

ManageEngine[®] Opstor

User Guide

Table of Contents

INTRODUCTION.....	3
System Requirements	5
GETTING STARTED	6
Starting OpStor Server	7
Starting OpStor Client.....	8
Shutting Down OpStor Server	9
UNDERSTANDING THE GUI	10
Home Tab	12
Device Properties Page	13
Problem Tickets	20
Favorite Links	21
Search	22
Skins	23
Auto Refresh.....	24
DISCOVERING STORAGE DEVICES.....	25
Autodiscovery	26
Prerequisites For Device Discovery.....	27
Adding A Device	28
Editing Device Details.....	29
VISUALIZATION.....	30
Map View	31
Map Icons	32
Drilling Down The Map	33
FAULT MONITORING AND ESCALATION	34
Viewing Alarms	35
Viewing Alarm Details.....	36
Email Alarm Reports.....	37
Acknowledging Alarms	38
Annotating Alarms	39
Clearing Alarms	40
Deleting Alarms	41

Schedule Alarm Actions.....	42
Escalate Unattended Alarms	43
REPORTS.....	44
Fabric Switch Reports.....	46
Storage Array Reports	48
Tape Library Reports	49
Host Server Reports	50
Host Bus Adapter (HBA) Reports	51
Miscellaneous Reports	52
LIVE GRAPHS.....	53
Plotting Live Graphs	54
CONFIGURATION	55
Launching WebApp	56
Telnet.....	57
SNMP	58
OPSTOR ADMINISTRATION	59
Manage Storage Devices	60
Schedule Alarm Actions.....	61
Email Alarm Reports.....	62
Manage OpStor Users	63
Set Monitoring Intervals	64
Clear Old Data	65
Configure Mail Server	66
Set Threshold Limits	67
Registering With A License.....	68
FAQ.....	69
TROUBLESHOOTING TIPS.....	71
KNOWN ISSUES	73

Introduction

ManageEngine® OpStor is designed as an affordable alternative to monitor multi-device, multi-vendor storage networks through a user-friendly Web-interface. Hassle-free installation, intelligent discovery algorithms, visual representation, fault detection & escalation features coupled with smart business reports make it a compelling choice for SME administrators.

The screenshot displays the ManageEngine OpStor web interface. The top navigation bar includes links for Home, Alarms, Maps, Reports, Admin, and Support. The main content area is divided into several sections:

- Devices Summary:** A sidebar menu with links for Fabric Switches, Storage Arrays, Tape Libraries, Hosts, and HBAs, each with a count of 1.
- Storage Infrastructure:** A central area showing details for various components:
 - Fabric Switches:** One device, 'LightSand_A', with 100% availability and no recent alarms.
 - Storage Arrays:** One device, 'HITACHI_DFRAID_001', with 100% availability and no recent alarms.
 - Tape Libraries:** One device, 'Adic_1', with 100% availability and a recent alarm for 'Door Circuit failure'.
 - Hosts:** One device, 'kuo1.india.adventnet.com', with 14% availability and a recent alarm for 'HOST STATUS - IP REACHABLE'.
 - HBAs:** One device, 'kuo1.india.adventnet.com_HBA1', with 0% availability and no recent alarms.
- Latest 5 Alarms:** A table listing recent alerts:

Source	Status	Date & Time	Message
kuo1.india.adventnet...	Clear	Nov 25, 2008 11:40:02 AM	HOST STATUS - IP REACHABLE
kuo1.india.adventnet...	Critical	Nov 24, 2008 08:27:53 PM	HOST STATUS - IP NOT REACHABLE
Adic_1	Major	Nov 24, 2008 01:44:58 PM	Door Circuit failure

How OpStor Works?

OpStor uses a 3-tier architecture, database-server-client, and a bundled MySQL database. OpStor server and the database form the back-end, with server running business logic and database storing all the data. The client is web based intuitive. It shows comprehensive information about your storage network. OpStor server discovers the storage devices and its sub components and stores the data in MySQL database. The OpStor client is a web based client, which provides multiple views of the storage devices and also offers rich set of reports and graphs to present the collected information to IT personnels.

Storage Devices: OpStor offers real-time visibility into the core storage devices such as RAIDs, tape libraries, and tape drives. It monitors the status and availability of all the storage devices, generates alarms when the device status changes, and generates business reports.

Interconnects: OpStor offers fine-grained view of the interconnects such as switches and HBAs. Apart from monitoring status, generating alarms and reports, OpStor also collects port-level data on various parameters on a regular basis and offers real-time graphing of port-level performance for troubleshooting.

Servers: OpStor monitors hosts in the storage environment which can be HP-UX, IBM-AX, Windows, or Linux. It monitors the status and availability of all the servers and generates alarms for server status change.

Fault Management: OpStor detects faults in the network through periodical status polling and generates color-coded alarms for the faults. It can also be configured to send an email / SMS to the administrator about the fault detected in the network.

Performance Management: OpStor measures the performance of the storage hardware, such as the utilization, traffic, errors, etc. by collecting data at regular intervals. These data are provided in the form of reports and graphs to the administrators.

Inventory Management: OpStor maintains an accurate inventory of storage resources, such as RAIDs, tape libraries, tape drives, switches, HBAs, and host servers. It provides options to add support information, location, and trouble tickets against each of the devices and provides meaningful reports to administrators to track the assets.

Web based client: OpStor has a web client that enables access to the OpStor server using a standard web browser, such as internet explorer and Mozilla. This provides administrators with the convenience of anywhere access at anytime. Using the remote client, OpStor can support multiple concurrent users.

This document covers the help topics for all the functions in the product.

The topics covered in this document are

- System Requirements
- Getting Started
- Understanding the GUI
- Discovering Storage Devices
- Visualization
- Fault Monitoring And Escalation
- Reports
- Graphs
- Configuration
- OpStor Administration
- FAQ
- Troubleshooting
- Known Issues

System Requirements

This section details the minimum hardware requirements, operating systems supported, and web browser requirements for running OpStor.

