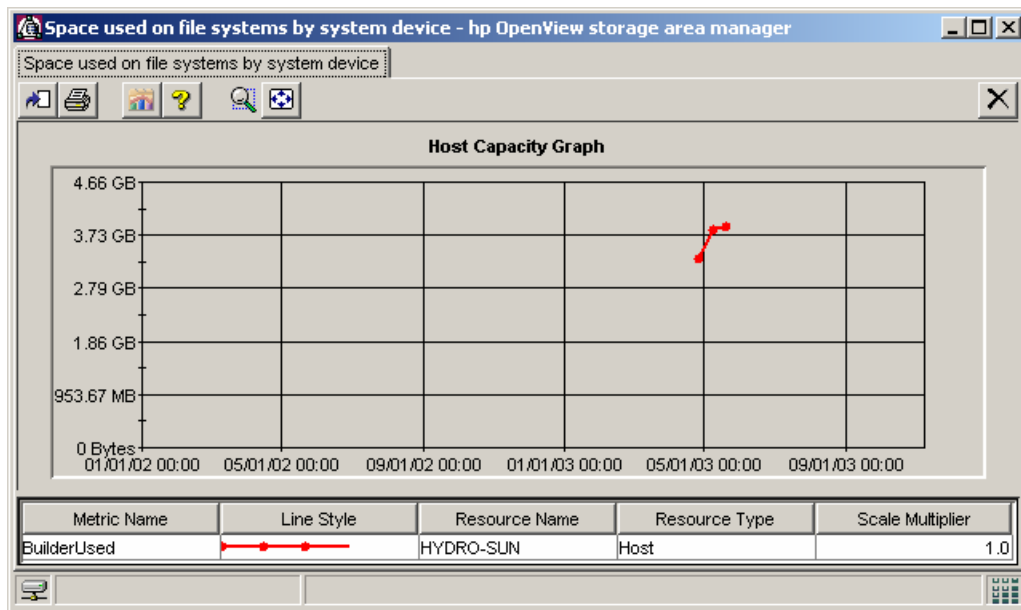


2. Click *Host Summary*.
3. Click *HYDRO-SUN* to view the capacity information for this specific host.



Notice several reports are available for an individual host that were not available at the storage domain level.

- Click the *Graph* button for space used on file systems by system device.



As with Storage Optimizer, you can configure trending models in Storage Builder in show, in a graphical format, a prediction of the direction the data will take in the future.

- Click the *Edit Chart* button on the graph toolbar.

**Select Time Period for Data Display**

☒ Relative  
Time Period: 1 Year(s)

☐ Absolute  
Start Date: 11/07/2002 Start Time: 14:00  
End Date: 11/07/2003 End Time: 14:00

**Customize Chart Presentation**

☒ Show X-Axis Grid Lines ☒ Show Y-Axis Grid Lines

**Trending**

☐ Show Trend Data  
Analysis Model: Best Fit  
Analysis Model Parameters: None  
Projection: 1 Week(s)  
Confidence Parameters: ☒ Show Range Confidence %: 95

OK Cancel Help

- Set Trending options as desired and click the *OK* button.



7. Return to the Storage Builder home page.
8. Click *Host LUN Summary*.

Hosts - hp OpenView storage area manager

File View Tools Help

Hosts Storage Builder

Capacity LUN Utilization

Show Organization: Select ...

Name	Orga...	Visible	Assig...	Used	Avail...	Utiliza...	Unkn...
C04...	ACME...	384.82 GB	97.83 GB	0 Bytes	97.83 GB	0 %	288 GB
C04...	ACME...	382.82 GB	145.06 GB	0 Bytes	145.06 GB	0 %	237.77 GB
C04...		350 GB	0 Bytes	0 Bytes	0 Bytes	0 %	350 GB
C05...		203.51 GB	0 Bytes	0 Bytes	0 Bytes	0 %	203.51 GB
C05...		135.67 GB	0 Bytes	0 Bytes	0 Bytes	0 %	135.67 GB
HYD...	Ecom...	16.87 GB	0 Bytes	0 Bytes	0 Bytes	0 %	16.87 GB
POC...		45.28 GB	33.82 GB	18.6 GB	15.22 GB	55 %	11.46 GB
POC...	Ecom...	148.92 GB	121.96 GB	118.52 GB	3.44 GB	97 %	26.96 GB
POC...		0 Bytes	0 Bytes	0 Bytes	0 Bytes	0 %	0 Bytes
REM...	Globe...	830.98 GB	0 Bytes	0 Bytes	0 Bytes	0 %	830.98 GB
REM...	Globe...	73.9 GB	0 Bytes	0 Bytes	0 Bytes	0 %	73.9 GB
REM...	IT Op...	208.43 GB	160 GB	66.77 GB	93.23 GB	42 %	48.43 GB
REM...	IT Op...	378.97 GB	71.06 GB	0 Bytes	71.06 GB	0 %	307.9 GB
REM...	IT Op...	415.9 GB	191 GB	0 Bytes	191 GB	0 %	224.9 GB
REM...	IT Op...	415.9 GB	80 GB	0 Bytes	80 GB	0 %	335.9 GB

Resources Applications

Discovery Off

You could use the information on this View panel to determine where space is available for a new volume or volume group. *Assigned space* is space that has been assigned to the host using Storage Allocator or has otherwise been identified as being available to the host. LUN space that cannot be mapped to any Storage Area Manager host is listed as *Unknown*.

9. Return to the Storage Builder home page.
10. Click *Volume Group Summary*.
11. Click the *Run Query* button.

**Volume Groups - hp OpenView storage area manager**

File View Tools Help

Volume Groups on Storage Builder

Capacity

Configure...

**Top-N Query**

Available Metrics: # of LUNs Return: 200 View: Largest values Run Query

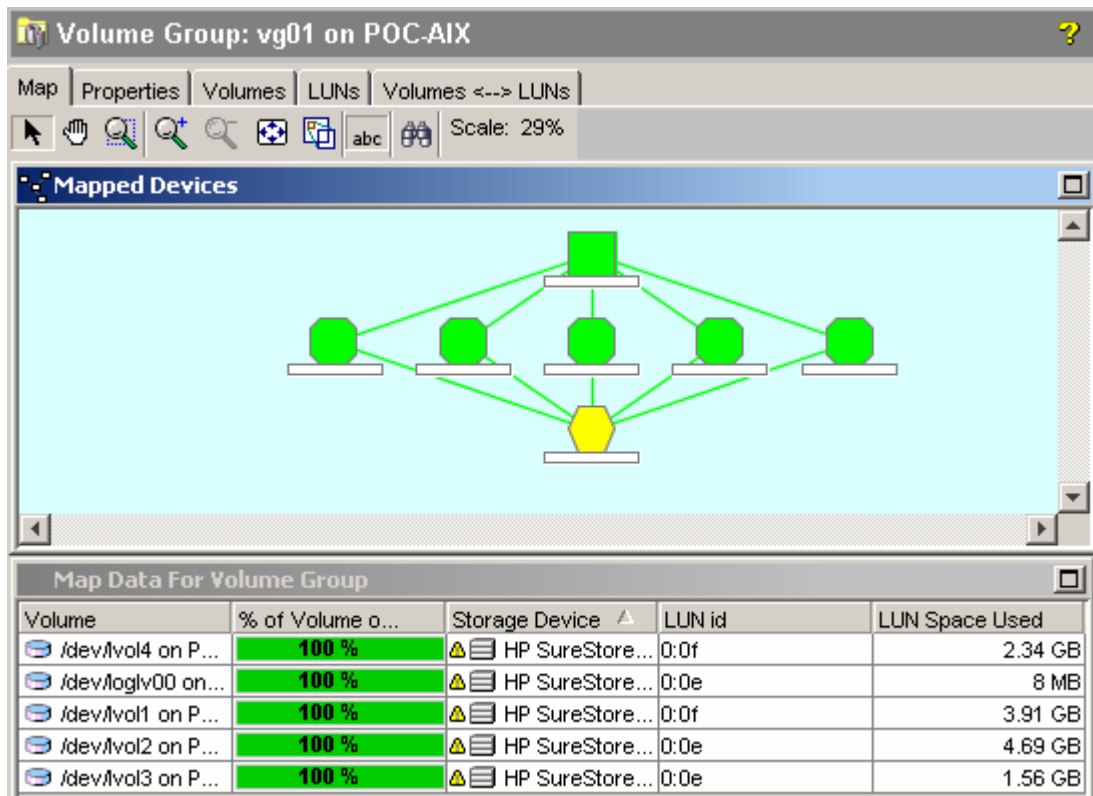
Query results as of 2003/11/08 07:20:24

Volume ...	System ...	# of Vol...	Size of ...	# of LUNs	LUN Sp...	Total LU...	% used
/dev/vg0...	POC-H...	8	13.58 GB	1	13.58 GB	16.96 GB	80 %
/dev/vg0...	POC-H...	4	31.98 GB	4	31.98 GB	32 GB	100 %
/dev/vg0...	POC-H...	4	31.98 GB	4	31.98 GB	32 GB	100 %
/dev/vg0...	POC-H...	4	31.98 GB	4	31.98 GB	32 GB	100 %
/dev/vg0...	POC-H...	3	8.99 GB	3	8.99 GB	9 GB	100 %
rootvg o...	POC-AIX	9	3.62 GB	1	4.09 GB	17.77 GB	23 %
vg01 on ...	POC-AIX	5	9.1 GB	2	12.51 GB	13.75 GB	91 %
vg02 on ...	POC-AIX	2	2 GB	1	2 GB	2.29 GB	87 %
Volume...	REMS...	1	38.15 GB	4	19.08 GB	40 GB	48 %
Volume...	REMS...	1	95.37 GB	1	47.69 GB	100 GB	48 %
Volume...	REMS...	0	0 Bytes	2	0 Bytes	20 GB	0 %
<b>Totals</b>		<b>41</b>	<b>266.76 GB</b>	<b>27</b>	<b>203.89 GB</b>	<b>315.78 GB</b>	<b>65 %</b>

Storage Events Event Filter: None Total Events: 710 Displayed Events: 710

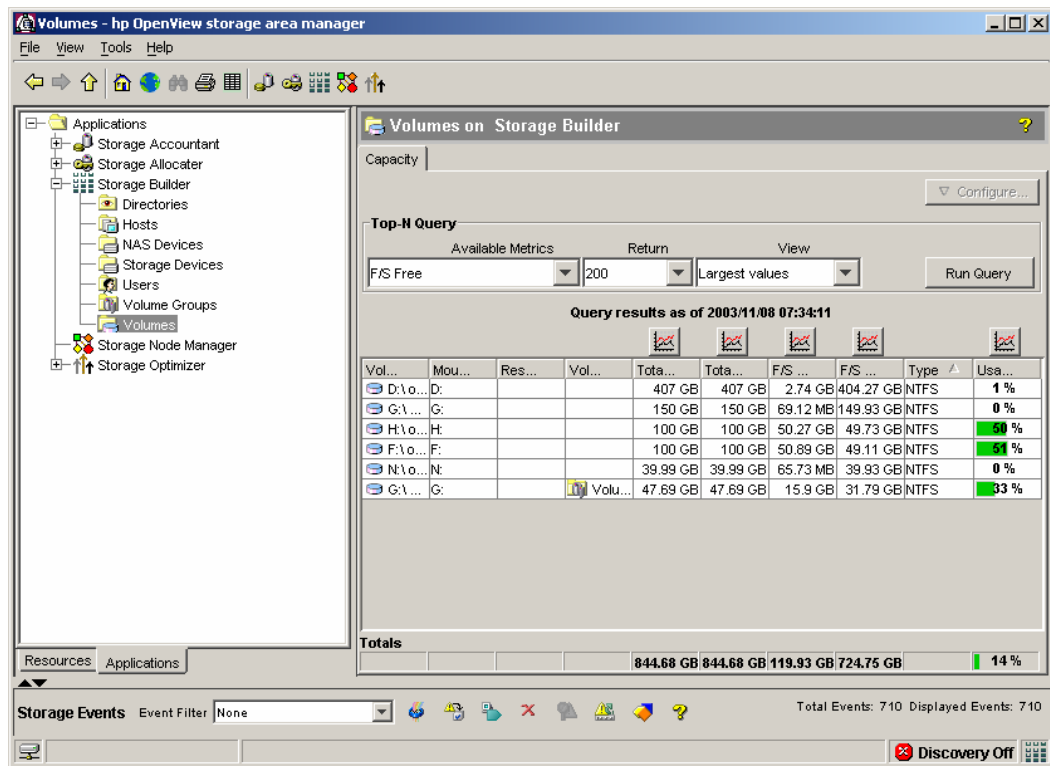
Discovery Off

12. Double-click *vg01* on *POC-AIX* to view a map of that volume group.

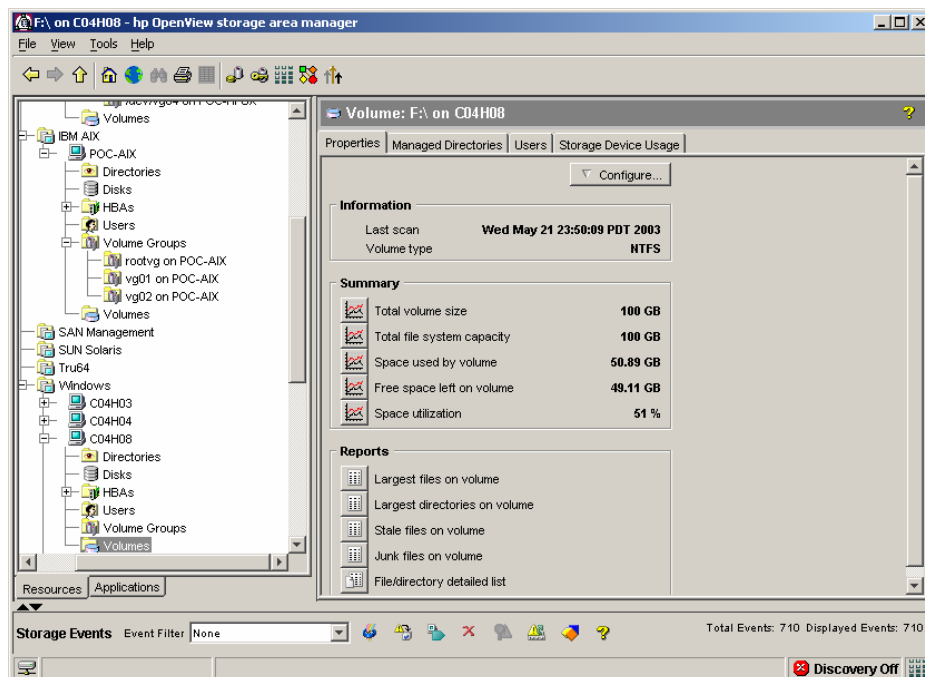


13. Investigate the information provided by the other tabs on this View panel.

14. Return to the Storage Builder home page.
15. Click *Volume Summary*.

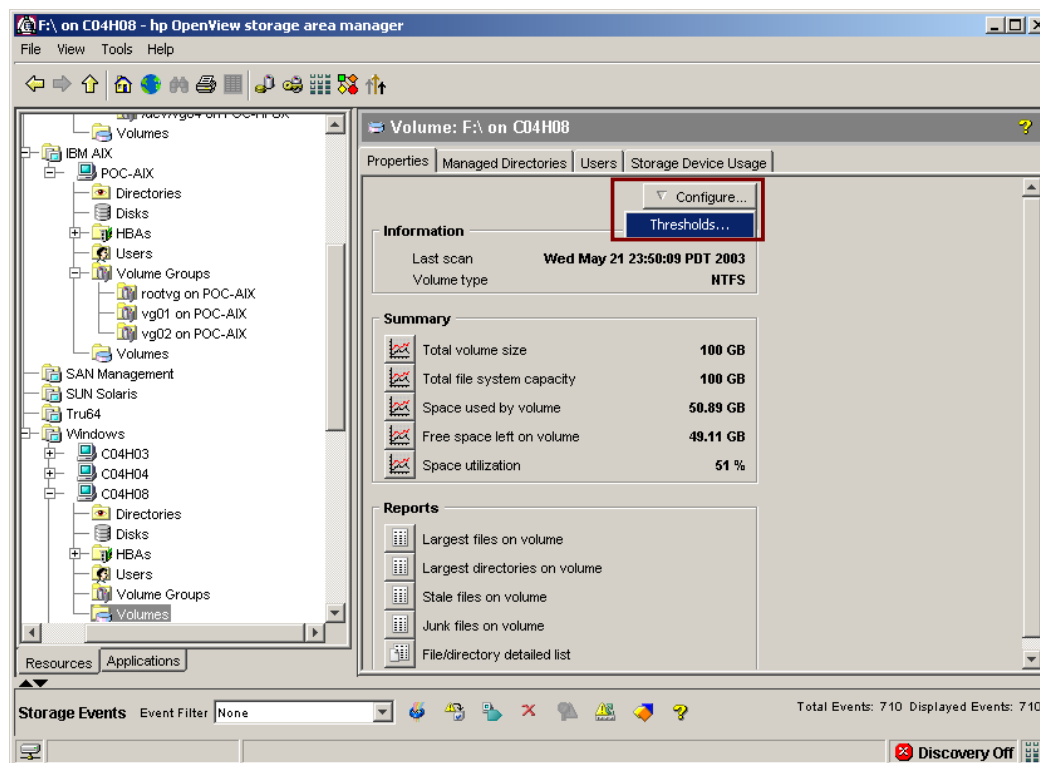


16. Double-click a volume from the list to display additional capacity information about the volume.



## Hands-on practice: configuring thresholds

1. From a specific volume's Properties panel, click the *Configure...* button.
2. Select *Thresholds...* from the drop-down menu.

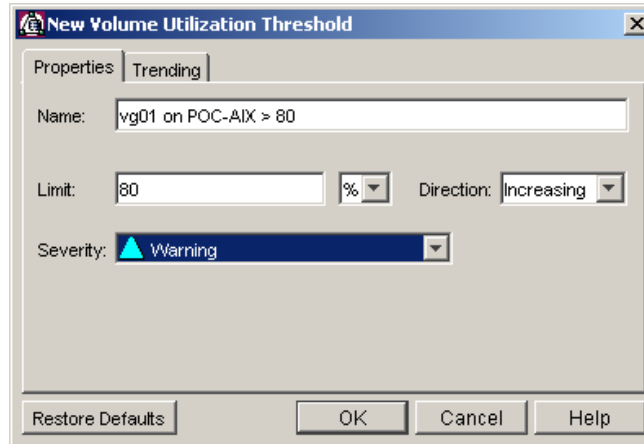


The Thresholds & Alerts window displays. Several types of thresholds available in Storage Builder:

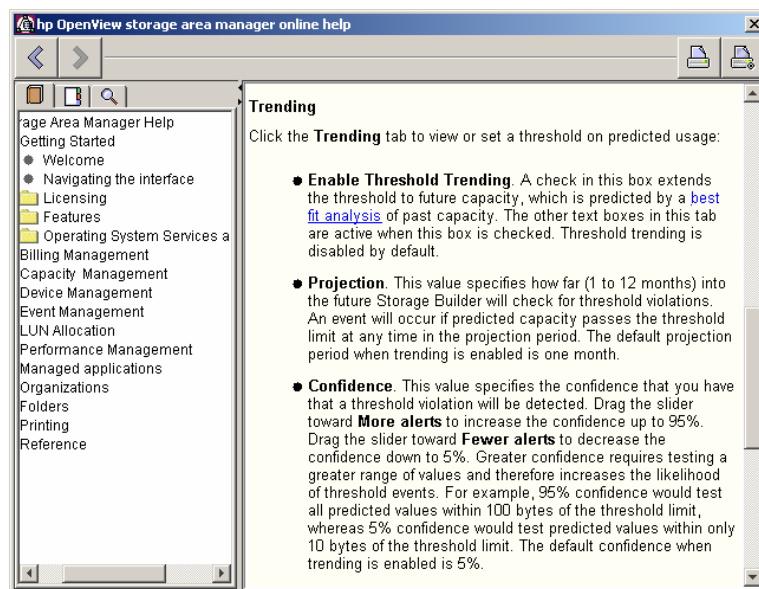
- **Domain** — Apply to all similar devices in the domain
- **Organization** — Apply to all similar resources in an organization
- **Resource** — Apply to a specific resource
- **Managed application** — Apply to organizational levels within an application

In this practice, you will create a resource threshold on a specific volume.

3. Click the *New* button.
4. Create a threshold that will generate a warning message when the volume surpasses 80% capacity.
  - a. Enter a name for the threshold.
  - b. Enter 80 in the limit field.
  - c. Select *Warning* from the Severity drop-down menu.
  - d. Click the *Trending* tab.



- e. Click the *Help* button to access the Storage Area Manager online help. Read the section on trending to better understand how to set a threshold on predicted usage. Close the window when you are done.