Hardware Requirements

- Pentium III 1 Ghz
- 1 GB RAM
- 10 GB Hard disk space (before installation)

Operating Systems Supported

- Windows 2000+SP4
- Windows 2003
- Windows 2008
- Windows XP
- Windows Vista
- Red Hat Linux 8.0 and above
- Mandrake Linux 10
- Debian 3.0



Note: Contact opstor-support@manageengine.com for any other platform support.

Web Browsers Supported

- Internet Explorer 5.5 or higher
- Opera 7.0 or higher
- Mozilla 2.0 or higher

Getting started

The topics covered under this section are:

- Starting OpStor Server
- Starting OpStor Client
- Shutting down OpStor server

Starting OpStor Server



Note: Please install OpStor in a machine that has IP access to the storage devices in your environment.

To start OpStor server in Windows, follow these steps:

1. Click Start --> Programs --> ManageEngine OpStor 6 --> Start OpStor (or) Double-click "OpStor" icon in the desktop.
2. The server will be started in port 80 (default port) or the one you had specified during installation.

To start OpStor server in Linux, follow these steps:



Note: To receive the traps in 162 port, you must start the server as a 'root' user.

1. Execute **StartOpStorServer.sh** under *<OpStor Home>/bin* directory. Where, *<OpStor Home>* is the directory where OpStor is installed.
2. The server will be started in port 80 (default port) or the one you had specified during installation.



Note: For changing the port at which OpStor server is started, please refer to **question 1** in FAQs section.

To start OpStor Server as a service in Windows, follow these steps:

1. Run "**OpStorService.bat**" present under *<OpStor Home>/bin* directory. This will install OpStor as a service.
2. To ensure the service installation, go to Control Panel --> Administrative Tools --> Services and check whether the following two services are listed.
 - o ManageEngineOpStor
 - o ManageEngineOpStorApache (dependency service)
3. Now select ManageEngineOpStor and start the service. This automatically starts the dependency service ManageEngineOpStorApache also. (or) From the command prompt navigate to *<OpStor Home>/bin* and run the command "**OpStorService.bat -t**". This will start OpStor server as a service.



Note:

1. If you want to stop OpStor server, select the ManageEngineOpStor and stop the service (or) run the command "**OpStorService.bat -p**" under *<OpStor Home>/bin*. This automatically stops the service ManageEngineOpStorApache also.
2. To remove the service, run the command "**OpStorService.bat -r**"

Starting OpStor Client

To start an OpStor client, follow these steps:

1. Open a web browser.
2. Type `http://<Server name>:<Port no.>` in the address bar and hit Enter.

Where,

<Server name> is the name of the machine where the OpStor server is running.

<Port no.> is the port which you had specified during OpStor installation. The port number is shown in the command prompt where the server is started. (By default, OpStor starts in port 80)

3. Enter the username and password to login into web client. First time users use "admin / admin" as "username / password".
4. The startup wizard pops up. It has two steps namely mail server settings, and alarm reports settings.
5. In Step one, enter the mail server details. These settings will be used by OpStor to send out daily alarm reports or escalation reports to administrators.
6. In Step two, select the required reports and enter the mail ids
7. Finish the wizard



Note: You can finish or cancel the wizard at any point of time. All the options in the wizard are also available in the Admin tab in the client GUI.

This starts the client and the home page is shown.

The above mentioned wizard is shown only during the first time login into the client. From the second time, you can simply open a browser and connect to `http://<Server name>:<Port no.>` and see the home page.

Shutting Down OpStor Server

To shut down the OpStor server, follow these steps:

In Windows:

1. Click Start --> Programs --> ManageEngine OpStor 6 --> Shutdown OpStor

(or)

1. Go to <OpStor Home>\bin directory
2. Run ShutdownOpStor.bat

(or)

If the server is running as a service, stop the service.

In Linux:

1. Go to <OpStor Home>/bin directory
2. Execute ShutdownOpStor.sh under <OpStor Home>/bin

Understanding The GUI

OpStor has a web based GUI that is very user friendly.

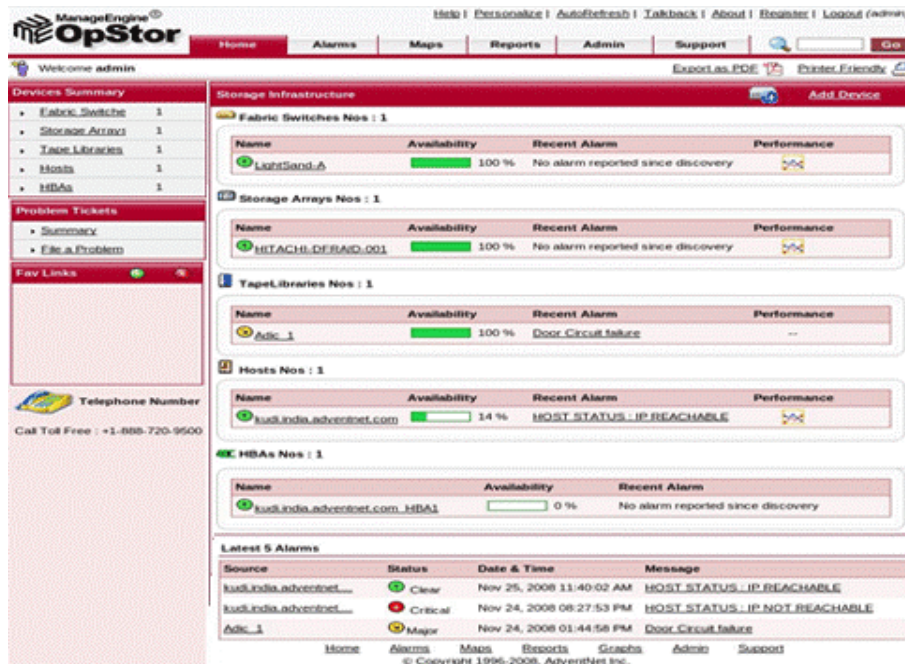


Fig. Home page of OpStor client.