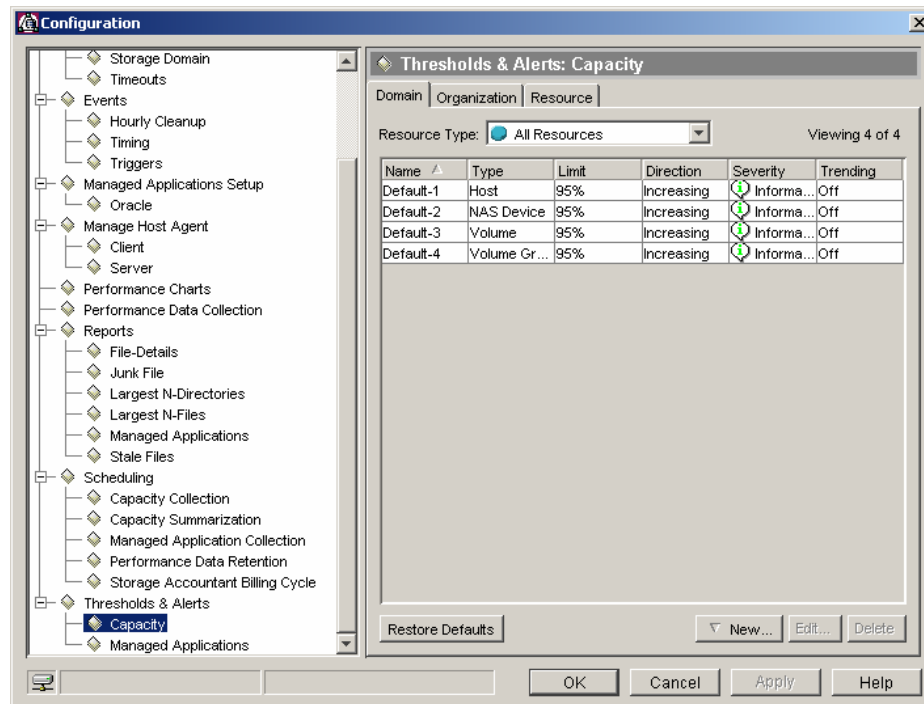
- f. Click the *OK* button.

5. View a list of all thresholds configured for Storage Builder.

- a. Select Tools → Configure.
- b. Under Thresholds & Alerts, select *Capacity*.

Managed Application thresholds are also related to Storage Builder, these will be discussed later.

- c. Do you see the threshold you created? Is Trending on or off?



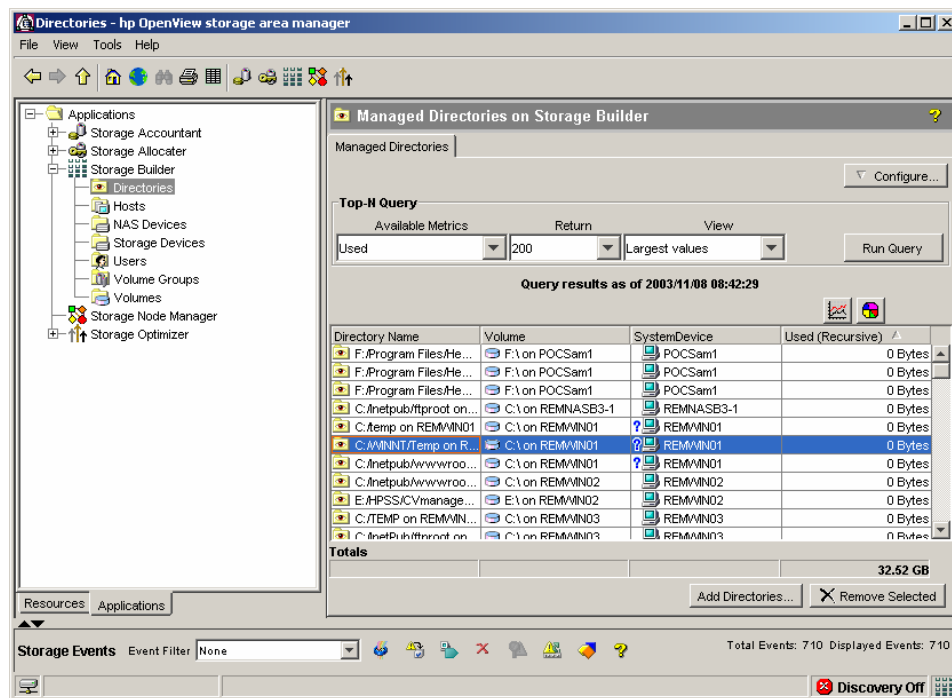
## Hands-on practice: viewing and configuring managed directories

Before you can view managed directory capacity, file data must be collected and the directories must be managed. To view the capacity of unmanaged directories, view a detailed file report.

1. From the Applications tree, expand the *Storage Builder* node.
2. Select *Directories*.

Alternatively, return to the Storage Builder home page and click *Managed Directory Summary*.

3. Click the *Run Query* button.



The ability to configure thresholds is also available from this View panel.

4. Double-click a directory from the list to display the Properties panel.
5. Click the *Back to Directories* button from the main toolbar.

Directories do not display in this view panel until they are added as a managed directory by the administrator or operator.

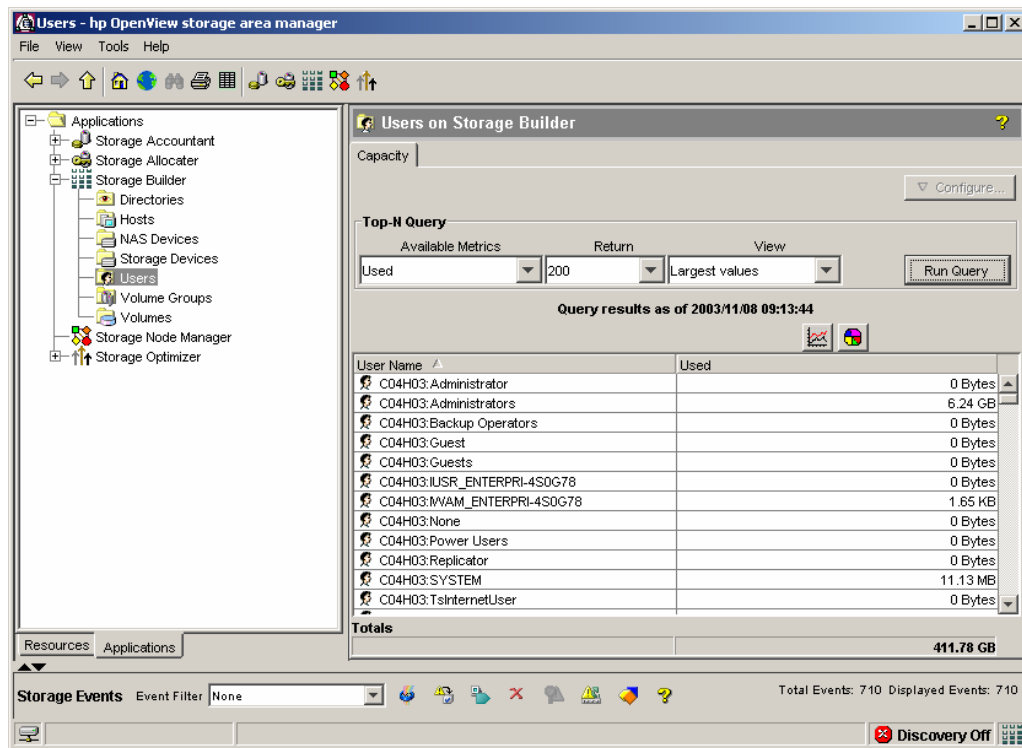
6. Click the *Add Directories...* button.
7. Expand a host and select a directory.
8. Click the *OK* button.

When using the Demo/Simulation, new directories are not added to the list.



## Hands-on practice: viewing user information

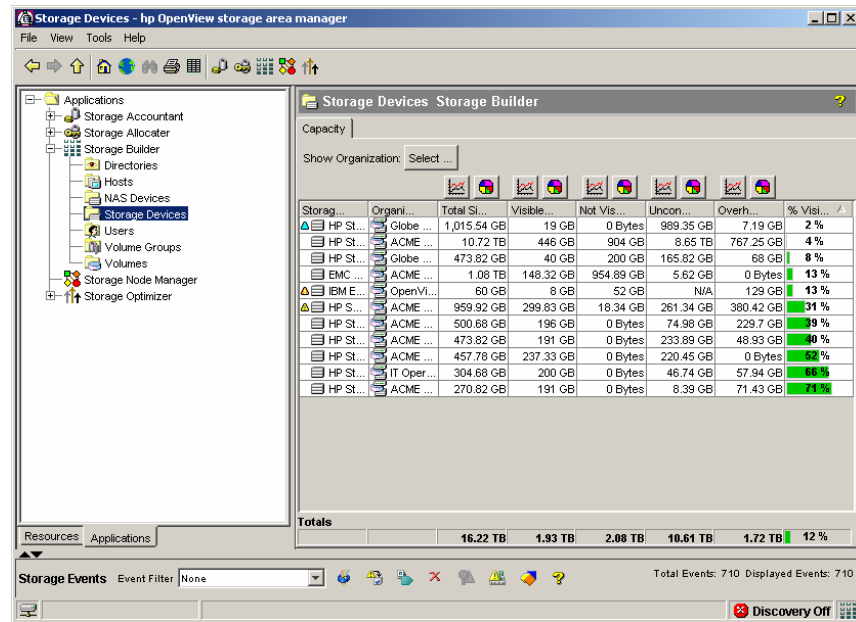
1. From the Applications tree, expand the *Storage Builder* node.
2. Select *Users*.
3. Click *Run Query*.



A list of users and total file space used displays. Domain and NIS users are listed by the domain name and user account. Local users are listed by the machine name and user account.

## Hands-on practice: viewing storage device information

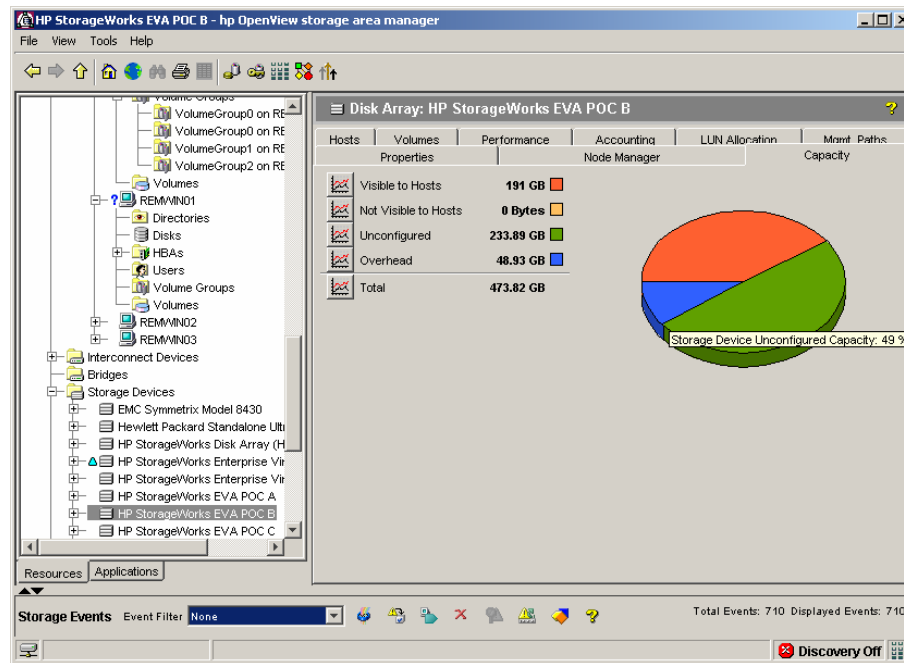
1. From the Applications tree, expand the *Storage Builder* node.
2. Select the *Storage Devices* node.



The resulting list displays how much space is visible to hosts, not visible to hosts, unconfigured, and attributed to overhead. This information can also be viewed in graphs and charts. Select a device or multiple devices to view a comparison, and then click the graph or chart button associated with the desired attribute.

3. Limit the list to only storage devices that are part of the ACME Corporation organization.
  - a. Click the *Select...* button next to Show Organization.
  - b. Select *ACME Corporation*.
  - c. Click the *OK* button.

4. Double-click one of the device names in the list to view a graphical summary of capacity consumption for the device.



## Hands-on practice: setting collection schedules

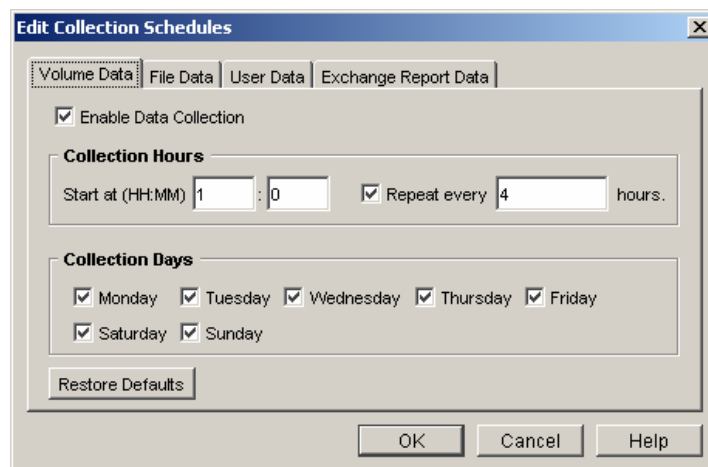
Storage Builder relies on Storage Area Manager Core Services to collect storage device capacity information. This information (total device capacity, unconfigured capacity, visible to hosts, not visible to hosts) updates automatically as discovery runs on a continuous basis.

The Storage Builder Host Agent components perform host capacity data collection. You must set collection schedules for individual hosts and four types of data (file, volume, user, and managed application data).

1. Select *Tools* → *Configure*.
2. Under Scheduling, select *Capacity Collection*.
3. Select a host from the list.

You can choose to preempt the collection schedule and immediately collect volume, file, or user data on the selected host by clicking the *Start Collection...* button.

4. Click the *Set Schedule...* button.



5. Click the *Help* button to review the default collection schedules for each type of data. When done, close the window.
6. Click the *OK* button.

You can also set collection schedules directly from a host View panel.

7. In the Resources tree, expand the *Hosts* node and select a specific host.
8. From the Capacity tab, click the *Configure...* button. You can start collection, set schedules, or configure thresholds.

## Hands-on practice: using the Storage Builder CLUI

To view a list of Storage Builder-related commands, enter `builder` at the command prompt and a list of available commands displays. Replace the word *builder* with `bldr` before any command to shorten the syntax.

1. To retrieve the age at which data is archived, enter  
`bldr getDataArchivalAge` at the command prompt.
2. To set the age at which data is archived, enter  
`bldr setDataArchivalAge <days>` at the command prompt.  
The number must be a positive number.
3. To retrieve the number of days archives will be retained, enter  
`bldr getdataretentionage` at the command prompt.
4. To set the number of days that archives will be retained, enter  
`bldr setDataRetentionAge <days>` at the command prompt.
5. To retrieve the types of data collection on a host, enter  
`bldr listHostCollectionTypes` at the command prompt.



### Objectives

After completing this lab, you should be able to:

- View information for managed applications including properties, maps, reports, and charts of application health
- Configure thresholds for managed applications
- Customize a Storage Area Manager configuration to meet customer requirements

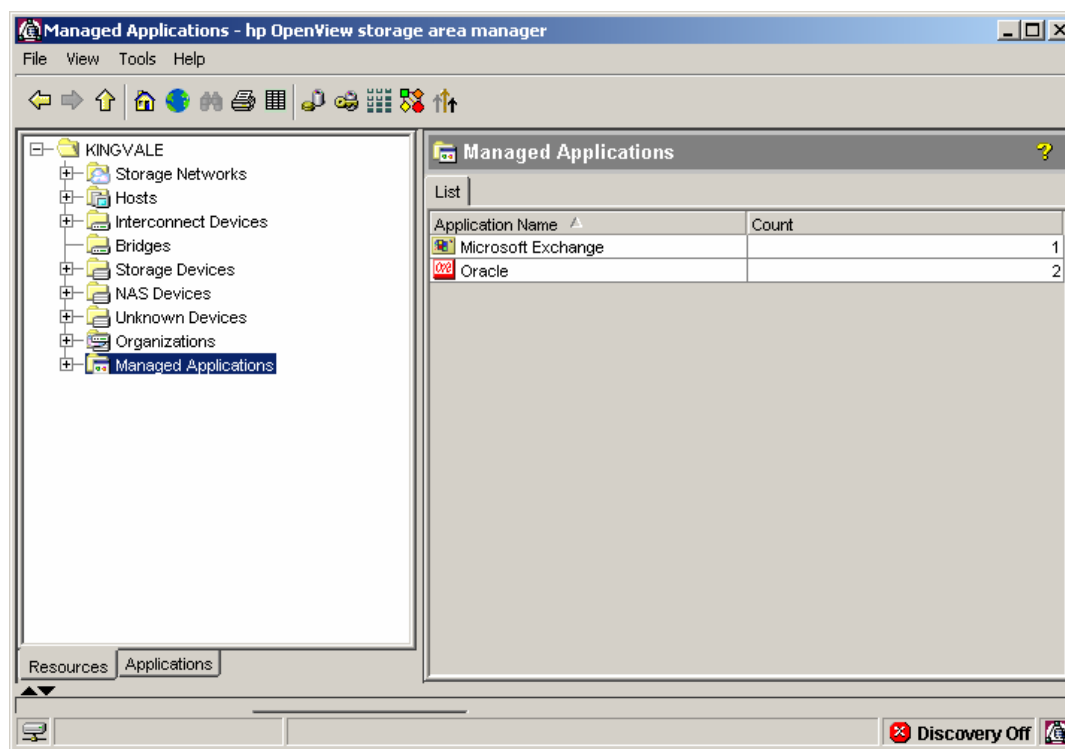
### Requirements

This exercise requires the following resources:

- The Storage Area Manager Demo/Simulation
- *HP OpenView Storage Area Manager Fundamentals*, Module 11, “Storage Builder”
- *HP OpenView Storage Area Manager Fundamentals*, Module 12, “Managed Applications”

## Hands-on practice: viewing application information

1. From the Resources tree, select the *Managed Applications* node.



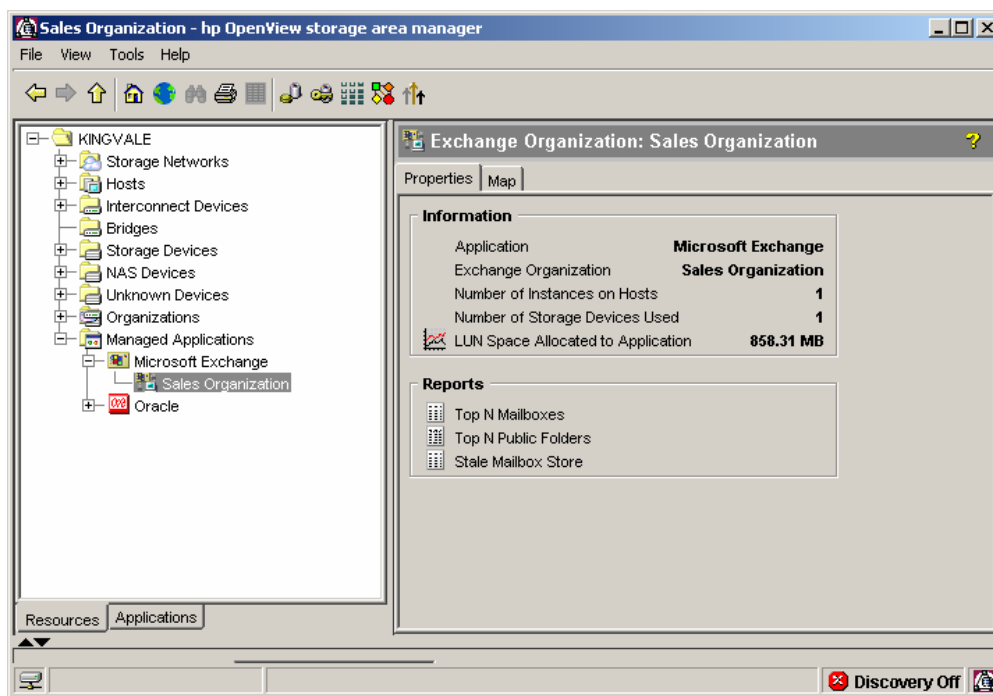
2. Expand the *Managed Applications* node.
3. Select *Microsoft Exchange*.

The Properties panel displays high-level information about the Exchange installations, including the total amount of LUN space used by all Exchange Organizations.

4. Expand the *Microsoft Exchange* node.



5. Select *Sales Organization*.



The Properties panel for the organization displays summary information for the organization including three factory-default reports.

6. Click the available report buttons to investigate the information provided by each report.

For example:

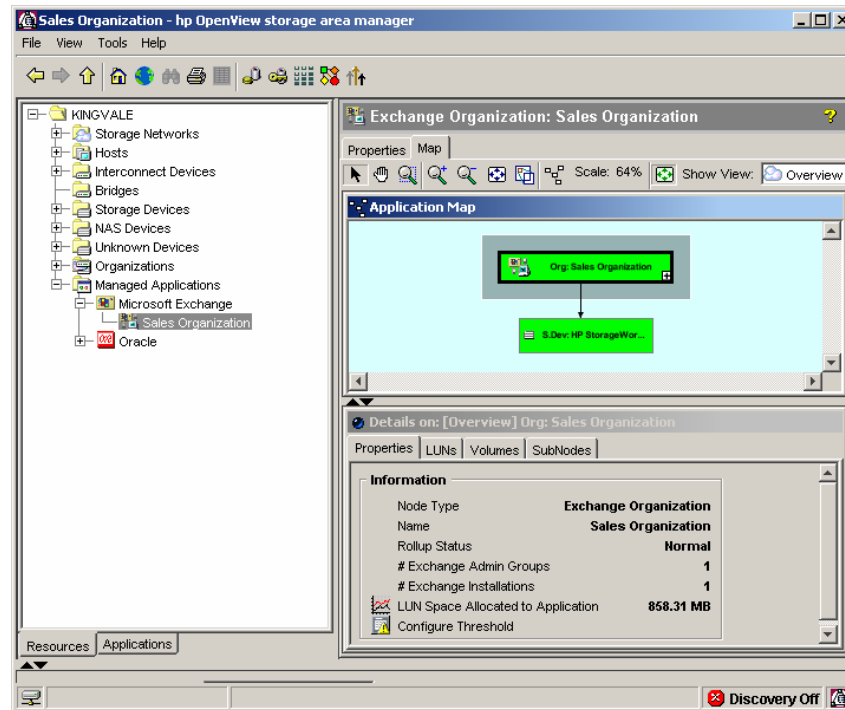
**Exchange Top Mailboxes: Sales Organization**

Report generated on Nov 8, 2003 10:17:30 AM, sorted descending on 'Installation'.

**Total Size (Bytes): 854772**

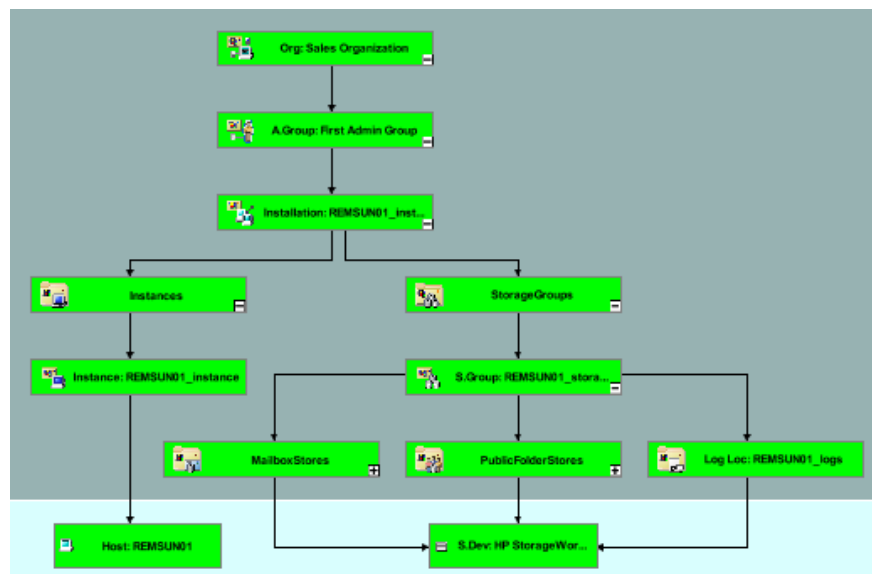
Installation	Storage Group	Mailbox Store	Name	Size (Bytes)	Storage Device(s)
REMSUN01	REMSUN01_storage_group	REMSUN01_mbs0	Catherine Curtis	121234	HP StorageWorks EVA POC D VD003
REMSUN01	REMSUN01_storage_group	REMSUN01_mbs2	John Gourlay	234234	HP StorageWorks EVA POC D VD003
REMSUN01	REMSUN01_storage_group	REMSUN01_mbs0	Shawn White	23414	HP StorageWorks EVA POC D VD003
REMSUN01	REMSUN01_storage_group	REMSUN01_mbs0	Candy Woltz	121234	HP StorageWorks EVA POC D VD003
REMSUN01	REMSUN01_storage_group	REMSUN01_mbs1	Somil Maredia	121234	HP StorageWorks EVA POC D VD003
REMSUN01	REMSUN01_storage_group	REMSUN01_mbs0	Simon Hunt	233422	HP StorageWorks EVA POC D VD003

- Click the *Map* tab to view the application maps.



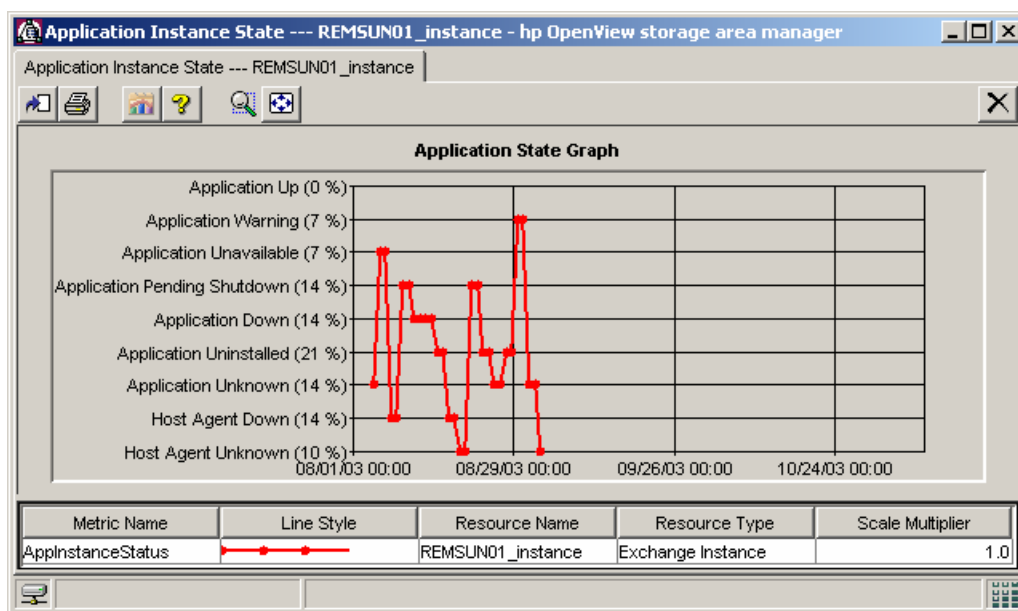
The map is initially collapsed. When a node is selected in the map, a corresponding View panel with several tabs displays below it. There are also buttons to view a historical capacity graph and to configure thresholds.

- Double-click or click the + symbols to expand the nodes.



Application nodes display inside a gray rectangle, and storage network nodes outside the rectangle as shown in the previous graphic.

9. In the application map, select instance *REMSUN\_01*.  
An instance is defined as the operating system processes that are accessing the application.
10. In the View panel below the map, click the *graph* button to view a historical perspective of application status from the perspective of this instance.
11. Click the *Edit Chart Properties* button.
12. Set the time period to *3 months*.
13. Click the *OK* button.



14. Close the chart window.
15. In the application map, select the high-level node, *Sales Organization*.
16. In the View panel, click the *LUNs* tab.  
The total capacity allocated to the application on each LUN displays.
17. Click the *Volumes* tab.

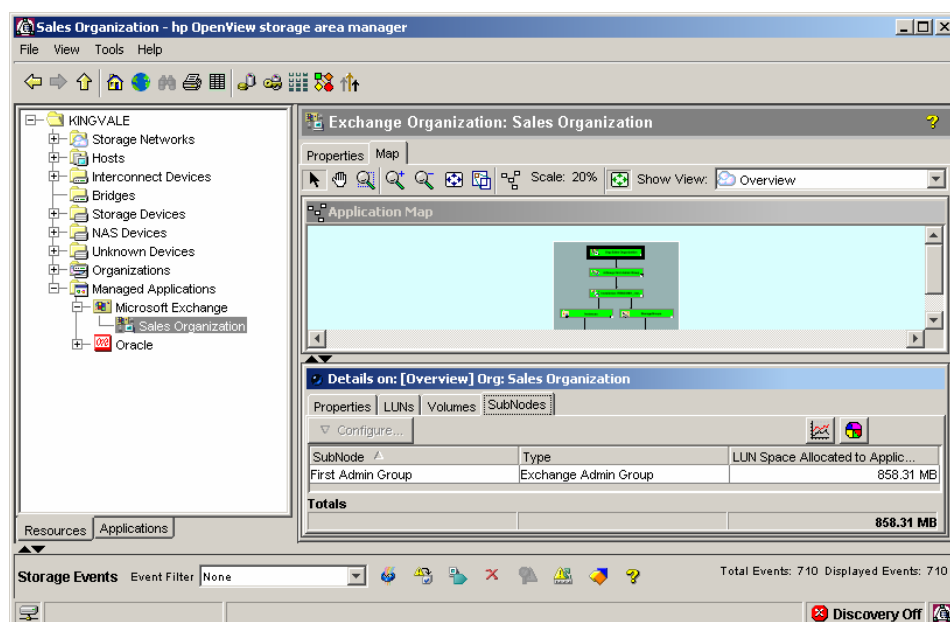
The Resource Sharing column indicates clustering.

- Shared = clustered
- Private = clustered, not shared
- Blank = not clustered

Are any volumes in the Sales Organization clustered?

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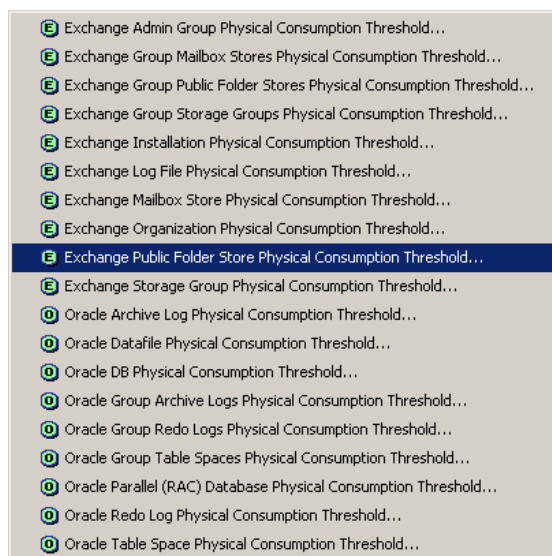
18. Click the *SubNodes* tab.



This panel displays information for the subnodes of the currently selected node, in this case, the root node (Sales Organization). You can configure thresholds from this panel by selecting a subnode and clicking the *Configure...* button.

You can view a complete list of thresholds configured for managed applications from the Configuration window.

19. Select *Tools* → *Configure*.
20. Under Capacity, select *Managed Applications*.
21. Click the *New...* button.



# Customer scenario activity: managing storage capacity

The activities in this section will test your knowledge of general Storage Builder functionality and managed application features.

ACME Corporation wishes to capitalize on the more cost-effective use of storage provided by SAN environments. As such, ACME Corporation needs to gather capacity information to facilitate decision-making about the order that the DAS systems should be migrated to the SAN. ACME Corporation also wants to use Storage Builder to determine how much data is being retained but not used on a regular basis and to help analyze the company’s backup window requirements. Additionally, ACME Corporation wants to be proactively notified when specific capacity usage-related scenarios occur in their environment.

## Configuring capacity data collection

ACME Corporation wants to collect capacity data as follows:

Data type	Days of week	How often	Begins at
Volume	Every day	Every 8 hours	1am
File	Tuesday	Once a week	4am
User	Every day	Every 4 hours	2am
Exchange Report Data	Every day	Every 4 hours	3am

1. How can ACME Corporation set the required schedules?
2. Who on ACME Corporation’s staff has the proper Storage Area Manager user privileges to set the schedules?

## Analyzing host capacity utilization

1. ACME Corporation plans to consider the utilization level (specifically comprehensive percentages of capacity usage), along with other operational factors (server age, DAS storage type and initial purchase price, financial recovery period, backup requirements) to decide which of the DAS hosts should be moved to the SAN first. With respect to capacity, the host with the lowest level of utilization is considered the highest priority for moving to the SAN.

As part of this analysis, ACME Corporation needs a hierarchical list of underutilized DAS hosts. How can ACME Corporation create the list?

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## Monitoring capacity usage

1. On SAN-attached hosts, ACME Corporation wishes to move files not being used for a period of six months to the MSA1000 LUN, to free the more expensive EVA storage.

How can ACME Corporation determine which files to move?

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2. ACME Corporation also wants to determine how much space is consumed by temporary files or certain types of files that are not considered business relevant (for example, internet downloads like images or multimedia files).

How can ACME Corporation make this determination?

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- How can ACME Corporation determine how much Exchange information is not being actively used?

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- .....
- .....
- .....

## Predicting the backup environment

- How can ACME Corporation determine the total amount of data to be backed up?

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## Configuring thresholds and alerts

ACME Corporation wishes to monitor certain key resources (for example, volumes, volume groups, directories, users, and applications). If capacity thresholds are exceeded on these resources, ACME Corporation wants to perform a hierarchical list of actions the closer the resource comes to the physical capacity limit.

For example, ACME Corporation wants to monitor a 20GB volume on one of the file servers. When the volume exceeds 80 percent of capacity, they would like an event to display in the View panel and an email to be sent to the SAN administrator on call.

1. How can ACME Corporation configure Storage Builder to meet their requirements?

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## Configuring data retention

1. ACME Corporation wants to retain capacity data in the following manner:
  - Keep unsummarized data for 30 days
  - Keep seven days worth of data in each summary
  - View historical data in capacity graphs for the past two years

How can ACME Corporation accomplish these requirements?

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## Customer scenario activity: answers

The answers to the Managing Storage Capacity customer scenario activity follow.

### Configuring capacity data collection

1. How can ACME Corporation set the required schedules?
  - a. **Select *Tools* → *Configure*.**
  - b. **Under Scheduling, select *Capacity Collection*.**
  - c. **Select a host from the list and click the *Set Schedule* button.**
  - d. **Use the tabs to access the collection-schedule options for the different data types.**
2. Who on ACME Corporation's staff has the proper Storage Area Manager user privileges to set the schedules?

**Only ACME employees with administrator or operator privileges can set the collection schedules.**

### Analyzing host capacity utilization

1. As part of this analysis, ACME Corporation needs a hierarchical list of underutilized DAS hosts. How can ACME Corporation create the list?
  - a. **Access the Storage Builder home page.**
  - b. **Click *Host Summary*.**
  - c. **Locate the host with the lowest values in the % utilized column.**

### Monitoring capacity usage

1. How can ACME Corporation determine which files to move?
  - a. **Select *Tools* → *Configure*.**
  - b. **Under Reports, select *Stale Files*.**
  - c. **Configure the Stale File report to include files of all types that have not been accessed for the last 180 days.**
  - d. **In the Resources panel, select a host.**
  - e. **Click the *Stale Files on System Device* button. Review the results of the report.**

2. ACME Corporation also wants to determine how much space is consumed by temporary files or certain types of files that are not considered business relevant (for example, internet downloads like images or multimedia files).  
How can ACME Corporation make this determination?
  - a. **Select *Tools* → *Configure*.**
  - b. **Under Reports, select *Junk File*.**
  - c. **Configure the Junk File report parameters as desired (for example, to include specific files, such as .gif, .tiff, and so on).**
  - d. **In the Resources panel, select a host.**
  - e. **Click the *Junk Files on System Device* button. Review the results of the report.**

## Managing application capacity

1. How can ACME Corporation identify the top Exchange users?
  - a. **In the Resources tree, expand the *Managed Applications* node.**
  - b. **Expand the *Microsoft Exchange* node.**
  - c. **Select an organization.**
  - d. **In the Reports section, click the *Stale Mailbox Store* button. Review the results of the report.**
2. How can ACME Corporation identify the top Exchange users?
  - a. **In the Resources tree, expand the *Managed Applications* node.**
  - b. **Expand the *Microsoft Exchange* node.**
  - c. **Select an organization.**
  - d. **In the Reports section, click the *Top N Mailbox* button. Review the results of the report.**

## Predicting the backup environment

1. How can ACME Corporation determine the total amount of data to be backed up?
  - a. In the **Resources** tree, select the domain.
  - b. Click the *Capacity* tab.
  - c. In the **Reports** section, click the *Space Needed for Full Backup* button. View the results of the graph.

## Configuring thresholds and alerts

1. How can ACME Corporation configure Storage Builder to meet their requirements?

ACME Corporation must create the threshold, specify an on-call administrator, and configure a trigger to send the email. By default, an event is sent to the Storage Area Manager event panel when the threshold is exceeded.

Creating the threshold:

- a. Select *Tools* → *Configure*.
- b. Under **Thresholds & Alerts**, select *Capacity*.
- c. Select *Volume* from the **Resource Type** drop-down menu.
- d. Select the volume to be monitored from the list.
- e. Click the *New* button. Select *Volume Utilization Threshold* from the shortcut menu.
- f. Enter a name for the threshold.
- g. Set the limit to *80%*.
- h. Click the *OK* button.

Configuring the on-call contact:

- a. From the **Configuration** window, select *Contacts*.
- b. Click the *Add* button.
- c. Enter the contact information and click the *OK* button.
- d. Ensure a check mark appears next the SAN administrator that is oncall.

**Configuring the trigger:**

- a. From the Configuration window, under Events, select *Triggers*.
- b. Click the *Add* button to create a new trigger.
- c. Enter a name for the trigger.
- d. Select *Capacity* from the Category drop-down menu.
- e. In the events section, scroll down and select the *VOLUME\_THRESHOLD\_EXCEEDED* event.
- f. In the Action Configuration section, select *SendMailAction* from the Action drop-down menu.
- g. Enter appropriate values for the action parameters. Use the *%contactName* macro for the To parameter to send the email to the person you designated in the Contacts panel.
- h. Click the *OK* button.

## Configuring data retention

1. ACME Corporation wants to retain capacity data in the following manner:
  - Keep unsummarized data for 30 days
  - Keep seven days worth of data in each summary
  - View historical data in capacity graphs for the past two years

How can ACME Corporation accomplish these requirements?

Select *Tools* → *Configure*. Under Scheduling, select *Capacity Summarization*. Set data summarization and retention parameters:

- Accept measurements for summary after *30* days
- Summarize collected measurements every *7* days
- Keep summary measurements for *730* days

### Objectives

After completing this lab, you should be able to:

- View accounting summary information
- View information for organizations
- View accounting bills and reports
- Set up Storage Accountant
- Execute Storage Accountant-related CLUI commands
- Customize a Storage Area Manager configuration to meet customer requirements

### Requirements

This exercise requires the following resources:

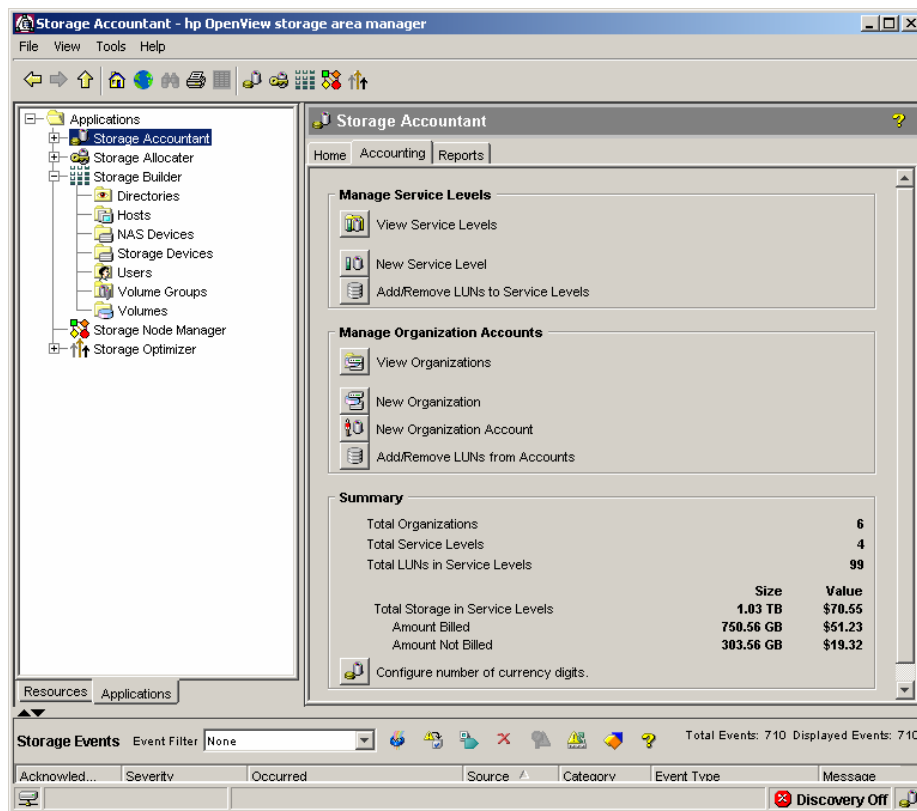
- The Storage Area Manager Demo/Simulation
- *HP OpenView Storage Area Manager Fundamentals*, Module 13, “Storage Accountant”

## Hands-on practice: viewing summary information

1. Navigate to the Storage Accountant home page.



2. Click *Accountant Summary*.



3. Click the *View Service Levels* button and review the service levels and associated prices that have been configured.

## Hands-on practice: viewing organization information

1. In the Resources tree, under the Storage Accountant node, select *Organizations*.  
Initially, the screen displays without any organizations listed.
2. Click the *Run Query* button and review the information provided for each organization.