- The tabs at the top represent the major modules in the tool: Home, Alarms, Maps, Reports, Admin, Support.
- The left panel contains three sections.
 - The first section lists the links of the device summary reports for Fabric Switches, Storage Arrays, Tape Libraries, Hosts and HBAs.
 - The second section has the links for filing problem tickets and viewing its summary.
 - The third section is the favorite links section to which you can add your own links.
- Top-right corner has a search textbox and 9 links: Help, Personalize, AutoRefresh, Talkback, About, Register, Logout, Export as PDF, and Printer Friendly.
 - **Search:** Search for devices and alarms by entering the string or sub-string, of the required device name / alarm source, in the search dialog.
 - **Help:** Access the help documents by clicking 'Help' link.
 - **Personalize:** Personalize the look-and-feel by selecting one of the pre-defined skins.
 - **Auto Refresh:** Refreshes the home page, alarms page and device inventory pages.
 - **Talkback:** Send product feedback to OpStor team through email.

- **About:** Know about the installed OpStor build details by clicking on 'About' link.
 - **Register:** Register your copy of OpStor with the license purchased
 - **Logout:** Click 'Logout' to logout from the client session.
 - **Export as PDF:** Save the current page as a pdf file by clicking 'Export as PDF' link.
 - **Printer Friendly:** Print the current page contents by clicking 'Printer Friendly' link.
-
- The display area in the center of the screen shows individual devices listed under each category of devices - Fabric Switches, Storage Arrays, Tape Libraries, Hosts, HBAs.
 - In the display area you will also find the latest 5 alarms received from devices in storage environment managed by OpStor.
 - The support tab lists the various options for you to get technical support. Links to OpStor web site, user forums, email support, toll free number and product brief are given in the support page.

Home Tab

The first tab that appears by default when you log into the client is the Home page. The Home tab main display area is named as 'Storage Infrastructure' which shows following information grouped under device types - Fabric Switches, Storage Arrays, Tape Libraries, Hosts, HBAs.

- Device Type Table : All discovered devices of the particular type are listed in table format with following information displayed
 - Device Name : Status icon along with name is shown. Click on the name link to navigate to device inventory page
 - Availability : Shows Today's availability in bargraph % format. Click on the bargraph to view zoomed view of Today's availability and also the Availability History of the device.
 - Recent Alarm : Most recent alarm raised against the device is shown. Click on the alarm message to navigate to the alarm detail page. If there are no alarms, message 'No alarms reported since discovery' is shown with no link.
 - Performance : Clicking on the Performance Statistics icon helps in navigating to device performance report page.

If no devices are discovered, then on launching the client, 'Add Device' link is shown. Please click on the link to add a particular storage device to OpStor.

The screenshot displays the 'Storage Infrastructure' dashboard. On the left, there is a sidebar with 'Devices Summary' (Fabric Switches: 1, Storage Arrays: 1, Tape Libraries: 1, Hosts: 1, HBAs: 1), 'Problem Tickets' (Summary, File a Problem), and 'Fav Links'. Below the sidebar is a 'Telephone Number' section with 'Call Toll Free : +1-888-720-9500'. The main area shows an 'Add Device' link in the top right. The 'Storage Infrastructure' section is divided into five categories: Fabric Switches (1), Storage Arrays (1), Tape Libraries (1), Hosts (1), and HBAs (1). Each category contains a table with columns for Name, Availability (with a bargraph), Recent Alarm, and Performance. At the bottom, there is a 'Latest 5 Alarms' table.

Category	Name	Availability	Recent Alarm	Performance
Fabric Switches	LightSand_A	100 %	No alarm reported since discovery	[Icon]
Storage Arrays	HITACHI.DERAND.001	100 %	No alarm reported since discovery	[Icon]
Tape Libraries	Adic_1	100 %	Door_Circuit failure	--
Hosts	tudi.india.adventnet.com	14 %	HOST STATUS : IP REACHABLE	[Icon]
HBAs	tudi.india.adventnet.com_HBA1	0 %	No alarm reported since discovery	

Source	Status	Date & Time	Message
tudi.india.adventnet...	Clear	Nov 25, 2008 11:40:02 AM	HOST STATUS : IP REACHABLE
tudi.india.adventnet...	Critical	Nov 24, 2008 08:27:53 PM	HOST STATUS : IP NOT REACHABLE
Adic_1	Major	Nov 24, 2008 01:44:58 PM	Door_Circuit failure

To facilitate adding of device, exclusive 'Add Device' link is available on top-right corner of infrastructure view board.

Below the infrastructure view, 'Latest 5 alarms' are listed sorted on time.

To print the report, click on the 'Printer Friendly' link on the top-right corner of home page. To save the report in PDF format, click 'Export as PDF' link in top-right corner of home page.

Device Properties Page

OpStor collects all possible information about the devices after discovery. Clicking on the device name link shows the device properties page. The device properties are grouped under different heads and shown in the RHS of the screen. The various properties for each of the devices are listed below;

FC Switches & Ports	RAIDs & Controllers	Tape Libraries & Drives	HBAs	Host Servers
<ul style="list-style-type: none"> • Brocade • McData • EMC • Cisco • QLogic • HP • Light Sand 	<ul style="list-style-type: none"> • IBM ESS • HP MSA • HP EVA • EMC CLARiiON • Infortrend • Unistar TeraVault • Bosch • NetApp • Hitachi • IBM DS4000 / FastT • IBM N-Series • LSI Logic • StorageTek • SUN StorEdge • Accordance • Areca RAID • EMC Centera 	<ul style="list-style-type: none"> • ADIC • HP ESL / HP EML • IBM 3584 / TS 3100 / TS 3500 • StorageTek • Qualstar • Tandberg • Overland • DELL • Quantum • SUN StorEdge 	<ul style="list-style-type: none"> • Emulex • JNI • HP • QLogic 	<ul style="list-style-type: none"> • Windows • Linux • IBM-AIX • HP-UX • Solaris

Device Category	Vendor	Properties
FC Switches and Switch Ports	<ul style="list-style-type: none"> • Brocade Switch 	<ul style="list-style-type: none"> • Device Info • Tech Support Info • Product Info • WWN Info • Zoning Info
	<ul style="list-style-type: none"> • Brocade Switch Ports 	<ul style="list-style-type: none"> • Device Info
	<ul style="list-style-type: none"> • McData Switch 	<ul style="list-style-type: none"> • Device Info • Tech Support Info • Product Info • WWN Info • Zoning Info
	<ul style="list-style-type: none"> • McData Switch Ports 	<ul style="list-style-type: none"> • Device Info
	<ul style="list-style-type: none"> • EMC Switch 	<ul style="list-style-type: none"> • Device Info • Tech Support Info • Product Info • WWN Info • Zoning Info

Device Category	Vendor	Properties
	<ul style="list-style-type: none"> EMC Switch Ports 	<ul style="list-style-type: none"> Device Info
	<ul style="list-style-type: none"> Cisco Switch 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info WWN Info VSAN Info
	<ul style="list-style-type: none"> Cisco Switch Ports 	<ul style="list-style-type: none"> Device Info
	<ul style="list-style-type: none"> QLLogic Switch 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info WWN Info Zoning Info
	<ul style="list-style-type: none"> QLLogic Switch Ports 	<ul style="list-style-type: none"> Device Info
	<ul style="list-style-type: none"> LightSand Switch 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info WWN Info Zoning Info
	<ul style="list-style-type: none"> LightSand Switch Ports 	<ul style="list-style-type: none"> Device Info
	<ul style="list-style-type: none"> HP Switch 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info WWN Info Zoning Info
	<ul style="list-style-type: none"> HP Switch Ports 	<ul style="list-style-type: none"> Device Info
RAIDs and RAID Controllers	<ul style="list-style-type: none"> IBM ESS 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info Disk Drives Storage Pool Info Storage Volumes Interconnects Info
	<ul style="list-style-type: none"> IBM ESS RAID Controller 	<ul style="list-style-type: none"> Device Info
	<ul style="list-style-type: none"> HP MSA 	<ul style="list-style-type: none"> Device Info Volume Info Disk Drive Info Storage Pool Info Interconnects Info Product Info Tech Support Info
	<ul style="list-style-type: none"> HP MSA Controller 	<ul style="list-style-type: none"> Device Info
	<ul style="list-style-type: none"> HP EVA RAID 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info Storage Volume Disk Drive Info Storage Pool Info Interconnects Info
	<ul style="list-style-type: none"> HP EVA RAID Controller 	<ul style="list-style-type: none"> Device Info

Device Category	Vendor	Properties
	<ul style="list-style-type: none"> HP EVA RAID Controller Port 	<ul style="list-style-type: none"> Device Info
	<ul style="list-style-type: none"> EMC CLARiiON RAID 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info Raid Group Disk Drives LUN Info Host-Port Map Interconnects Info
	<ul style="list-style-type: none"> EMC CLARiiON RAID Controller 	<ul style="list-style-type: none"> Device Info
	<ul style="list-style-type: none"> EMC CLARiiON RAID Controller Port 	<ul style="list-style-type: none"> Device Info
	<ul style="list-style-type: none"> Infortrend RAID 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info Disk Drives Logical Drives Logical Volumes RAID Partitions Channels LUN Info Power Supply Info Fan Info
	<ul style="list-style-type: none"> Infortrend RAID Controller 	<ul style="list-style-type: none"> Device Info Product Info Cache Info Disk Array Info Host Side Info Drive Side Info Redundant Controller Info
	<ul style="list-style-type: none"> Unistar TeraVault RAID 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info Disk Drives Logical Drives Logical Volumes RAID Partitions Channels LUN Info Power Supply Info Fan Info
	<ul style="list-style-type: none"> TeraVault Controller 	<ul style="list-style-type: none"> Device Info Product Info Cache Info Disk Array Info Host Side Info Drive Side Info Redundant Controller Info

Device Category	Vendor	Properties
	<ul style="list-style-type: none"> Bosch RAID 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info Disk Drives Logical Drives Logical Volumes RAID Partitions Channels LUN Info Power Supply Info Fan Info
	<ul style="list-style-type: none"> Bosch RAID Controller 	<ul style="list-style-type: none"> Device Info Product Info Cache Info Disk Array Info Host Side Info Drive Side Info Redundant Controller Info
	<ul style="list-style-type: none"> NetApp RAID 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info Disk Utilization CPU Utilization Cluster Info Quota Info Interconnects Info Port Info
	<ul style="list-style-type: none"> Hitachi RAID 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info LUN Host Mappings Interconnects Info
	<ul style="list-style-type: none"> Hitachi RAID Controller 	<ul style="list-style-type: none"> Device Info
	<ul style="list-style-type: none"> IBM DS4000 / FastT RAID 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info Hosts Group Volume Group Volumes LUN Mappings Disk Drives Component Health Info Interconnects Info
	<ul style="list-style-type: none"> IBM DS4000/FastT RAID Controller 	<ul style="list-style-type: none"> Device Info Product Info
	<ul style="list-style-type: none"> IBM N-Series RAID 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info Disk Utilization CPU Utilization Cluster Info Quota Info Interconnects Info Port Info