**Organizations on Storage Accountant**

Accounting

**Query Filter**

Organization ...	# of Account...	Total Cost of ...	Total Space in...	# of LUNs
ACME Corpor...	6	\$12.77	182.4 GB	26
ASP Internatio...	0	\$0.00	0 Bytes	0
Code Shop	0	\$0.00	0 Bytes	0
Ecomdotnet	3	\$6.58	85.73 GB	11
Globe Media	3	\$3.29	56 GB	7
IT Operations	3	\$8.60	123.42 GB	16
Media Broadc...	0	\$0.00	0 Bytes	0
OpenView Un...	4	\$11.51	175.03 GB	11
World Outsou...	6	\$8.48	127.98 GB	14

**Totals**

# Organizations: ... 25 \$51.23 750.56 GB 85

Total Active: 6 Displayed: 9

New Organization... Edit Selected... Close Selected...

**Storage Events** Event Filter: None Total Events: 710 Displayed Events: 710

Acknowled... Severity Occurred Source Category Event Type Message

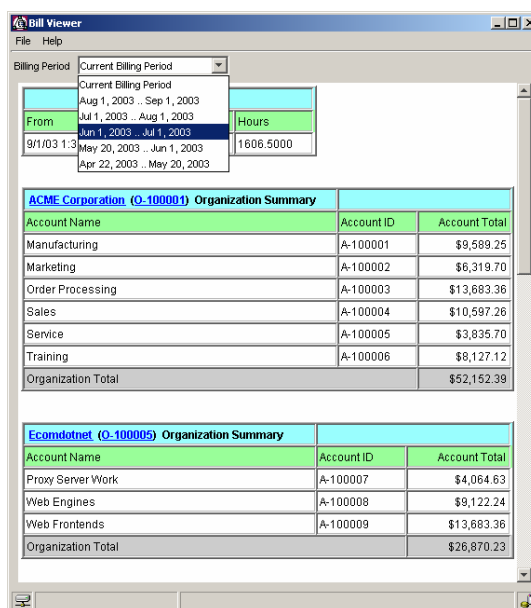
Discovery Off

You can limit the results of the query by using the Query Filter options. Experiment with these on your own.

Additionally, the buttons at the bottom of the screen enable you to add, modify, or close organizations.

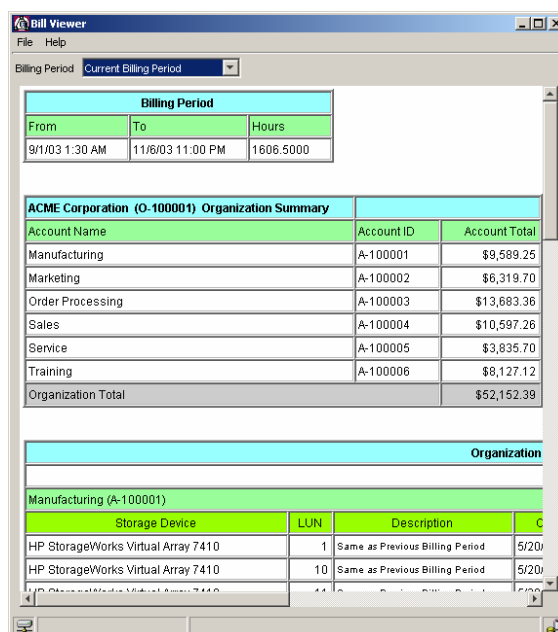
## Hands-on practice: viewing bills and reports

1. From the Applications tree, select *Storage Accountant*.
2. Click the *Reports* tab.
3. Click the *View Current and Past Organization Bills* button.
4. Select a timeframe from the Billing Period drop-down menu.



When the Bill Viewer is launched from the context of multiple organizations, a summary bill displays.

5. In the Bill Viewer, click one of organization links to view a detailed bill.





6. Close the summary and detailed bills.
7. From the Reports tab, click the *View Storage Device Billing Reports* button.

The screenshot shows the 'Storage Device Report Viewer' window. At the top, there is a 'Billing Period' dropdown menu set to 'Current Billing Period'. Below this is a table with the following data:

Billing Period		
From	To	Hours
9/1/03 1:30 AM	11/6/03 11:00 PM	1606.5000

Below the billing period table is a 'Storage Device Billing Summary' table with the following data:

Storage Device	Storage Device Serial Number	In Accounts	Not in Accounts
<a href="#">HP StorageWorks Disk Array (HSG80 controller)</a>	ZG02804581.ZG94716177	\$32,511.09	\$0.0
<a href="#">EMC Symmetrix Model 8430</a>	000184500419	\$14,403.52	\$7,200.72
<a href="#">HP SureStore Disk Array XP512</a>	40150	\$90,303.01	\$4,561.12
<a href="#">HP StorageWorks Virtual Array 7410</a>	00USP1001134	\$28,767.75	\$8,630.32
<a href="#">HP StorageWorks EVA POC D</a>	50001FE100150E90	\$12,946.27	\$25,892.56
<a href="#">HP StorageWorks EVA POC C</a>	50001FE100150EA0	\$18,124.77	\$0.0
<a href="#">HP StorageWorks EVA POC B</a>	50001FE100150EB0	\$8,026.67	\$2,589.25
<a href="#">Storageworks EVA 2</a>	50001FE150008BB0	\$4,142.80	\$30,035.36

When the Storage Device Report Viewer is launched from the context of multiple organizations, a summary bill displays.

8. In the Storage Device Report Viewer, click one of the storage devices to view a detailed bill.

The screenshot shows the 'Storage Device Report Viewer' window with the 'Billing Period' dropdown set to 'Current Billing Period'. The 'Billing Period' table is the same as in the previous screenshot.

Below the billing period table is a 'Storage Device Billing Summary' table with the following data:

Storage Device	Storage Device Serial Number	In Accounts	Not in Accounts
EMC Symmetrix Model 8430	000184500419	\$14,403.52	\$7,200.72

Below the summary table is a section titled 'EMC Symmetrix Model 8430 (EMCSYMMETRIX500419)'. Under this title is a table titled 'Activity of LUNs in an Account' with the following data:

LUN	Organization	Account	Description	Occurred	Service
00000	ACME Corporation	Marketing	Same as Previous Billing Period	5/20/03 8:00 PM	Platinu
00000	ACME Corporation	Marketing	Management server started (restarted)	9/3/03 12:11 PM	Platinu
00001	World Outsourcing	Customer 2	Same as Previous Billing Period	5/20/03 8:00 PM	Platinu

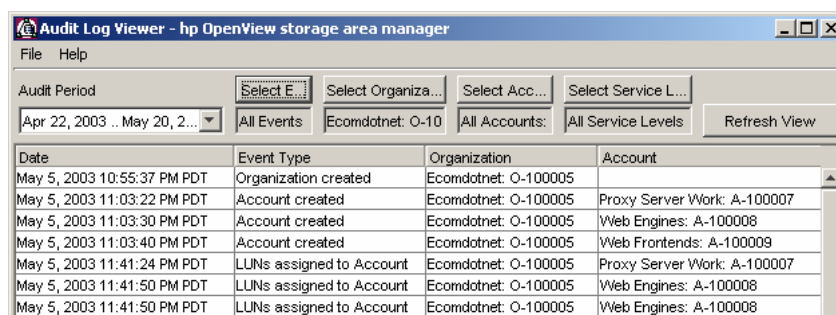
9. Close the storage device reports.

Summary and detailed reports are also available for service levels. Investigate those now if you wish. Close all reports when you are done.

10. From the Reports tab, click *Audit Log Viewer*.

By default, all Storage Accountant events are logged, not to the main Storage Area Manager Event panel, but to the Audit Log Viewer. This provides a place to research billing transactions and system events that can explain changes in an organization's bill.

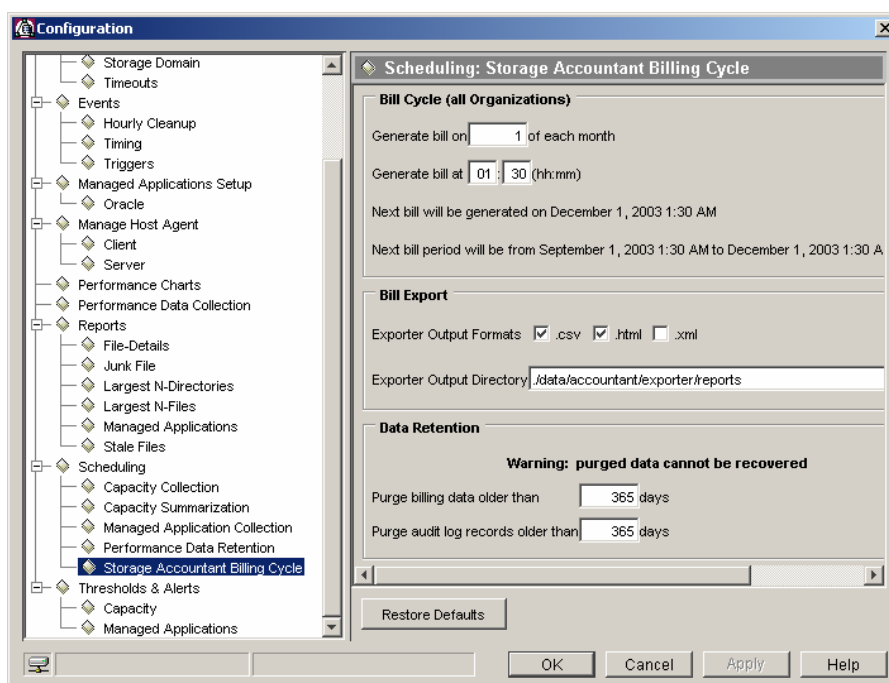
11. Use selection features at the top of the Audit Log Viewer to view only events for the Ecomdotnet organization, between April 22, 2003 and May 20, 2003.



Date	Event Type	Organization	Account
May 5, 2003 10:55:37 PM PDT	Organization created	Ecomdotnet: O-100005	
May 5, 2003 11:03:22 PM PDT	Account created	Ecomdotnet: O-100005	Proxy Server Work: A-100007
May 5, 2003 11:03:30 PM PDT	Account created	Ecomdotnet: O-100005	Web Engines: A-100008
May 5, 2003 11:03:40 PM PDT	Account created	Ecomdotnet: O-100005	Web Frontends: A-100009
May 5, 2003 11:41:24 PM PDT	LUNs assigned to Account	Ecomdotnet: O-100005	Proxy Server Work: A-100007
May 5, 2003 11:41:50 PM PDT	LUNs assigned to Account	Ecomdotnet: O-100005	Web Engines: A-100008
May 5, 2003 11:41:50 PM PDT	LUNs assigned to Account	Ecomdotnet: O-100005	Web Engines: A-100008

The duration that records in the audit log are retained is user-configurable.

12. From the main menu, select *Tools* → *Configure*.
13. Under Scheduling, select *Storage Accountant Billing Cycle*.



Notice that additional bill cycle, bill export, and data retention options that are configurable from this panel.

## Hands-on practice: setting up Storage Accountant

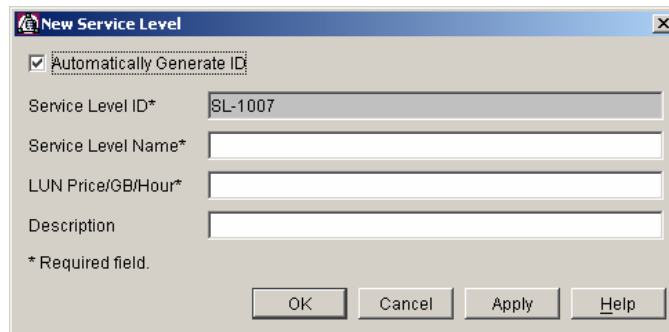
This practice covers the Storage Accountant setup process that consists of five steps:

1. Creating service level
2. Adding LUNs to service level
3. Creating organizations
4. Creating accounts
5. Adding LUNs to accounts

Closing accounts is also covered.

### Creating a new service level

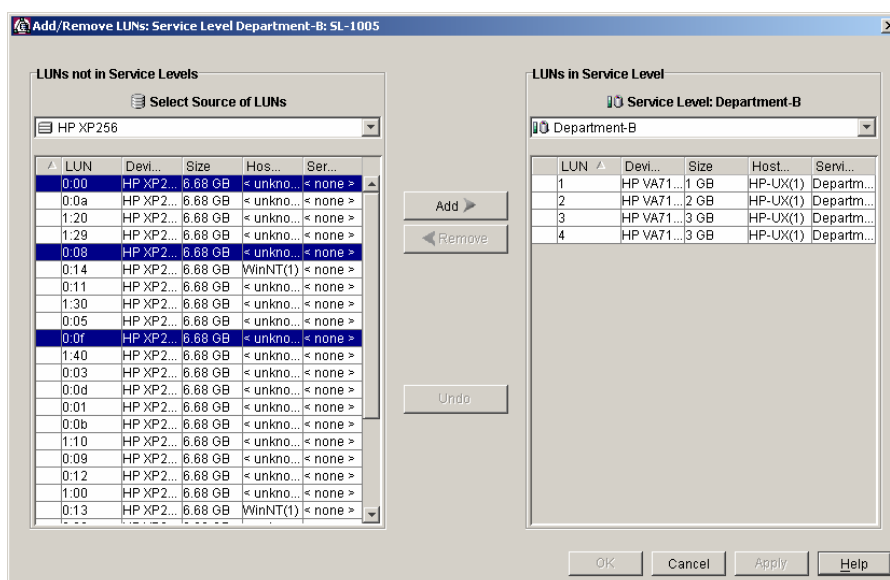
1. From the Applications tree, expand the *Storage Accountant* node and right-click *Service Levels*. Select *New Service Level* from the shortcut menu.
2. In the New Service Level dialog box, enter the service level name and price, and then click the *OK* button.



The image shows a Windows-style dialog box titled "New Service Level". It has a standard title bar with a close button (X). Inside the dialog, there is a checked checkbox labeled "Automatically Generate ID". Below this, there are four text input fields: "Service Level ID\*" (containing "SL-1007"), "Service Level Name\*", "LUN Price/GB/Hour\*", and "Description". A note at the bottom left states "\* Required field.". At the bottom right, there are four buttons: "OK", "Cancel", "Apply", and "Help".

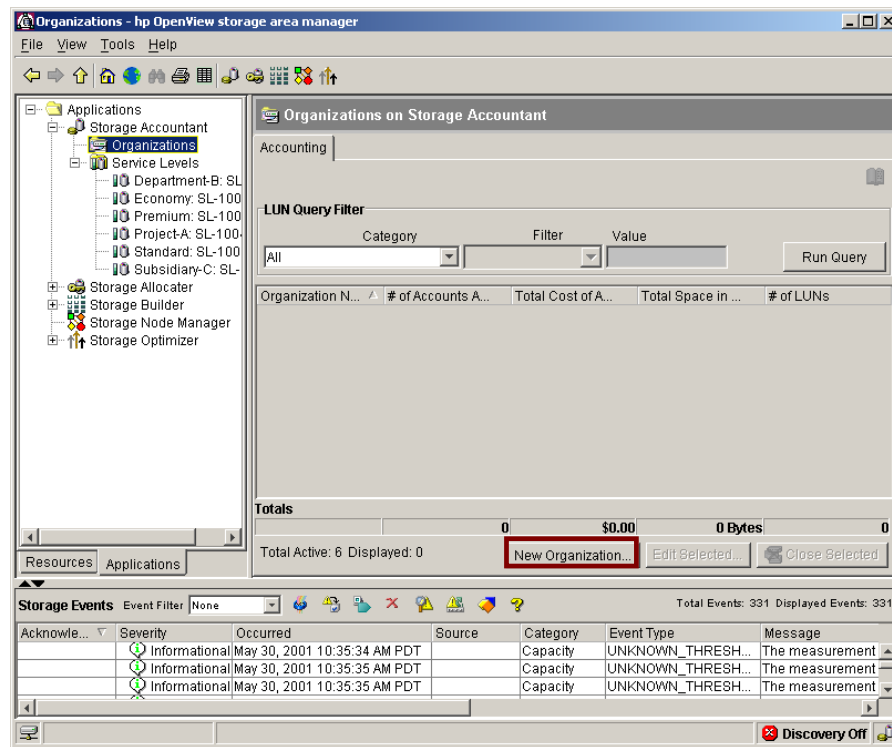
## Adding a new LUN to the service level

1. Under the *Storage Accountant* node, expand the *Service Levels* node.
2. Select the service level you created.
3. In the View panel, click the *Add/Remove LUNs* button.
4. Under LUNs not in Service Levels, select the source of the LUN from the drop-down menu.
5. Select the LUNs to add to the service level.
6. Click the *Add* button.
7. The LUNs now display in the LUNs in Service Level list.
8. Click the *OK* button.



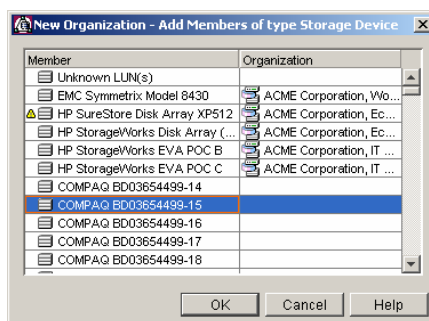
## Creating a new organization

1. From the Applications tree, expand the *Storage Accountant* node.
2. Select the *Organizations* node.
3. Click the *New Organization...* button.



4. Enter the organization and contact information in the Properties tab.
5. Click the *Membership* tab and click the *Add* button.
6. Select *Storage Device* from the shortcut menu.

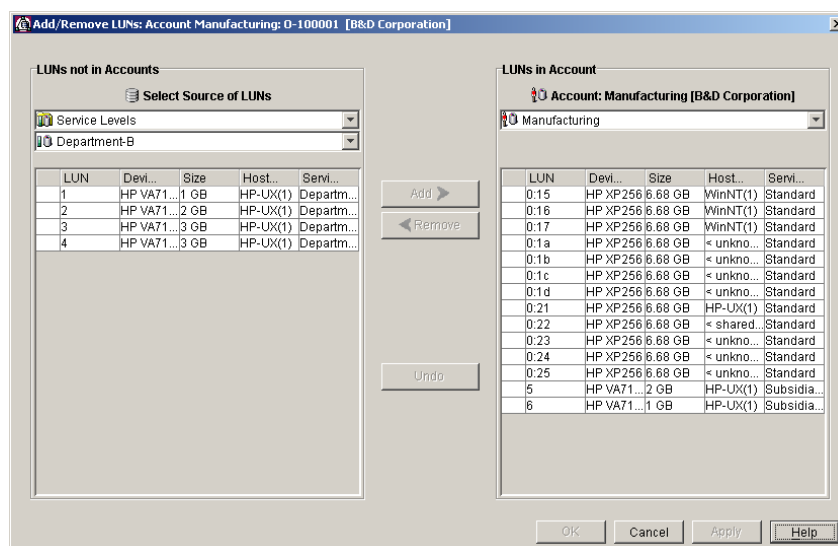
7. Select a storage device and click the *OK* button.



The device is now listed as a member of the newly created organization.

## Creating a new account and adding LUNs

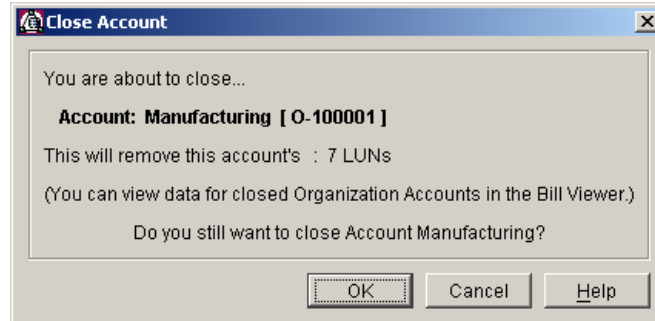
1. From the Resources tree, expand the *Organizations* node and select the new organization you created.
2. In the View panel, click the *New Account* button.
3. Enter the account name.
4. Click the *OK* button to create the account.
5. In the Resources tree, select the new account.
6. In the View panel, click the *Add/Remove LUNs* button.
7. Use the drop-down menus to filter the LUNs not in Accounts by *Service Level* or *Storage Device*.
8. Select the LUNs to add to the account.
9. Click the *Add* button.
10. Click the *OK* button.



## Closing accounts

1. From the Resources tree, expand the *Organizations* node.
2. Select an account.
3. In the View panel, click the *Close* button.
4. Click the *OK* button to confirm closure of the account.

After the account has been closed, it cannot be reopened.



## Hands-on practice: using the CLUI

To view a list of Storage Accountant-related commands, enter `accountant` at the command prompt and a list of available commands displays. Replace the word `accountant` with `acct` before any command to shorten the syntax.