Device Category	Vendor	Properties
	<ul style="list-style-type: none"> LSI RAID 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info Hosts Group Volume Group Volumes LUN Mappings Disk Drives Component Health Info Interconnects Info
	<ul style="list-style-type: none"> LSI RAID Controller 	<ul style="list-style-type: none"> Device Info Product Info
	<ul style="list-style-type: none"> Storage Tek RAID 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info Volume Group Volumes LUN Mappings Disk Drives
	<ul style="list-style-type: none"> Storage Tek RAID Controller 	<ul style="list-style-type: none"> Device Info Product Info
	<ul style="list-style-type: none"> SUN StorEdge 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info Virtual Disk Info DSP Domains DSP Processors DSP Volumes Storage Pool Info DSP SCSI Info DSP Ports
	<ul style="list-style-type: none"> Accordance RAID 	<ul style="list-style-type: none"> Device Info TechSupport Info Product Info Disk Utilization CPU Utilization Memory Utilization Disk Drives Devices Status Interconnects Info
	<ul style="list-style-type: none"> Areca RAID 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info Disk Drive Info Raid Set Info Volume Set Info Hardware Monitor Info
	<ul style="list-style-type: none"> Areca RAID Controller 	<ul style="list-style-type: none"> DeviceInfo Product Info

Device Category	Vendor	Properties
	<ul style="list-style-type: none"> EMC Centera 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info Cluster Node Info Cluster Pool Info Cluster Profile Info Interconnects Info
Tape Libraries and Tape Drives	<ul style="list-style-type: none"> ADIC Scalar i2000 Tape Library 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info
	<ul style="list-style-type: none"> ADIC Scalar i2000 Tape Drive 	<ul style="list-style-type: none"> Device Info Product Info
	<ul style="list-style-type: none"> ADIC Scalar 100 Tape Library 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info Library Partitions Library Movers
	<ul style="list-style-type: none"> ADIC Scalar 100 Tape Drive 	<ul style="list-style-type: none"> Device Info Product Info
	<ul style="list-style-type: none"> HP ESL / HP EML Tape Library 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info Chassis Info Interface Manager Changer Device Info Storage Media Location Info Port Info
	<ul style="list-style-type: none"> HP ESL / EML Tape Drive 	<ul style="list-style-type: none"> Device Info Product Info
	<ul style="list-style-type: none"> IBM 3584 / TS 3500 Tape Library 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info Chassis Info Port Info Limited Access Port Info Storage Media Location Info Changer Device Info SCSI Controller Info Physical Package Info Software Element Info Computer System Info
	<ul style="list-style-type: none"> IBM 3584 / TS 3500 Tape Drive 	<ul style="list-style-type: none"> Device Info Product Info
	<ul style="list-style-type: none"> StorageTek Tape Library 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info
	<ul style="list-style-type: none"> StorageTek Tape Drive 	<ul style="list-style-type: none"> Device Info Product Info

Device Category	Vendor	Properties
	<ul style="list-style-type: none"> Qualstar Tape Library 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info FC Info SCSI Info Cartridge Info
	<ul style="list-style-type: none"> Qualstar Tape Drive 	<ul style="list-style-type: none"> Device Info Product Info
	<ul style="list-style-type: none"> Tandberg Tape Library 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info
	<ul style="list-style-type: none"> Overland Tape Library 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info Library Modules
	<ul style="list-style-type: none"> Overland Tape Drive 	<ul style="list-style-type: none"> Device Info Product Info
	<ul style="list-style-type: none"> DELL PV 132T Tape Library 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info Library Movers
	<ul style="list-style-type: none"> DELL PV 132T Tape Drive 	<ul style="list-style-type: none"> Device Info Product Info
	<ul style="list-style-type: none"> DELL PV 136T Tape Library 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info Library Movers
	<ul style="list-style-type: none"> DELL PV 136T Tape Drive 	<ul style="list-style-type: none"> Device Info Product Info
	<ul style="list-style-type: none"> Quantum Tape Library 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info
	<ul style="list-style-type: none"> SUN StorEdge 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info
HBAs	<ul style="list-style-type: none"> Emulex JNI HP QLogic 	<ul style="list-style-type: none"> Device Info Tech Support Info Product Info
	<ul style="list-style-type: none"> HBA Port 	<ul style="list-style-type: none"> Device Info
Host Servers	<ul style="list-style-type: none"> Windows Linux IBM-AIX HP-UX Solaris 	<ul style="list-style-type: none"> Device Info Product Info Disk Utilization CPU Utilization SCSI Details Disk I/O Memory Utilization Devices Status

Problem Tickets

When you find a problem with any of the devices, you can record it by filing a problem report on the corresponding device. For this,

1. Click on the 'File a Problem' link available on the left hand panel of the page.
2. This pops up a window.
3. In this, select the device name, state the Problem and its Description.
4. Click on 'Submit' button

This info is stored in OpStor database for future reference. In addition OpStor generates reports on storage devices problem history.

Summary

Clicking on 'Summary' link in the left hand panel leads you to the reports page that shows pending problems as on date. Information on the problem with respect to device name, filed date, and owner is displayed.

You can check for 'Closed' or 'All' tickets also, by selected the option in the combo-box above the table. You can sort the table on any of the column by clicking on the column header.

To see more details on a problem, click the 'Problem' link. You can annotate on the problem ticket and/or close the ticket. To see the details of the device that caused the problem, click the 'Device' link.

Finally report can be viewed and printed by clicking on "Printer Friendly" link.

Favorite Links

A very friendly feature that keeps your favorite links (product bookmarks) grouped together for instant access. These links are available in Left Hand Side panel in all the pages for quick and easy access.

To add a favorite link, follow these steps :

1. Go to the page that you want to bookmark.
2. Click the '+' icon in the 'Fav Links' section in the LHS panel.
3. Enter a name for the link.
4. Click 'Add Link'.

This link name gets added to the 'Fav Links' section.

To delete a favorite link, follow these steps :

1. Click the 'x' icon in the 'Fav Links' section in the LHS panel.
2. Select the links that you want to delete from the 'Remove Favorite Link' popup window.
3. Click 'Remove Links'

Search

The search dialog in the top-right corner helps in searching for devices and alarms in the systems.

Type a device name or alarm source or any of its sub-string and click 'Search' to get the list of matching devices and alarms in tabular form. The device names and alarm sources have links to the corresponding device details.

The search helps you to reach any device directly without going through inventory tables. This will be helpful when you know the device name and want to look at its properties or alarms.

Skins

The 'Personalize' option is used to change the skin of the client GUI.

You can change the look and feel of the client by applying one of the pre-defined skins. The settings will be retained for a particular user. The default skins available with the product are – Indigo Blue, Maroon, Steel Grey, Sun Shine, and Jungle.

To change the skin, follow these steps:

1. Click 'Personalize'.
2. Select the radio button corresponding to the skin that you want to apply.
3. Click 'Submit'.

The new skin will get applied immediately.

Auto Refresh

Auto refresh option allows user to view latest inventory and alarm information from database without having to manually refresh web pages.

Auto refresh link is available on the top-right corner of the each opstor web page.

Clicking on the link, pops up a window showing Auto Refresh options. Users can specify the refresh time period directly. After specifying the refresh period, click save button to store the changes. This information will be persisted in database for the user who configured refresh option. Whenever user logs in, auto refresh, will be enabled. To disable auto refresh, specify '-1' as interval.

Discovering storage devices

The topics covered under this section are:

- Autodiscovery
- Prerequisites For Device Discovery
- Adding A Device
- Adding Device Details

Autodiscovery






OpStor scans the storage network and automatically discovers Fibre Channel Switches, RAIDs, Tape Libraries, and HBAs, when the server is started. OpStor discovery is primarily **Out-of-band** using SNMP and / or device vendor specific algorithms. OpStor, when it discovers Fibre Channel Switches, also discovers its immediate neighborhood i.e. connected devices. This is termed as **discovery-via-switch** and it is enough to configure Switch IPs for discovery during start-up. If any of your storage device is not connected to fabric or present in a different network, you must specify the IP of the device explicitly during start-up.

OpStor discovery runs variety of vendor specific algorithms to completely model the discovered device. Modeling includes identifying sub components, logical interconnections and also gathering asset information. For example, when a RAID is identified, the RAID controllers in the RAID, and the ports in the controller are also discovered. Thus a complete inventory of all the storage devices and its sub-components is discovered and maintained.

OpStor also provides SNMP agents for popular HBAs based on SNIA HBA API. Using these HBA agents, In-band discovery is enabled. However, agents are not packaged along with the product. You need to download these OpStor HBA agents separately.

Prerequisites For Device Discovery

The list of storage devices that are monitored by OpStor and their respective supported models, features supported and prerequisites for monitoring are listed below.

 SAN Switches	 Storage Arrays	 Tape Libraries	 HBAs	 Host Servers
<ul style="list-style-type: none"> • Brocade Silkworm Series • McData Sphereon series • EMC Connectrix • Cisco MDS series • QLogic SANbox • HP Switches • LightSand 	<ul style="list-style-type: none"> • IBM ESS • HP MSA • HP EVA • EMC CLARiiON • Infortrend • Unistar TeraVault • Bosch • NetApp • Hitachi Lightning • Hitachi Thunder • Hitachi Tagmastore • IBM DS4000 / FastT • IBM N-Series • StorageTek / LSI Logic • SUN StorEdge • Areca RAID • EMC Centera 	<ul style="list-style-type: none"> • HP ESL / HP EML • DELL PVT • IBM 3584 / TS 3100 / TS 3500 • Overland Neo • ADIC Scalar • StorageTek • Qualstar • Quantum • Tandberg • SUN StorEdge 	<ul style="list-style-type: none"> • QLogic • Emulex • JNI • HP 	<ul style="list-style-type: none"> • Windows • Linux • IBM-AIX • HP-UX • Solaris

Adding A Device

After the initial discovery, you can use 'Manage Storage Devices --> Add Device' option in the 'Admin' tab, to add a new device.



Note: Only 'Admin' users can add device(s).

To add a Device, follow these steps:

1. Click the 'Admin' tab in the OpStor client.
2. Select 'Manage Storage Devices' option.
3. Enter the IP address of the new device.
4. Choose the Device Type whether it is a Raid, FC Switch, Tape Library or a Host
5. Depending on the Device Type selected, other required fields given below appear.
 - a. Choose Vendor : Displays the Vendor list
 - b. Choose Model : Displays all the supported device models for the selected vendor.
 - c. Provider : This is a non editable field, where the Management Interface used for fetching the data from the device is displayed
 - d. Depending on the provider the other options like Username, Password, Port, SSL, Community, Namespace and Timeout will be displayed.
2. The option for the 'Ping the given IP' can either be checked or unchecked depending on the ping facility available for the device.
3. Submit the data in the above fields.
4. Click 'Add Device' button.



Note: You can select the parameter **Unknown/Others** for the fields if you are not sure of the option.

The device is added and a confirmation message is shown. Table below shows the discovered device. You can click on the device link to navigate to device properties page.

In case of non discovery of the device, you can follow the troubleshooting tips displayed in the webclient and try readding the device.

Editing Device Details

Clicking on any device name link takes you to the device details page. The device properties are classified under various heads namely Device Info, Product Info, Tech Support Info, WWN info, Zoning info, etc. These groups are shown as links in the Right Hand Side of the device details page. Clicking on a link shows the properties under that heading. You can edit a few details like 'Device Location', 'Tech support info', etc.

To edit the device details

1. Click 'Edit' link at the top-right corner of a property group.
2. The editable values are shown in textboxes.
3. You can change the required values and click 'Submit' to save the entries in the database.



Note: Only 'Admin' users can edit device details.

Visualization

The topological map shows a graphical representation of devices and their interconnections in the network. The table shows the link details (source and destination devices).

- **Sub maps:** Click on any device icon to see the device map (sub map). It shows sub components of the device and the connections to other devices. Details of links in this map are listed in a table below.
- **Device details link:** Call-out beside each device links to the corresponding device details page.

To print the map, click "Printer Friendly" link in the top-right corner.

To save the map in PDF format, click "Export as PDF" link in the top-right corner.

The topics covered under this section are:

- Map View
- Map Icons
- Drilling Down the Map

Map View

Clicking the 'Map' tab shows the topological map of the discovered SAN devices. The map shows the device icons and the interconnections in the form of links. Map legends are shown in LHS panel. Map can be seen in Grid, Circle, Tree, or Radial Tree layouts.