1. Display all service levels by entering  
`accountant listservicelevels -D` at the command prompt.
2. Display information about a specific service level (for example, creation time, price for the service level, and LUNs assigned to a service level) by entering  
`accountant getServiceLevel <serviceLevelId>` at the command prompt.  
(Example: `accountant getservicelevel SL-100`)
3. Display information on all accounts in the organization by entering  
`accountant listaccounts -D` at the command prompt.
4. Display information about a specific account by typing  
`accountant getAccount <accountId>` at the command prompt.  
(Example: `accountant getaccount A-100001.`)



## Customer scenario activity: billing for storage use

ACME Corporation wants to recover hardware, installation, and maintenance costs of different types of storage that it employs in its data center. LUNs from the different storage arrays are assigned to different organizations. These organizations get charged for using the LUNs.

### Creating service levels and assigning prices

To use Storage Accountant, ACME Corporation must first classify all the LUNs in the SAN environment into different service levels based on vendor costs, quality-of-service (QOS) attributes, and so on. ACME Corporation decides to create the following service levels:

- XP256\_BusinessCopy\_Luns
- XP512\_RAID1\_Luns
- EMC\_Mirrored\_Luns
- EMC\_Non\_Mirrored\_Luns
- EVA\_Luns

ACME Corporation's next step is to assign prices to each service level. Assume:

- The EMC array has 50 mirrored and 50 nonmirrored LUNs.
- The EMC was purchased for a price of \$500,000.
- ACME Corporation wants to recover this cost within a period of three years.
- The total capacity of the array is 150GB.
- Each non-mirrored LUN is 1GB.
- Each mirrored LUN is 2GB (two LUNs involved)

1. What prices should be assigned to the following service levels?

EMC\_Mirrored\_Luns

.....

EMC\_Non\_Mirrored\_Luns

.....

Hint: The generic formula for pricing a service level is:

Price per GB/hr = ((Total cost of array / Total capacity in GB of the array) \*  
Average totalsize of a Type-A LUN ) / (Number of years to recover the cost  
\* 365 \* 24)

## Generating a current bill

1. The storage administrator at ACME Corporation has completed all the required Storage Accountant setup tasks:
  - Creating service levels and assigned prices
  - Adding LUNs to service levels
  - Creating organizations
  - Creating accounts
  - Added LUNs to the accounts

Now, the storage administrator would like to check if Storage Accountant is metering the LUN usages properly and accurately performing the billing. The storage administrator does not want to wait until the next bill is generated. How can the check be performed?

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## Scheduling bill retention

1. ACME Corporation has a policy of retaining historical customer monthly bills for a period of two years, for the purposes of auditing and resolving billing disputes. How would ACME Corporation configure Storage Accountant to achieve this?

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## Exporting bills

1. ACME Corporation wants to use end-to-end financial/invoicing applications for managing the billing process of its customers. These third-party billing applications are capable of taking .xml or .csv files as input.

How would ACME Corporation configure Storage Accountant, so the metered billing usage information accumulated and generated by Storage Accountant can be fed as input to these third-party billing applications?

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## Customer scenario activity: answers

The answers for the “Billing for Storage Use” customer scenario activity follow.

### Creating service levels and assigning prices

1. What prices should be assigned to the following service levels?

#### **EMC\_Mirrored\_Luns**

**The price for the EMC\_Mirrored\_LUNs service level:  $((500,000/150)*2) / (3 * 365 * 24) = .253678$**

#### **EMC\_Non\_Mirrored\_Luns**

**The price for the EMC\_Non\_Mirrored\_Luns service level:  $((500,000/150)) / (3 * 365 * 24) = .126839$**

### Generating a current bill

1. Now, the storage administrator would like to check if Storage Accountant is metering the LUN usages properly and accurately performing the billing. The storage administrator does not want to wait until the next bill is generated. How can the check be performed?

**Accountant provides an up-to-date bill that provides usage and billing information up to the last collection period.**

- a. **From the Accountant home page, select *Bill Viewer*.**
- b. **If not already selected, choose *Current Bill* from the Billing Period drop down menu.**

**At least one collection must have been completed to see the up-to-date bill, otherwise no data will appear.**

### Scheduling bill retention

1. ACME Corporation has a policy of retaining historical customer monthly bills for a period of two years, for the purposes of auditing and resolving billing disputes. How would ACME Corporation configure Storage Accountant to achieve this?
  - a. **Select *Tools* → *Configure*.**
  - b. **Under Scheduling select *Storage Accountant Billing Cycle*.**
  - c. **Set “Purge Data older than” to *730 days*.**

## Exporting bills

1. How would ACME Corporation configure Storage Accountant, so the metered billing usage information accumulated and generated by Storage Accountant can be fed as input to these third-party billing applications?
  - a. Select *Tools* → *Configure*.
  - b. Under *Scheduling* select *Storage Accountant Billing Cycle*.
  - c. For the *Exporter Output Formats*, select either the *.xml* or *.csv* checkbox.
  - d. For the *Exporter Output Directory*, enter the path where the 3<sup>rd</sup> party application will be able to retrieve and process the files.



### Objectives

After completing this lab, you should be able to:

- Create and modify organizational groups
- Create and modify security groups
- View allocation reports and host LUN assignments
- Assign LUNs to hosts
- Activate Storage Allocator on a new host

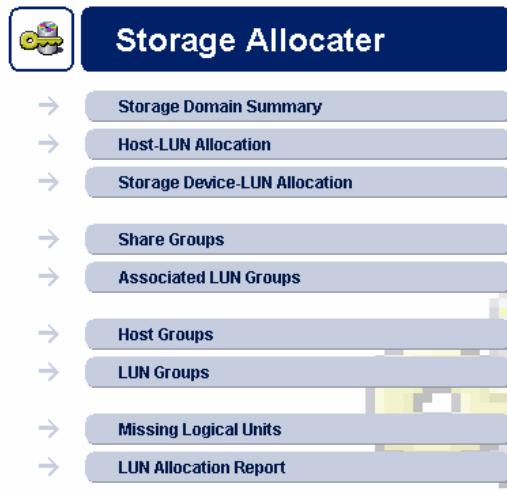
### Requirements

This exercise requires the following resources:

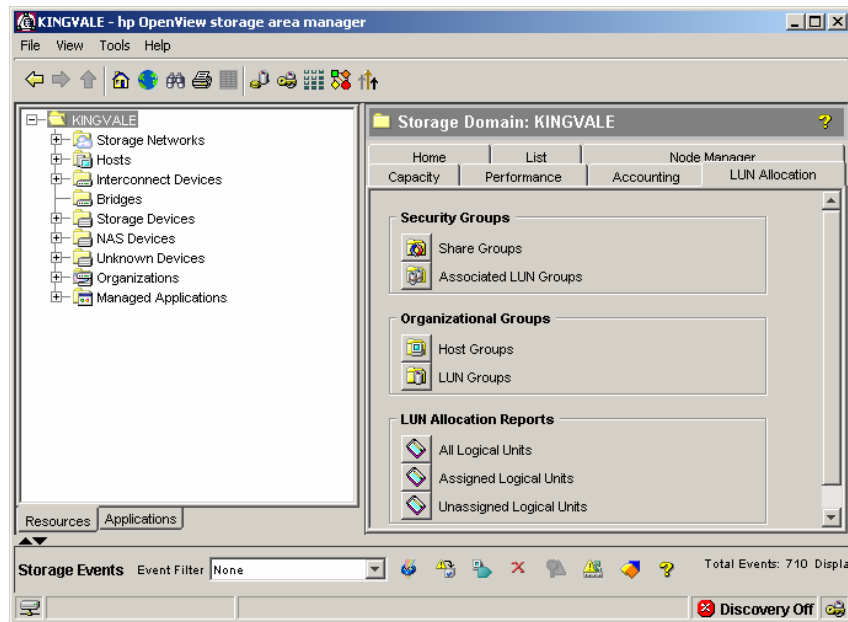
- The Storage Area Manager Demo/Simulation
- Classroom lab equipment (for the optional Storage Allocator activation practice)
- *HP OpenView Storage Area Manager*, Module 14, “Storage Allocator”

## Hands-on practice: viewing the storage domain summary

1. Navigate to the Storage Allocator home page by clicking the *Storage Allocator* icon on the main toolbar.



2. Click *Storage Domain Summary*.



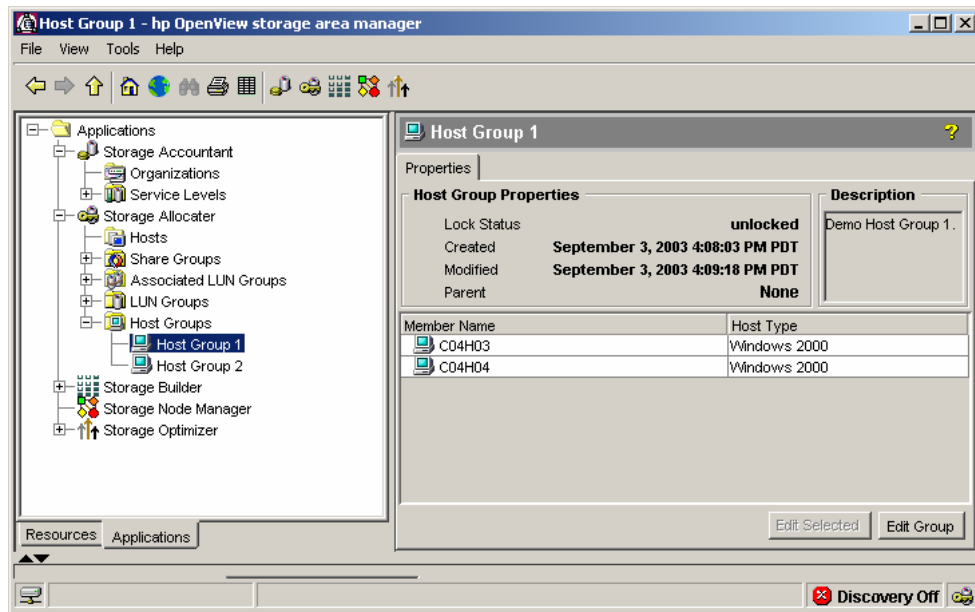
The Storage Domain Summary provides easy access to view or create security and organization groups, and view Allocator reports.



## Hands-on practice: working with organizational groups

Host and LUN Groups are called organizational groups because they are used to organize information in the Storage Area Manager user interface. Manipulation of these groups does not directly affect storage access. Organizational groups also enable you to create a hierarchy of groups.

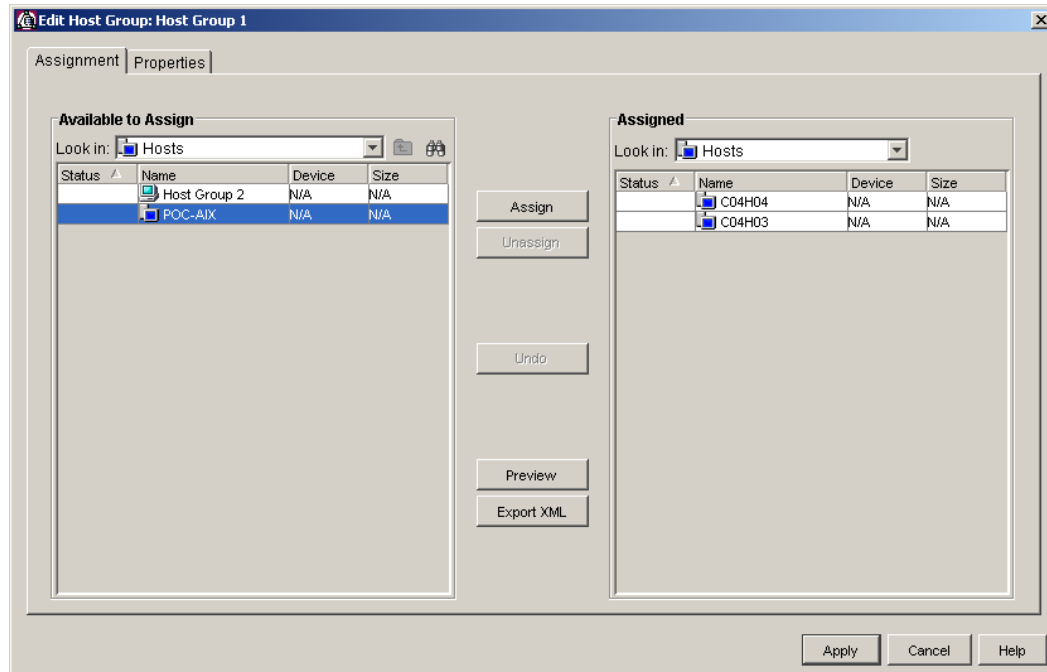
1. In the Applications tree, expand the *Storage Allocator* node.
2. Expand the *Host Groups* node.
3. Select *Host Group 1*.



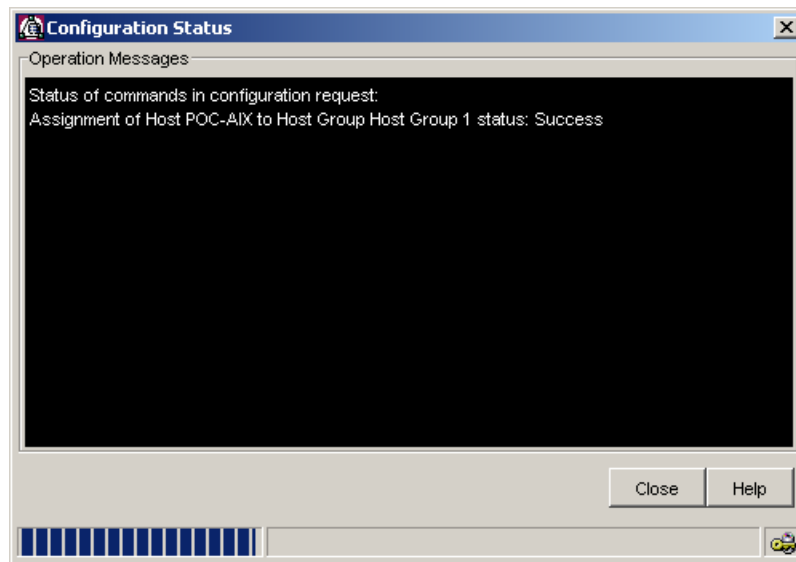
4. To add hosts to a host group, click the *Edit Group* button.
5. Click the *Assignment* tab.

Recall the rules for host groups:

- Host groups can contain hosts or other hosts groups.
- A host can be a member of only one host group.



6. Select a host from the Available to Assign list.
7. Click the *Assign* button.
8. Click the *Apply* button. A confirmation displays.



9. Click the *Close* button to acknowledge the confirmation.

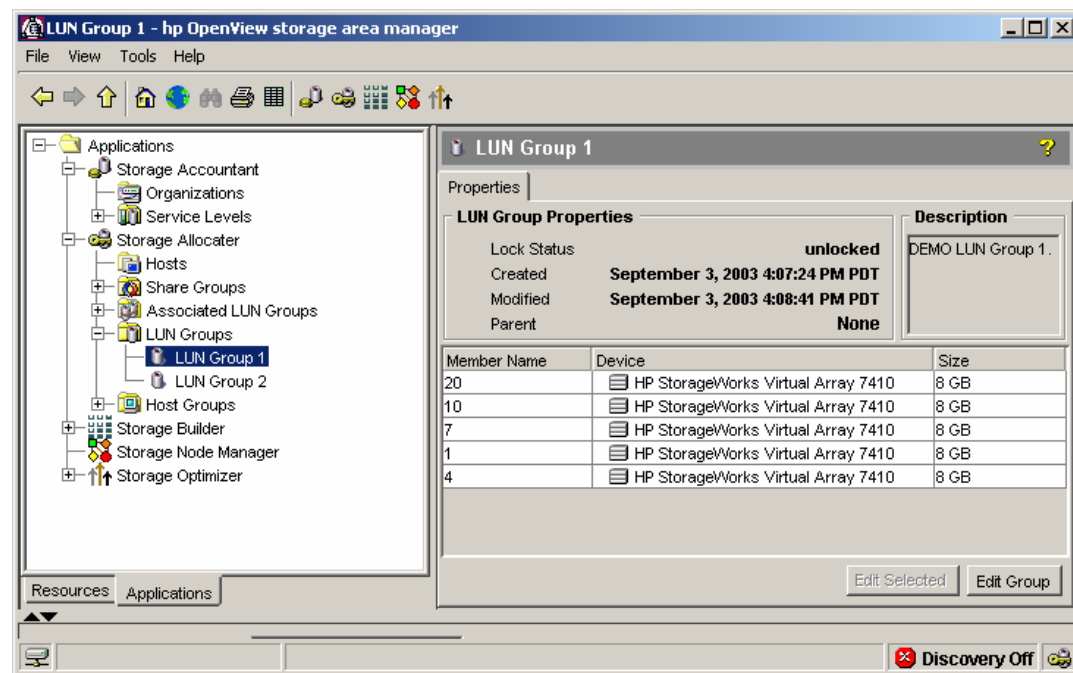
LUN groups are organizational groups that enable you to group LUNs into organizational sets.

Recall the rules for LUN groups:

- LUN groups can contain LUNs and other LUN groups.
- A LUN can be a member of only one LUN group.
- In the Edit LUN Group window, you can apply assignment and unassignment changes in a single configuration request.
- To assign LUNs that are part of a LUN group, you must select and assign the individual LUNs from within the group. If you want to assign and unassign several LUNs as a unit, use the associated LUN groups feature.

10. In the Resources tree, expand the *LUN Groups* node.

11. Select *LUN Group 1*.



In this example, the Storage Area Manager administrator has created a LUN group which includes several LUNs on the Virtual Array 7410 storage device.

## Hands-on practice: working with security groups

Storage Allocator share groups and associated LUN groups are called security groups because manipulation of these groups directly affects storage access control. Unlike organizational groups, security groups are not hierarchical; they cannot be members of other security groups.

1. In the Applications tree, expand the *Share Groups* node.

Share groups enable multiple hosts to share the same storage with read-write access.

Recall the rules for share groups:

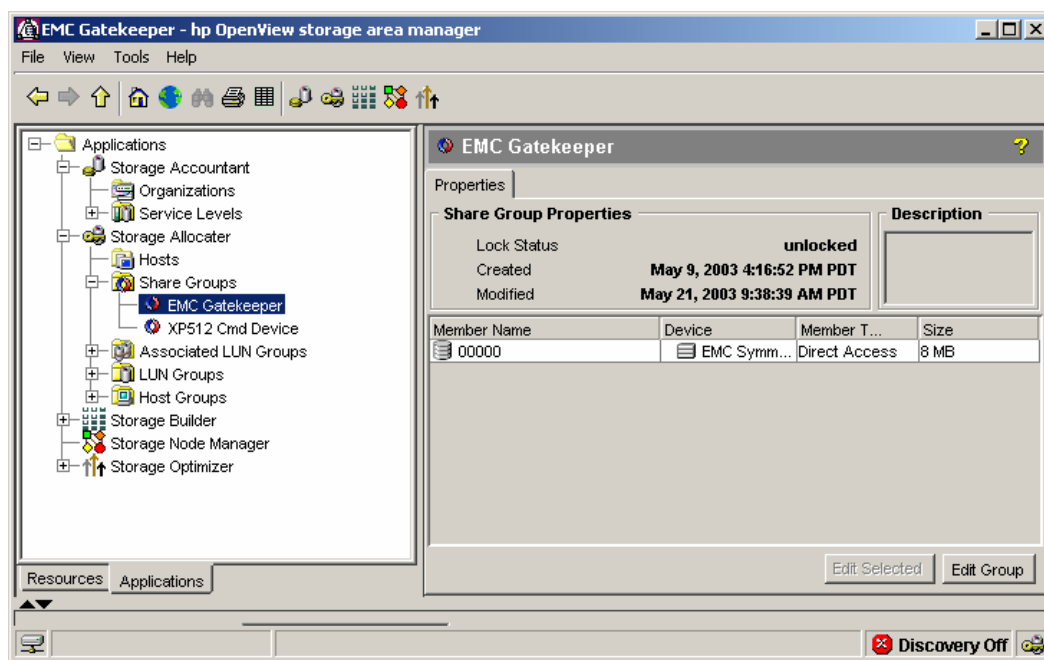
- When you assign a host to a share group, all the storage in the share group is assigned to the host.
- When you unassign a host from a share group, all the storage in the share group is unassigned from the host.
- When you assign storage to a share group, it is automatically assigned to each host in the share group.
- When you unassign storage from a share group, it is automatically unassigned from each host in the share group.



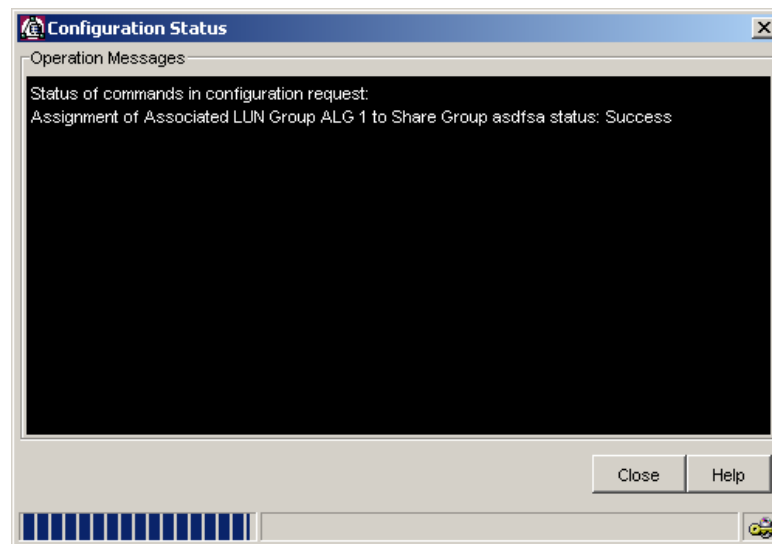
### Caution

When using share groups with data LUNs, you must use an application that preserves data integrity on shared storage (for example, Microsoft Cluster Server on Windows NT or Veritas Cluster Server on Solaris). Without this type of application, data corruption can occur.