Link details are shown in a table below the map. The links table shows the link name, source device, and destination device. Clicking on the source or destination link takes you to the corresponding device details page.

Map Icons

Each device in the map is represented by a map icon corresponding to the particular device type. The name of the device appears at the bottom of the icon.

A colored circle (with an arrow inside), beside the device icon, represents the status of the device. Red for critical, orange for major, yellow for minor, blue for warning, and green for clear.

Drilling Down The Map

The map icons and the call-outs are click-able.

- To see the sub-map of a particular device, click the map icon. To see the port details, click the port in the sub-map.
- To go to the device details, click the call-out near the particular device.

Fault Monitoring And Escalation

The traps and other notifications from the devices are received by the software and are converted into events and alarms. Depending of the criticality of the fault condition, each event and alarm is assigned a severity ranging from critical to clear. Each severity is given a specific color for easy visual identification.

OpStor actively monitors the faulty events and reports or escalates the faults to the user, administrator, or any other person via email or SMS.

Alarms Tab

Alarms from the devices and its sub components are listed in the Alarms tab. The pie charts show the number of alarms in each severity and category. The alarms table shows alarm source, severity, last changed time, and message.

- **Pie charts:** Clicking on a portion of the chart, all the alarms with that particular severity / category are listed.
- **Tables:** Clicking on the 'Message' takes you to the alarm details page that lists the events that affected the alarm and alarm notes (annotations and action logs)
- **Operations:** You can perform some operations on the alarms as part of management. Acknowledge / Unacknowledge to assign owner to an alarm. Clear or delete an alarm based on requirements. Annotate a text to the alarm that can be referred later.

The topics covered under this section are:

- Viewing Alarms
- Viewing Alarm Details
- Email Alarm Report
- Acknowledging Alarms
- Annotating Alarms
- Clearing Alarms
- Deleting Alarms
- Scheduling Alarm Actions
- Escalate Unattended Alarms

Viewing Alarms

You can view all the alarms in a single console under 'Alarms' tab.

Severity-wise alarms chart shows the number of alarms under each severity. Each pie in the chart is click-able. To view the alarms of a particular severity, click on that pie. For example, to see all critical alarms, click the red pie.

Category-wise alarms chart shows the number of alarms in each category of devices. To view the alarms of a device category, click that pie.

The LHS panel lists all the severities and categories and the number of alarms under each of them. This list will be maintained across all the pages under the alarms tab. Thus anytime you can click on these links to see the navigate to those alarms.

The table below the 2 pie charts shows all the alarms with their source, status, date & time, and message. It shows a maximum of 10 alarms and the others are list when you click the next link at the top-right corner of the table heading. Each column heading is a link, which when clicked sorts the alarms based on that column.

You can go to the device details page or the alarm details page with a single click. To see the details of the device that caused an alarm, click on the source link of the alarm. To see the details of the alarm, click the message of the alarm.

Just above the table there are options to acknowledge, clear, or delete alarms. To do any of these operations, select the specific alarms (by checking the checkbox), and clicking on the corresponding link. These options are also available for individual alarms in the alarm details page. It is advisable to do these operations from the details page.

Viewing Alarm Details

Clicking on the message link in an alarm brings you to the alarm details page.

Alarm details page shows

- Source - the device from which the alarm was generated.
- Entity - the parameter in the device that has faulted.
- Status - criticality of the fault (alarm).
- Last updated - the time when the last event, which affected the alarm, occurred.
- Message - description of the alarm.
- Owner name - the user who acknowledged the alarm.
- Alarm history - list of events (from the same entity) that affected the alarm.
- Alarm notes - annotations and logs are recorded here for reference.

To see details of the device that caused the alarm, click on the source link.

Just above the table there are options to acknowledge, clear, delete, and annotate alarms.

- To take ownership of the alarm, click 'Acknowledge'.
- To change the severity of the alarm to clear, click 'Clear'. This is done after the fault condition is physically fixed.
- To delete the alarm from the records, click 'Delete'. This is done when the device is replaced or restarted.
- To add some comments to the alarm, click 'Annotate' and type the content in the textbox. This helps in future reference, to understand the fault condition.

Email Alarm Reports

You can configure OpStor to send reports on daily and weekly alarms in your network. You can get reports on only the critical alarms and/or all alarms. These reports help in understanding what happened in the network in the day or week.

You can configure the time at which, these reports needs to be sent.

To configure weekly critical alarms' report :

1. In the web client, go to Admin tab
2. Check the option "Send weekly critical alarm report to" in the page
3. Edit the Subject field, if needed
4. Enter the email ids to which the weekly critical alarms list must be sent.
5. Click 'Submit'

The weekly critical alarms report is sent on every Monday at the specified time.

To configure weekly all alarms' report :

1. In the web client, go to Admin tab
2. Check the option "Send weekly all alarm report to" in the page
3. Edit the Subject field, if needed
4. Enter the email ids to which the weekly all alarms list must be sent.
5. Click 'Submit'

The weekly all alarms report is sent on every Monday at the specified time.

To configure daily critical alarms' report :

1. In the web client, go to Admin tab
2. Check the option "Send daily critical alarm report to" in the page
3. Edit the Subject field, if needed
4. Enter the email ids to which the daily critical alarms list must be sent.
5. Click 'Submit'

The daily critical alarms report is sent everyday at the specified time.

To configure daily all alarms' report :

1. In the web client, go to Admin tab
2. Check the option "Send daily all alarm report to" in the page
3. Edit the Subject field, if needed
4. Enter the email ids to which the daily all alarms list must be sent.
5. Click 'Submit'

The daily all alarms report is sent everyday at the specified time.

Acknowledging Alarms

OpStor provides an option for the users to pick and own alarms that they work on. This helps in avoiding multiple users working on a single alarm.

Alarms can be acknowledged in two ways.