2. Select *EMC Gatekeeper*.



3. To create a new share group, right-click *Share Groups* in the Applications tree.
4. Select *New Group* from the shortcut menu.
5. Enter a name and a description for the group.
6. Click the *OK* button.
7. In the *Applications* tree, select the group.
8. In the View panel, click the *Edit Group* button.
9. Click the *Assignment* tab.
10. Filter the list using the Look in: drop-down menu.
11. Select a resource from the Available to Assign list.
12. Click the *Assign* button.
13. Click the *Apply* button. A confirmation displays.



14. Click the *Close* button to acknowledge the confirmation.

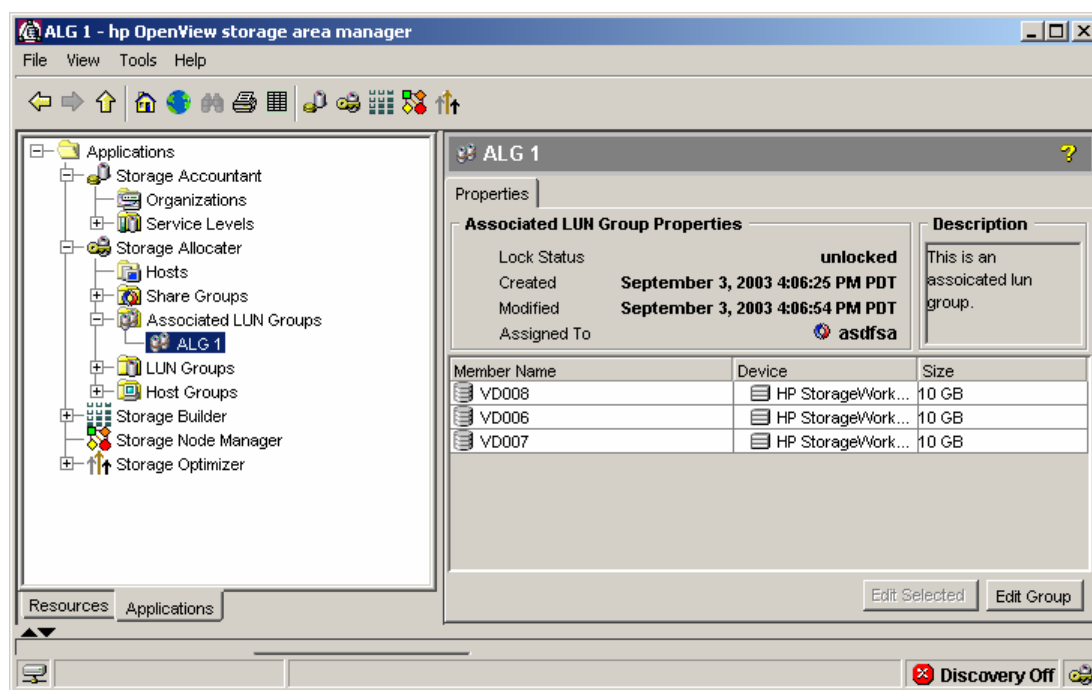
15. In the Applications tree, expand the *Associated LUN Groups* node.

Associated LUN groups are used for any set of LUNs that must be assigned and unassigned as a unit, for example, stripe sets, mirror sets, and sets of LUNs that contain parts of the same database.

Recall the rules for associated LUN groups:

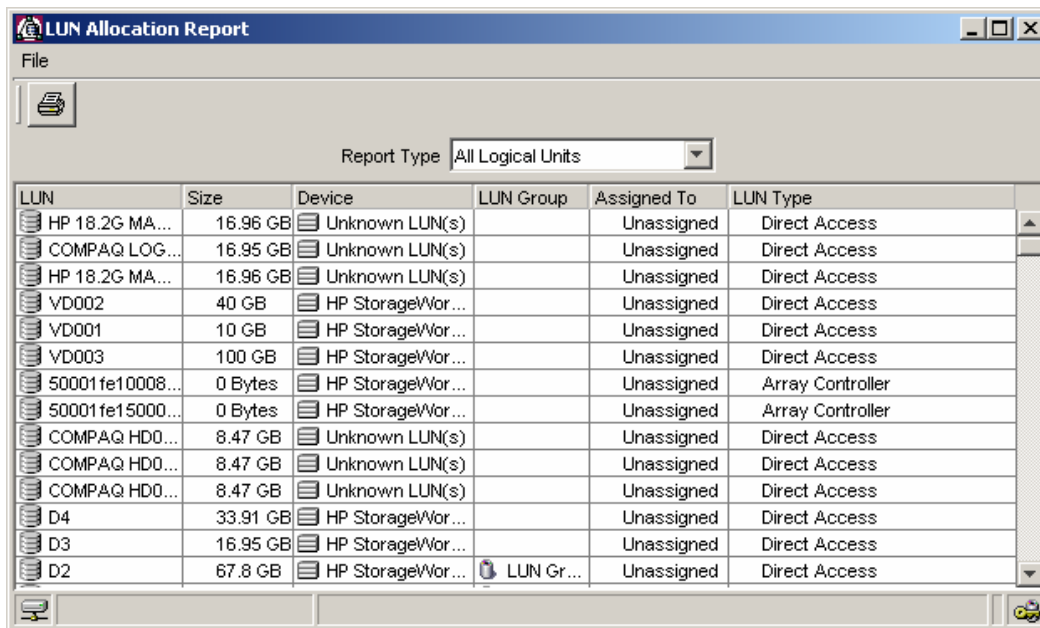
- When you assign an associated LUN group to a host or share group, all the LUNs in the associated LUN group are assigned to the single host or all the share group hosts.
- When you unassign an associated LUN group from a host or share group, all the LUNs in the associated LUN group are unassigned from the affected hosts.
- If you add a LUN to an associated LUN group that is assigned to a host or share group, the newly assigned LUN is automatically assigned to the host or the hosts in the share group.
- If you unassign a LUN from an associated LUN group that is assigned to a host or share group, the unassigned LUN is automatically unassigned from the affected hosts.

16. Select *ALG 1*.



## Hands-on practice: viewing LUN allocation reports

1. Navigate to the Storage Allocator home page by clicking the *Storage Allocator* icon on the main toolbar.
2. Click *LUN Allocation Report*.



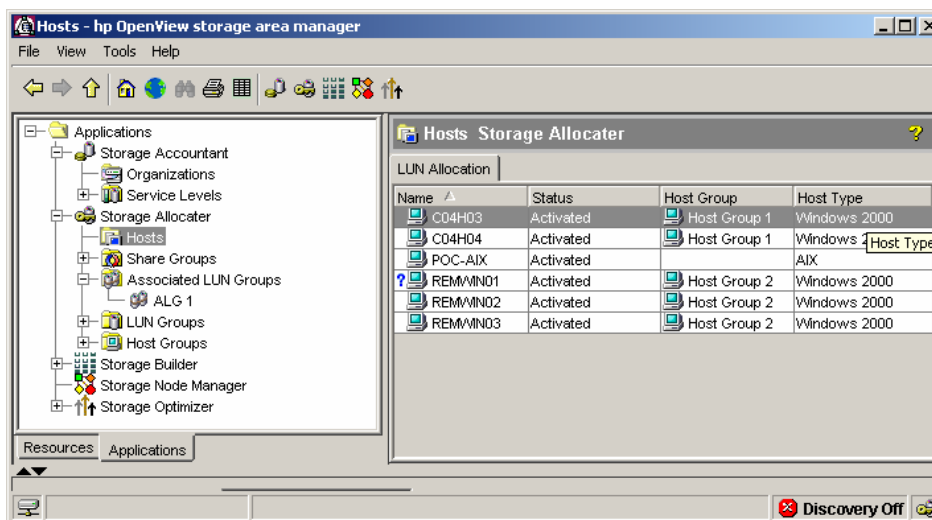
The screenshot shows the 'LUN Allocation Report' window. It has a 'File' menu and a 'Report Type' dropdown set to 'All Logical Units'. Below is a table with the following data:

LUN	Size	Device	LUN Group	Assigned To	LUN Type
HP 18.2G MA...	16.96 GB	Unknown LUN(s)		Unassigned	Direct Access
COMPAQ LOG...	16.95 GB	Unknown LUN(s)		Unassigned	Direct Access
HP 18.2G MA...	16.96 GB	Unknown LUN(s)		Unassigned	Direct Access
VD002	40 GB	HP StorageWor...		Unassigned	Direct Access
VD001	10 GB	HP StorageWor...		Unassigned	Direct Access
VD003	100 GB	HP StorageWor...		Unassigned	Direct Access
50001fe10008...	0 Bytes	HP StorageWor...		Unassigned	Array Controller
50001fe15000...	0 Bytes	HP StorageWor...		Unassigned	Array Controller
COMPAQ HD0...	8.47 GB	Unknown LUN(s)		Unassigned	Direct Access
COMPAQ HD0...	8.47 GB	Unknown LUN(s)		Unassigned	Direct Access
COMPAQ HD0...	8.47 GB	Unknown LUN(s)		Unassigned	Direct Access
D4	33.91 GB	HP StorageWor...		Unassigned	Direct Access
D3	16.95 GB	HP StorageWor...		Unassigned	Direct Access
D2	67.8 GB	HP StorageWor...	LUN Gr...	Unassigned	Direct Access

3. Investigate the report types available by using the Report Type drop-down menu.

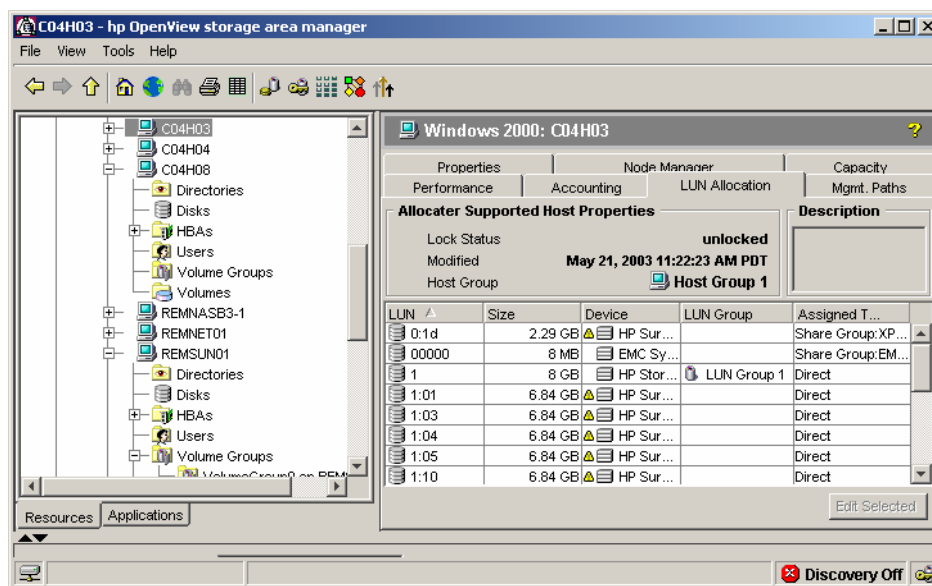
## Hands-on practice: viewing host LUN assignments

1. In the Applications tree, select *Hosts* under the Storage Allocator node.



The LUN Allocation panel lists all of the hosts on which Storage Allocator has been activated, the host group to which it belongs, and the host operating system type.

2. Double-click host *C04H03*.

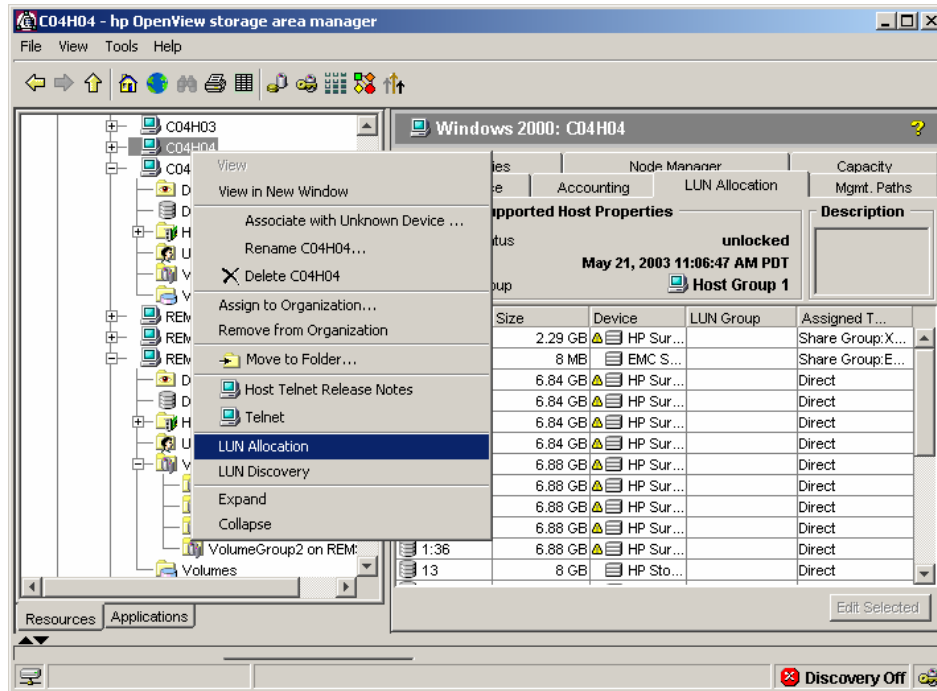


The LUN Allocation panel lists all the LUNs that have already been assigned to this host, the size of the LUN, what device the LUN belongs to, the LUN group (if applicable) and whether the LUN was assigned individually (direct) or through a security group.

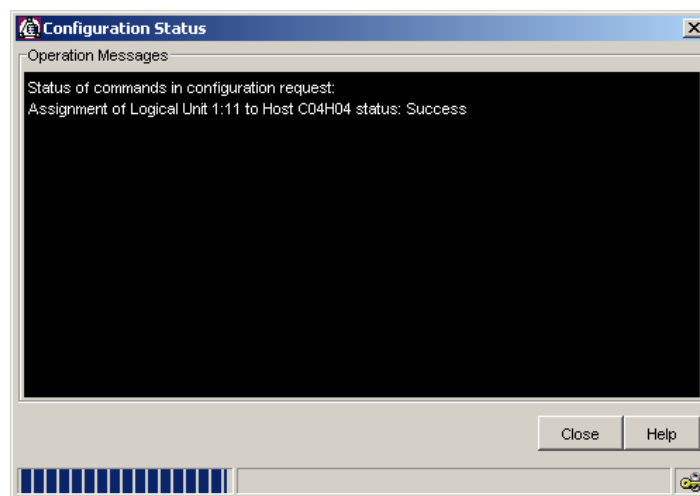


## Hands-on practice: assigning LUNs to hosts

1. In the Resources tree, right-click a host.
2. Select *LUN Allocation* from the shortcut menu.



3. Filter the list using the Look in: drop-down menu.
4. Select a resource from the Available to Assign list.
5. Click the *Assign* button.
6. Click the *Apply* button. A confirmation displays.



Notice that you can also unassign LUNs from hosts using this panel.

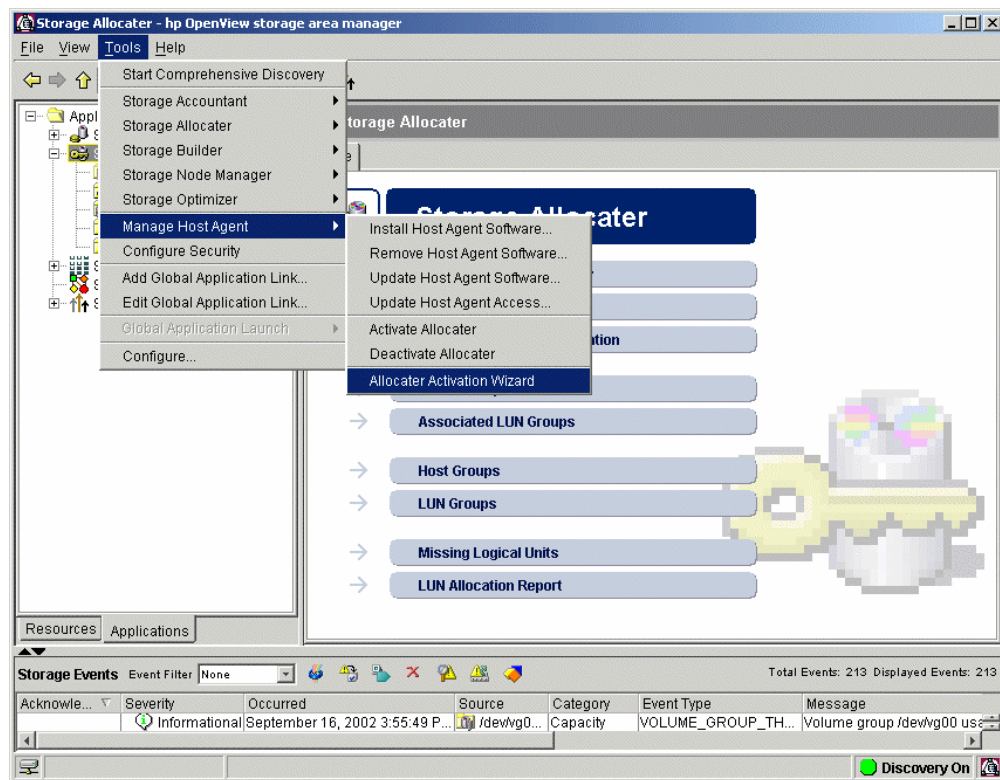
## Hands-on practice: activating Allocator on a new host (optional)

This is an optional practice requiring actual equipment. It cannot be performed using the Storage Area Manager simulation.

### Note

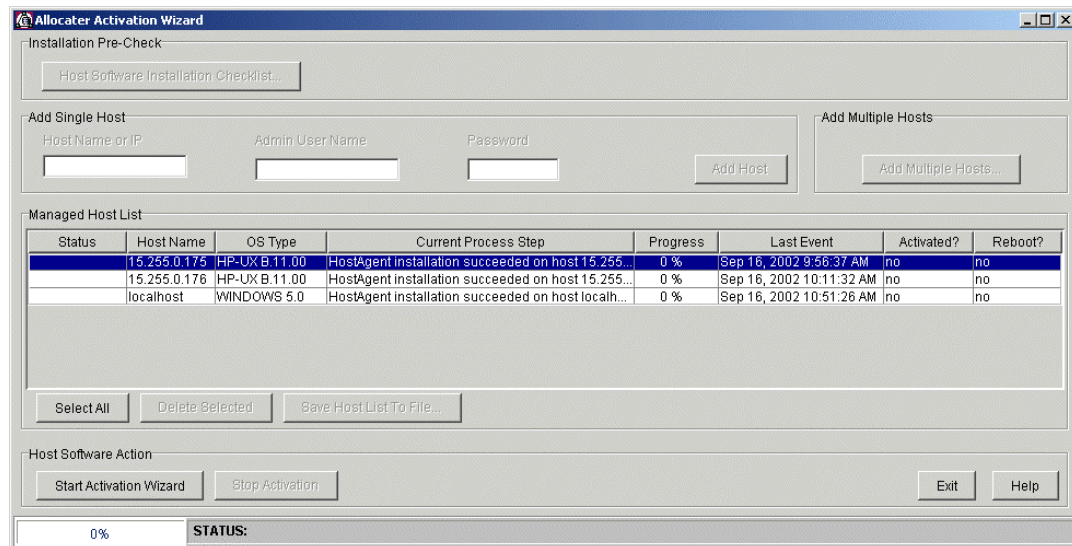
Only **one** Administrator can activate Storage Allocator on a SAN at a time.

1. Select *Tools* → *Manage Host Agent* → *Storage Allocator Activation Wizard*.



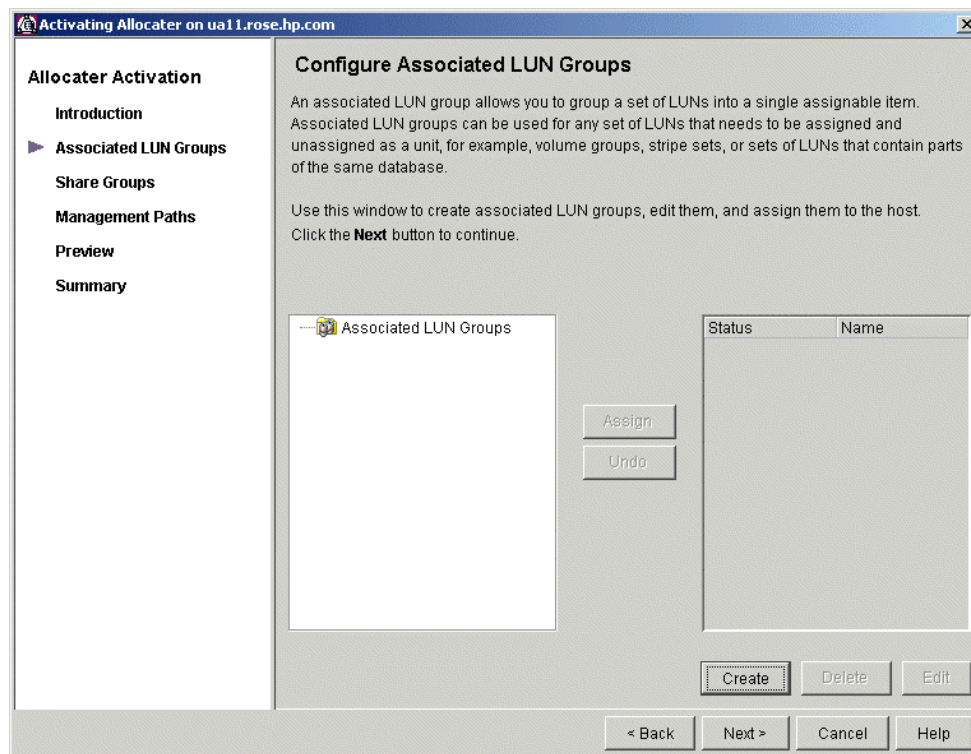
2. Select the host on which you want to activate Storage Allocator. If your host is not listed, enter the IP address in the Add Single Host window, enter the user name and password, and click *Add Host*.

- When your host displays in the Manage Host List, select it and then click *Start Activation Wizard*.

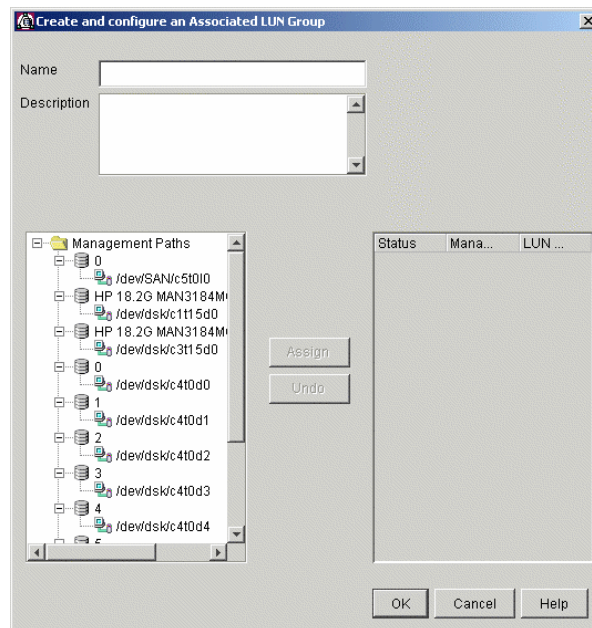


- In the resulting dialog box, view the introduction data and note the name of the host being activated in the menu bar at the top of the dialog box.
- Click the *Next* button to continue.

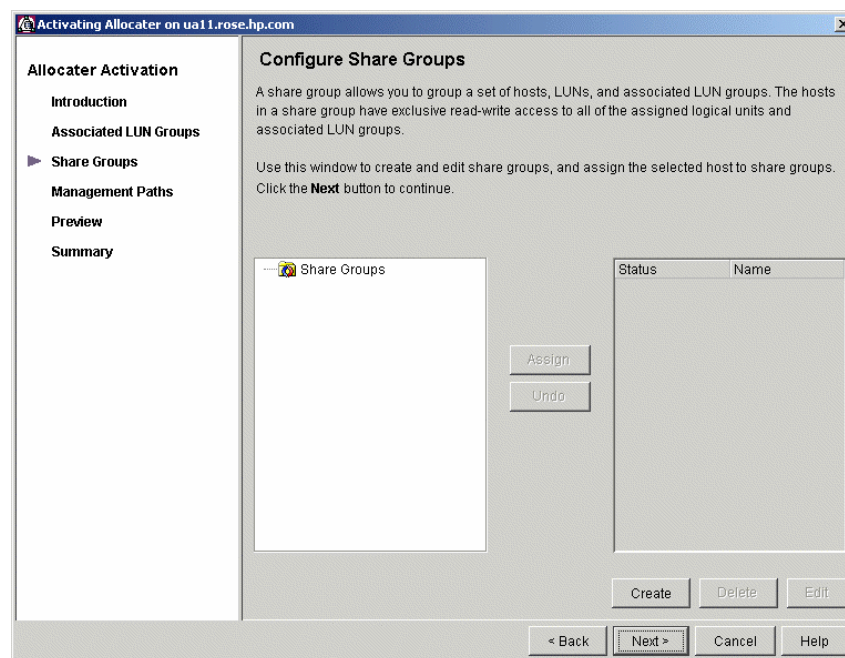
The next window enables configuration of Associated LUN groups.



6. Click the *Create* button.

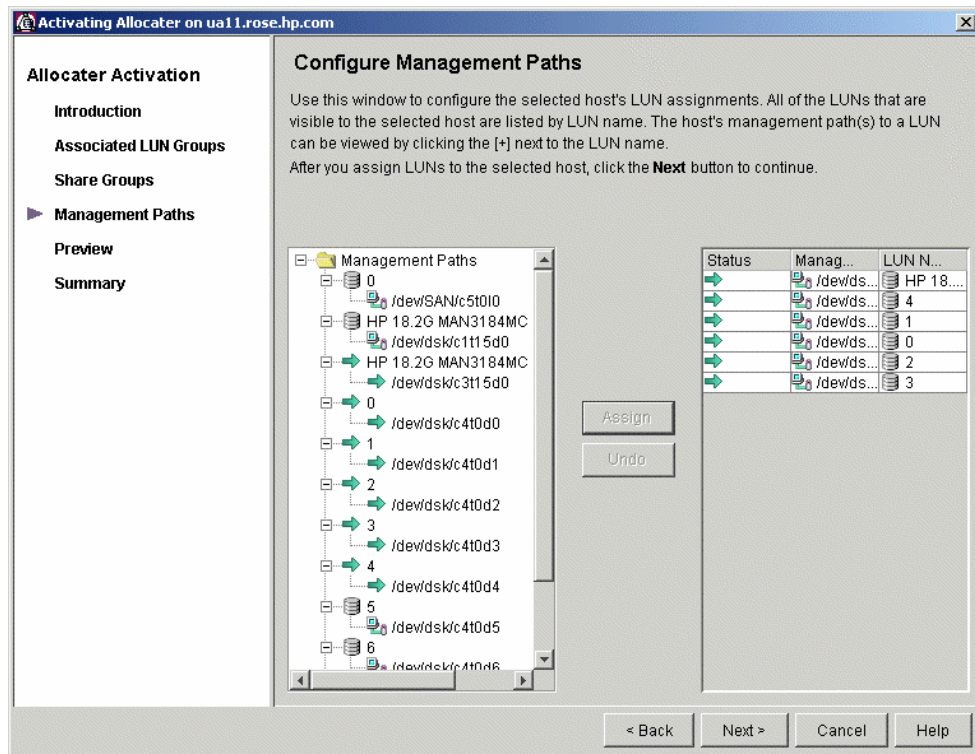


7. Enter a name and description for the Associated LUN group.
8. Select the management path of the LUN to be assigned.
9. Click the *Assign* button.
10. Click the *OK* button.
11. Click the *Next* button on the main window to continue with the wizard.



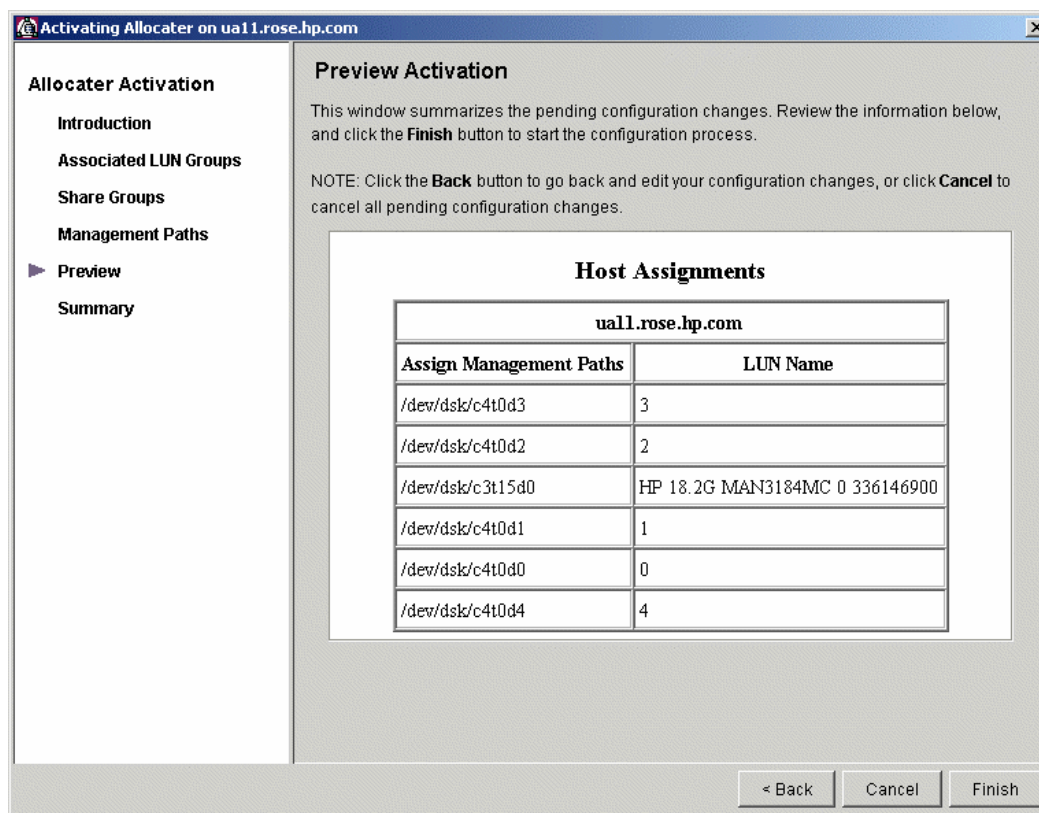


12. To create a share group, click the *Create* button.
13. Enter a name and description for the share group.
14. Select the LUNs to be added to the share group.
15. Click the *Assign* button.
16. Click the *OK* button.
17. Click the *Next* button on the main window to continue with the wizard.



18. Select the specific LUNs to assign to the host.
19. Click the *Assign* button.
20. Click the *Next* button to continue with the wizard.

21. Review the assignments created.



22. Click the *Finish* button.

When Allocator has been activated, you will receive a successful message in the status window. If activation was not successful, you will receive an error message.

23. Click the *OK* button when activation is complete.

### Objectives

After completing this lab, you should be able to:

- Gather log files using CLUI commands
- Analyze log files using DrSam
- Investigate Storage Area Manager problems using tools, such as log files and SAMTools

### Requirements

This exercise requires the following resources:

- Classroom lab equipment
- *HP OpenView Storage Area Manager Fundamentals*, Module 16, “Database Management and Basic Troubleshooting”

## Hands-on practice: gathering and analyzing log files

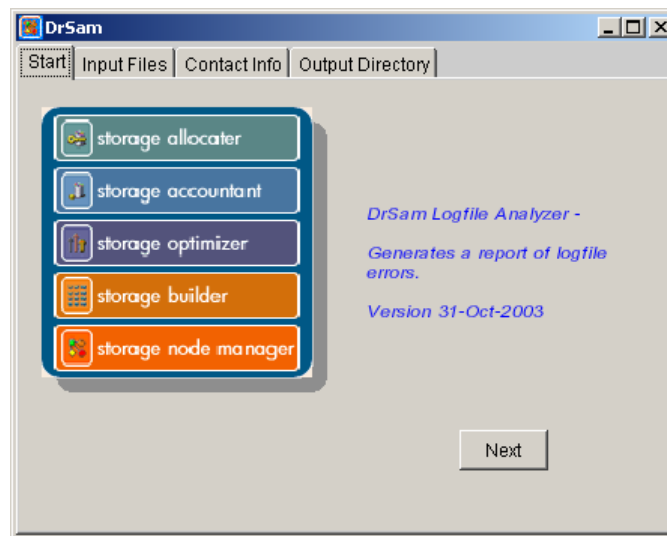
1. From the command line, execute  
`\sanmgr\managementserver\sbin\support.cmd` on the management server.

The command creates an image of management server data and log files called `support.zip` in `\sanmgr\managementserver\`.

2. Expand `support.zip` into a temporary directory.
3. Examine the contents of the directory and note the path to the management server log files.

...`\support\Program Files\Hewlett-Packard\sanmgr\managementserver\logs`

4. Launch DrSam by double-clicking `drsam.jar`.



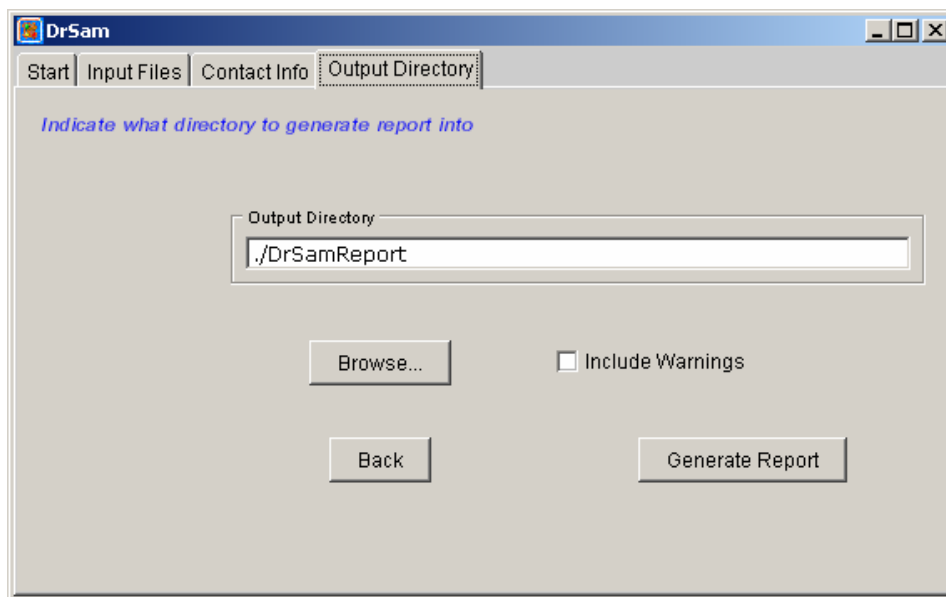
5. Select the *Input Files* tab.
6. Click the *Browse* button and locate the directory containing the management server log directory.
7. Click the *Select* button.



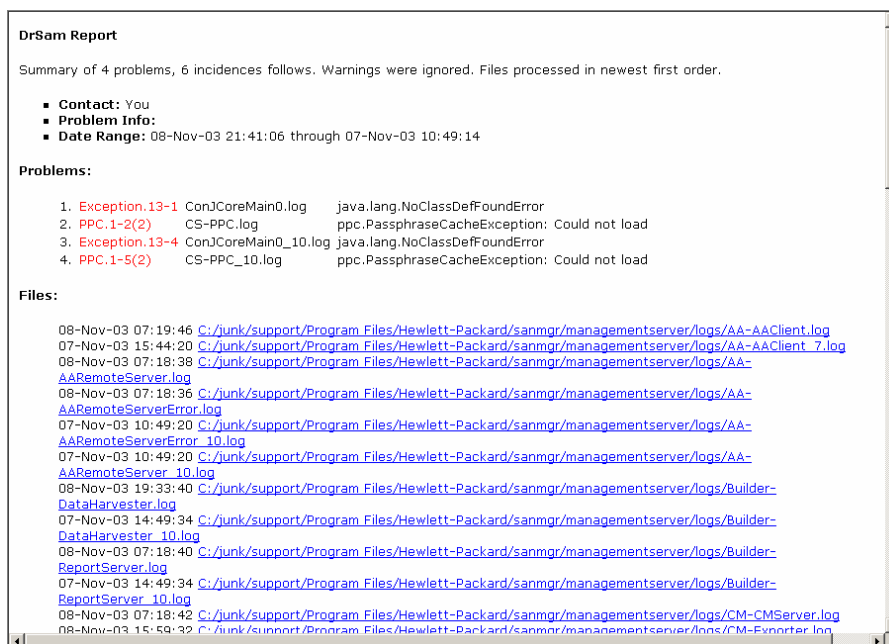
8. Click the *Next* button.
9. Enter the contact and problem description information.

10. Click the *Next* button.

11. Click the *Browse* button and select an output directory for the DrSam report.
12. Click the *Select* button.
13. Click the *Generate Report* button.



DrSam analyzes the log files and launches an .html report with a summary of the findings.



14. Examine the contents of the report.
15. Using the process used in the previous steps, use DrSam to analyze the SAN host log files gathered by the host\_support.cmd.

## Hands-on practice: Investigating Storage Area Manager problems

1. Your instructor has introduced some problems into the lab environment. Troubleshoot and resolve the issues using the tools and techniques covered in the *Database Management and Basic Troubleshooting* module. Record your investigations below.

Symptom: .....

Techniques/Tools Used in Investigation: .....

.....

.....

Problem Discovered: .....

Resolution: .....

.....

Symptom: .....

Techniques/Tools Used in Investigation: .....

.....

.....

Problem Discovered: .....

Resolution: .....

.....

Symptom: .....

Techniques/Tools Used in Investigation: .....

.....

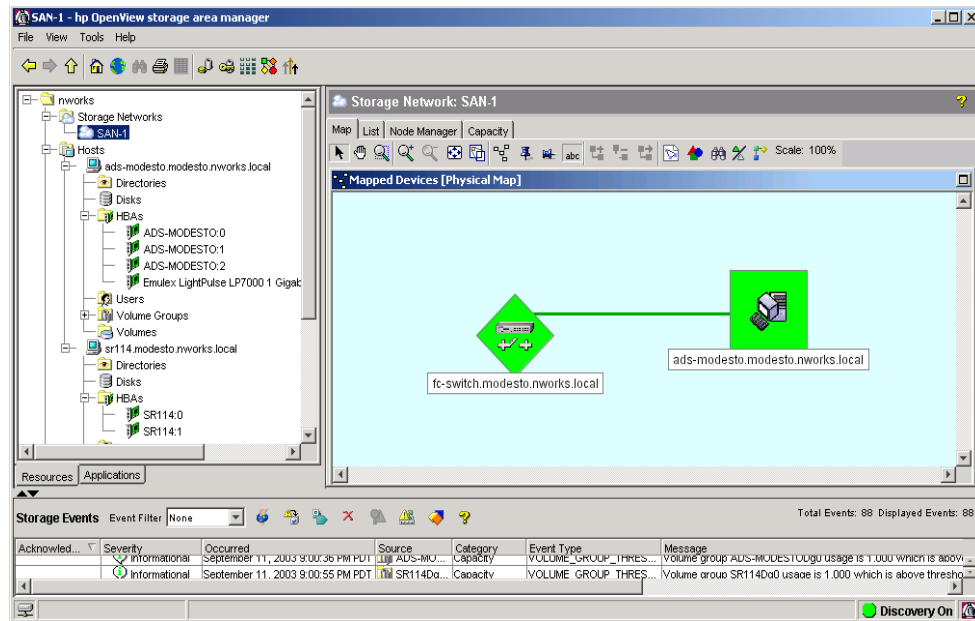
.....

Problem Discovered: .....

Resolution: .....

## Customer scenario activity: Troubleshooting HBAs

In this activity, you will troubleshoot a problem associated with a Host Bus Adapter on a Windows 2000 Server. The customer map is shown below.



The customer has a host named SR-114 connected to a switch that should be displayed on the map but instead they see the map shown above which displays only a single host named ADS-MODESTO connected to the switch. The Storage Area Manager Host Agent has been installed on SR-114 and the node is displayed in the Resources tree.

1. What are the possible reasons that SR-114 is missing from the map?

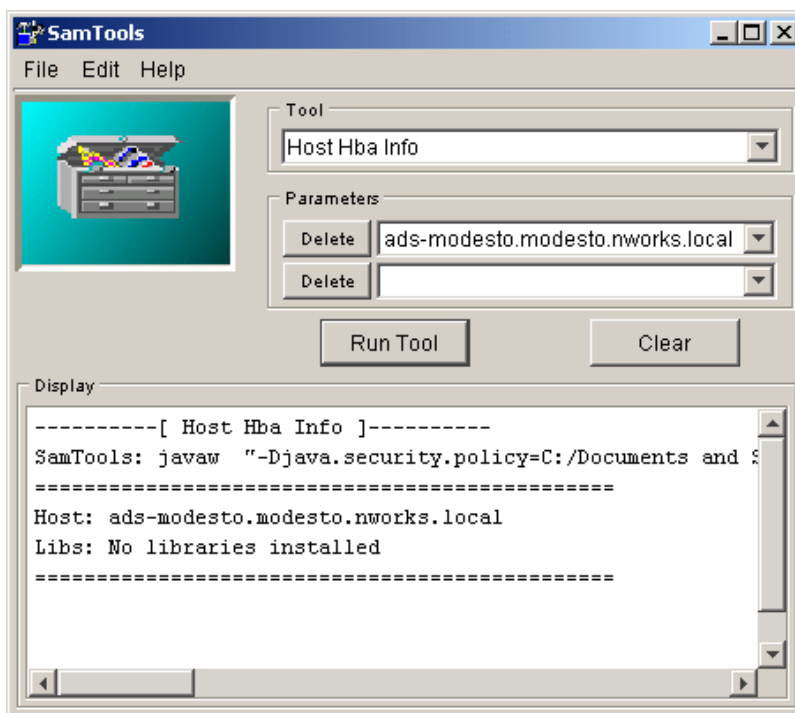
.....

.....

.....

2. What SAMTools utility could help diagnose the problem?

.....



3. Based on the output from the Host Hba Info tool above, what is the problem with the Host Bus Adapter?

.....

.....

4. How would you correct this problem?

.....

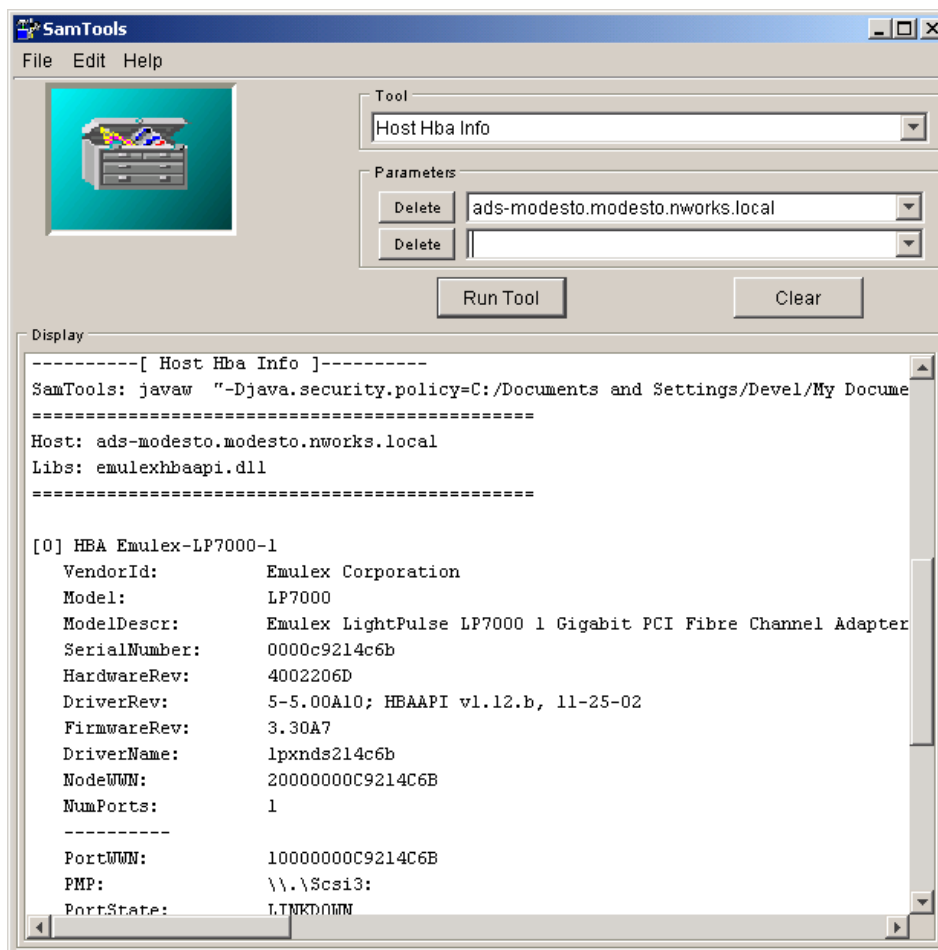
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5. Search the internet for “Emulex Drivers”. What is the main URL for Emulex HBA Drivers?

.....

The customer has loaded the latest HBA driver (which includes a SNIA library) on the host. They re-ran the SAM Tools Hba Info tool and received the following results.



6. Run the SAMTools Host Hba Info utility against an HBA in your environment. What is the Vendor, Model and Driver version for your HBA?

.....

.....

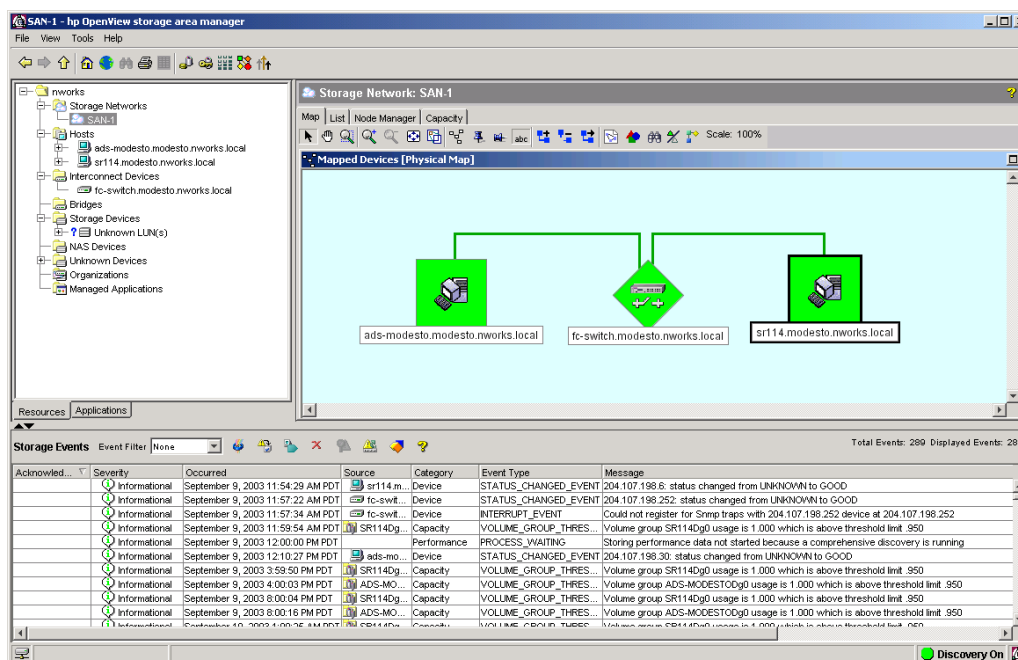
.....

7. Look at the Emulex LP7000 HBA for Windows hosts in the *Storage Area Manager Support Components and Configuration Guide*. Is the driver version shown in the above screen capture supported?

.....

8. Review the Host Hba Info results for the HBA that you queried. Is it supported?

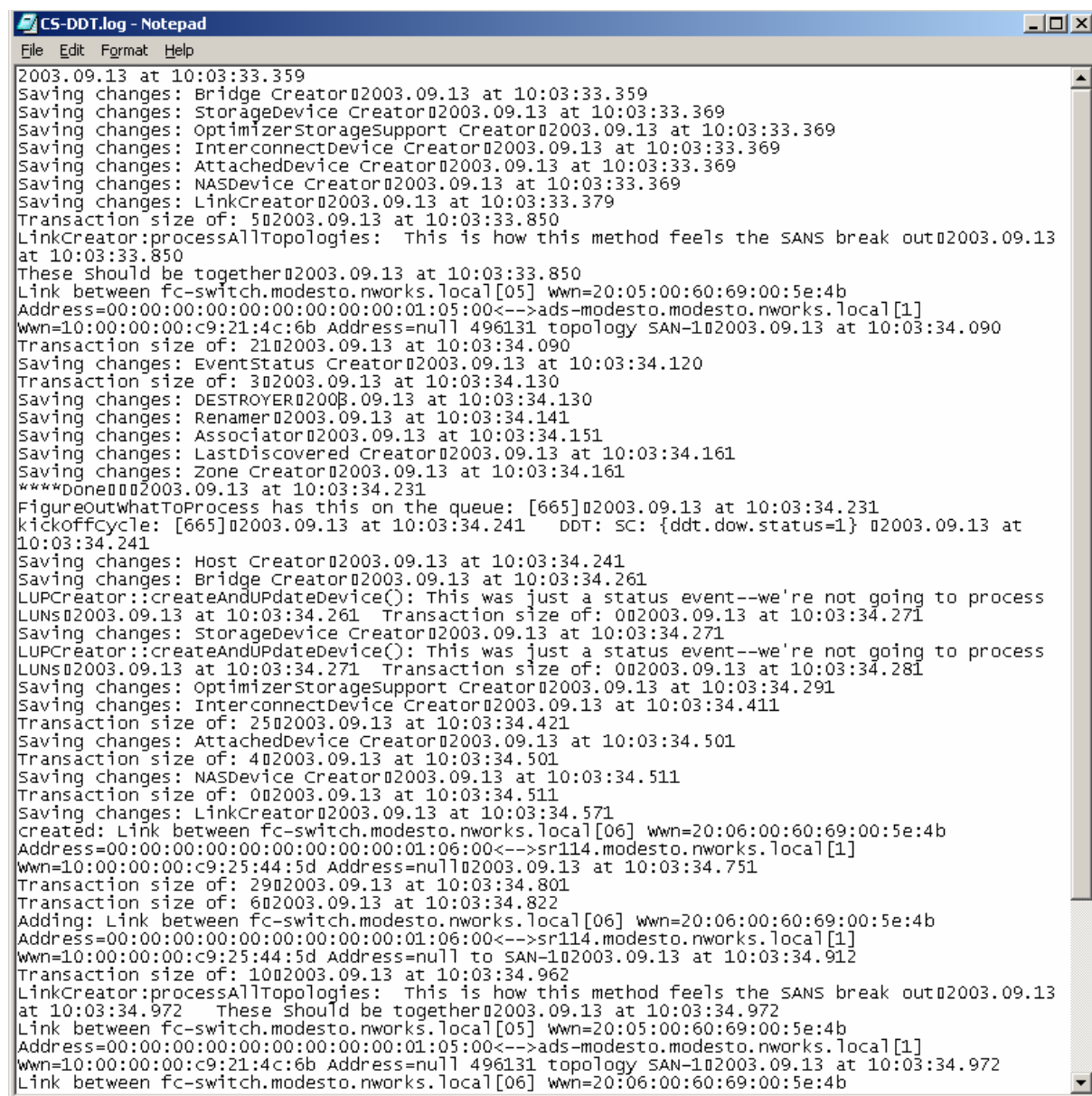
When the new HBA driver was loaded, Host Agent reported additional information for the HBA (beyond what was initially provided by the FC switch using the SNIA API).



9. Is the map different now? If so, what information from the SNIA interface did Storage Area Manager use to display a more detailed map?

10. Below is a subset of the customer's CS-DDT.log file. (resides in sanmgr\ManagementServer\logs\).

Which line or lines in the log show the point at which Storage Area Manager recognized the addition of the SNIA API?



```

2003.09.13 at 10:03:33.359
Saving changes: Bridge Creator02003.09.13 at 10:03:33.359
Saving changes: StorageDevice Creator02003.09.13 at 10:03:33.369
Saving changes: OptimizerStorageSupport Creator02003.09.13 at 10:03:33.369
Saving changes: InterconnectDevice Creator02003.09.13 at 10:03:33.369
Saving changes: AttachedDevice Creator02003.09.13 at 10:03:33.369
Saving changes: NASDevice Creator02003.09.13 at 10:03:33.369
Saving changes: LinkCreator02003.09.13 at 10:03:33.379
Transaction size of: 502003.09.13 at 10:03:33.850
LinkCreator:processAllTopologies: This is how this method feels the SANS break out02003.09.13
at 10:03:33.850
These should be together02003.09.13 at 10:03:33.850
Link between fc-switch.modesto.nworks.local[05] wwn=20:05:00:60:69:00:5e:4b
Address=00:00:00:00:00:00:00:00:01:05:00:00:ads-modesto.modesto.nworks.local[1]
wwn=10:00:00:00:c9:21:4c:6b Address=null 496131 topology SAN-102003.09.13 at 10:03:34.090
Transaction size of: 2102003.09.13 at 10:03:34.090
Saving changes: EventStatus Creator02003.09.13 at 10:03:34.120
Transaction size of: 302003.09.13 at 10:03:34.130
Saving changes: DESTROYER02003.09.13 at 10:03:34.130
Saving changes: Renamer02003.09.13 at 10:03:34.141
Saving changes: Associator02003.09.13 at 10:03:34.151
Saving changes: LastDiscovered Creator02003.09.13 at 10:03:34.161
Saving changes: Zone Creator02003.09.13 at 10:03:34.161
****Done02003.09.13 at 10:03:34.231
FigureoutwhatToProcess has this on the queue: [665]02003.09.13 at 10:03:34.231
kickoffCycle: [665]02003.09.13 at 10:03:34.241 DDT: SC: {ddt.dow.status=1} 02003.09.13 at
10:03:34.241
Saving changes: Host Creator02003.09.13 at 10:03:34.241
Saving changes: Bridge Creator02003.09.13 at 10:03:34.261
LUPCreator::createAndUpdateDevice(): This was just a status event--we're not going to process
LUNS02003.09.13 at 10:03:34.261 Transaction size of: 002003.09.13 at 10:03:34.271
Saving changes: StorageDevice Creator02003.09.13 at 10:03:34.271
LUPCreator::createAndUpdateDevice(): This was just a status event--we're not going to process
LUNS02003.09.13 at 10:03:34.271 Transaction size of: 002003.09.13 at 10:03:34.281
Saving changes: OptimizerStorageSupport Creator02003.09.13 at 10:03:34.291
Saving changes: InterconnectDevice Creator02003.09.13 at 10:03:34.411
Transaction size of: 2502003.09.13 at 10:03:34.421
Saving changes: AttachedDevice Creator02003.09.13 at 10:03:34.501
Transaction size of: 402003.09.13 at 10:03:34.501
Saving changes: NASDevice Creator02003.09.13 at 10:03:34.511
Transaction size of: 002003.09.13 at 10:03:34.511
Saving changes: LinkCreator02003.09.13 at 10:03:34.571
created: Link between fc-switch.modesto.nworks.local[06] wwn=20:06:00:60:69:00:5e:4b
Address=00:00:00:00:00:00:00:00:01:06:00:00:sr114.modesto.nworks.local[1]
wwn=10:00:00:00:c9:25:44:5d Address=null02003.09.13 at 10:03:34.751
Transaction size of: 2902003.09.13 at 10:03:34.801
Transaction size of: 602003.09.13 at 10:03:34.822
Adding: Link between fc-switch.modesto.nworks.local[06] wwn=20:06:00:60:69:00:5e:4b
Address=00:00:00:00:00:00:00:00:01:06:00:00:sr114.modesto.nworks.local[1]
wwn=10:00:00:00:c9:25:44:5d Address=null to SAN-102003.09.13 at 10:03:34.912
Transaction size of: 1002003.09.13 at 10:03:34.962
LinkCreator:processAllTopologies: This is how this method feels the SANS break out02003.09.13
at 10:03:34.972 These should be together02003.09.13 at 10:03:34.972
Link between fc-switch.modesto.nworks.local[05] wwn=20:05:00:60:69:00:5e:4b
Address=00:00:00:00:00:00:00:00:01:05:00:00:ads-modesto.modesto.nworks.local[1]
wwn=10:00:00:00:c9:21:4c:6b Address=null 496131 topology SAN-102003.09.13 at 10:03:34.972
Link between fc-switch.modesto.nworks.local[06] wwn=20:06:00:60:69:00:5e:4b

```



There are two requirements for Storage Area Manager to discover and associate a host with the FC switch to which it is connected:

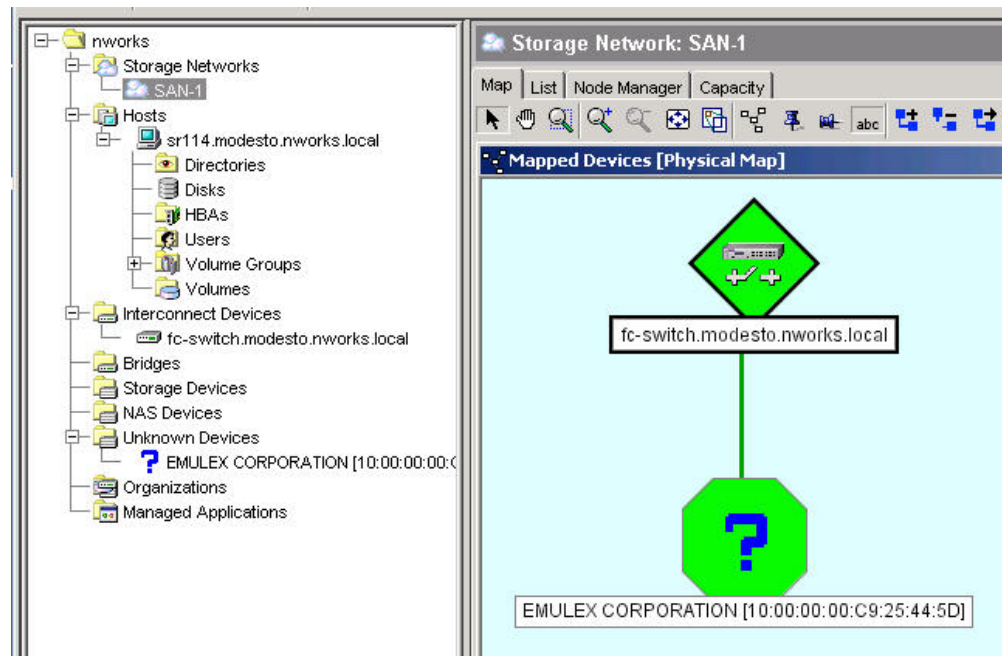
- The Host Agent must be installed on the host
  - A supported HBA driver with support for the SNIA API must be installed
11. In the map below, the HBA is displayed but it is not associated with the host on which it is installed. However, the HBA Driver and the Host Agent are installed on the host system. Can you explain why the HBA is presented with a question mark?

.....

.....

.....

.....



## Customer scenario activity: answers

1. What are the possible reasons that SR-114 is missing from the map?  
**There is no SNIA API Library loaded on the SR-114 system.**  
**In fact, it is likely that the HBA's driver is also not installed because the switch should be able to see the port WWN of the HBA even though it cannot identify the host itself.**
2. What SAMTools utility could help diagnose the problem?  
**The Host Hba Info tool can be used to request information about the HBA from via the SNIA API.**
3. Based on the output from the Host Hba Info tool above, what is the problem with the Host Bus Adapter?  
**There is no SNIA API library installed.**
4. How would you correct this problem?  
**Download and install the latest supported SNIA libraries for the HBA**  
**After, installation, wait for next DDT discovery cycle or force a new using *Tools → Start Comprehensive Discovery*.**
5. Search the internet for “Emulex Drivers”. What is the main URL for Emulex HBA Drivers?  
**<http://www.emulex.com/ts/dds.html>**
6. Run the SAMTools Host Hba Info utility against an HBA in your environment. What is the Vendor, Model and Driver version for your HBA?  
**No standard answer. Results depend on the vendor, model and driver version for your HBA.**
7. Look at the Emulex LP7000 HBA for Windows hosts in the *Storage Area Manager Support Components and Configuration Guide*. Is the driver version shown in the above screen capture supported?  
**As of November 6, 2003, it was not supported according to the *Storage Area Manager 3.1 Support Components and Configuration Guide*.**
8. Review the Host Hba Info results for the HBA that you queried. Is it supported?  
**No standard answer. Result depends on the HBA in your environment.**
9. Is the map different now? If so, what information from the SNIA interface did Storage Area Manager use to display a more detailed map?  
**The device map now displays the host. Storage Area Manager obtained the following information from the SNIA library: port WWN, vendor ID, model, description, serial number, driver and firmware revision, port status and numerous statistics.**

10. Which line or lines in the log show the point at which Storage Area Manager recognized the addition of the SNIA API?

**created: Link between fc-switch.modesto.nworks.local[06]  
Wwn=20:06:00:60:69:00:5e:4b  
Address=00:00:00:00:00:00:00:00:01:06:00<--  
>sr114.modesto.nworks.local[1] Wwn=10:00:00:00:c9:25:44:5d  
Address=null**

**Adding: Link between fc-switch.modesto.nworks.local[06]  
Wwn=20:06:00:60:69:00:5e:4b  
Address=00:00:00:00:00:00:00:00:01:06:00<--  
>sr114.modesto.nworks.local[1] Wwn=10:00:00:00:c9:25:44:5d  
Address=null to SAN-1**

11. In the map below, the HBA is displayed but it is not associated with the host on which it is installed. However, the HBA Driver and the Host Agent are installed on the host system. Can you explain why the HBA is presented with a question mark?

**The HBA driver is loaded and there is an active connection between the HBA and the FC switch. However, this condition usually indicates that the HBA driver version is not supported by Storage Area Manager. As a result, Storage Area Manager does not know which host the HBA is associated with. Because the switch is supported by Storage Area Manager, the HBA itself is recognized based on information provided by the switch using SNMP.**