1. In the 'Alarms' tab, select the checkbox before the specific alarm and click 'Acknowledge'. This option is available only for admin users.
2. In the alarm details page click 'Acknowledge'.

By doing one of the two actions above, the user becomes the owner of the particular alarm.

To unacknowledge an alarm, click 'Unacknowledge' in the specific alarm details page. The alarm ownership gets removed.

Annotating Alarms

In case of a user wants to add more details on a particular alarm, he can annotate the same in the alarm. This will be useful for later reference.

To annotate an alarm, click 'annotate' link in the specific alarm details page and add the content in the text-box. The annotation will get added in the alarm notes table.

Clearing Alarms

After fixing the fault condition in the device, the particular alarm can be cleared by the user, so that its status becomes clear.

To clear an alarm, click 'Clear' link in the specific alarm details page. The severity of the alarm will change to clear.

Deleting Alarms

After fixing the fault condition in the device, the particular alarm can be deleted by the user, if he feels that the record need not be maintained.

To delete an alarm, click 'Delete' link in the specific alarm details page. The alarm and its related events will get deleted permanently.

Schedule Alarm Actions

You might want to get an email or perform some action when a particular type of alarm is generated. In such a condition, you can configure an alarm action. This is checked whenever an alarm is generated or modified, and if the condition matched, an email is sent.



Note: Please configure the mail server before adding an alarm action.

To schedule a new alarm action, follow these steps:

1. In 'Admin' tab, select 'Schedule Alarm Actions'.
2. Enter an action name.
3. Set the conditions
 - a. Select the device type (RAID, Host, Tape Library, etc. or any)
 - b. Select the notification severity (Critical, major, minor, warning, or any)
 - c. Select the devices and move it to the RHS box
4. Select 'Send E-mail or SMS' and/or 'Run Program' based on your requirements
5. If you select 'Send E-mail or SMS', enter the from address, to address, subject, and message for the email / SMS to be sent.
6. If you select 'Run Program', enter the command to execute and select the options below if required.
7. Click 'Add Action'.

The new action is shown in the table.

To enable / disable an alarm action, follow these steps:

1. Click on the green icon against the particular action name in the view or actions table.

To view / modify an alarm action, follow these steps:

1. In 'Admin' tab, select 'Schedule Alarm Actions'.
2. Click the name link of the action that needs modification.
3. The selected values will be shown in the form below.
4. You can change the required values and click 'Modify Action'.

The alarm action gets modified.

To delete an alarm action, follow these steps:

1. In 'Admin' tab, select 'Schedule Alarm Actions'.
2. Click the trash-can icon against the particular action, in the actions table.

The action gets deleted.

Escalate Unattended Alarms

When some alarms are not attended for a particular time-period, it needs to be escalated to the administrator or the IT manager (based on need). For example, you get a critical alarm for a tape library and the fault condition is not resolved within 6 hours, it might cause a major problem in the operation of the storage infrastructure. Such alarms can be escalated and quick action can be taken to avoid any major problem.



Note: Please configure the mail server before adding an alarm escalation.

To add an alarm escalation rule, follow these steps:

1. In 'Admin' tab select 'Escalate Unattended Alarms'.
2. Enter a name for the new rule.
3. Set the conditions
 1. Select the severity (Critical, Major, Warning, Minor, or Any).
 2. Select the device category (RAID, Tape Library, etc. or Any).
 3. Enter the period in hours or minutes. i.e., if the alarm matching the above two condition is unaffected for the specified time period, the rule will be executed.
4. Enter from address, to address, subject, and message of the mail to be sent, for escalation.
5. Enter the time duration in which the above rule has to be checked.
6. Click 'Add Rule'.

The rule gets added in the table in the page. You can disable the rule by clicking on the green icon corresponding to the rule.

To modify an alarm escalation rule, follow these steps:

1. In 'Admin' tab select 'Escalate Unattended Alarms'.
2. Click the name link of the rule that needs to be modified.
3. The configured values are shown in the form below.
4. You can edit the required values and click 'Modify Rule'

The rule gets modified.

To delete an alarm escalation rule, follow these steps:

1. In 'Admin' tab select 'Escalate Unattended Alarms'.
2. Click the trash-can icon against the particular rule, in the escalation rules table.

The escalation rule gets deleted.

Reports

OpStor regularly gathers inventory and performance data of monitored storage devices and generates Summary, Availability and Performance reports. In OpStor client, reports are available under the 'Reports' tab. Summary reports consolidate the inventory information and generate report while Top 'N' reports compare availability or performance information of devices and generate reports.

Top 'N' Reports are generated for

- Today
- Yesterday
- Last Week
- This Month
- Last Month
- Last 'N' days
- From <time> to <time>

Users can choose appropriate period option and select from **Show Top** combobox, 5 / 10 / 15 or 20 and click on Show Report.

Reports are grouped based on device type for easy access and use. On the Left Hand Side (LHS), you will find the following report links. Click on highlighted link to view the corresponding report.

Fabric Switch Reports : Generates following reports for Fabric switches and switch ports.

- Summary
- Top N Availability
- Top N Performance

Storage Array Reports : Generates following reports for storage arrays, controllers and controller ports

- Summary
- Top N Availability

Tape Library Reports: Generates following reports for tape libraries.

- Summary
- Top N Availability

Host Server Reports: Generates following reports for host servers

- Summary
- Top N Availability

HBA Reports: Generates following reports for Host Bust adapters and its ports

- Summary
- Top N Availability

Miscellaneous Reports

- Vendor
- Location
- Problem Reports

Fabric Switch Reports

Summary

This report fetches the latest inventory information for all the fabric switches discovered and generates a consolidated report on

- Total Number of Fabric switches
- Total Number of Operational ports
- Total Number of Unused Ports
- Total Number of Problem Ports

In addition, individual switch consolidated report is presented with information such as

- Name
- Admin Status
- Operational Status
- Total No. of Ports
- Operational Ports
- Unused Ports
- Problematic ports

By clicking on the name link, user can quickly navigate to switch detailed inventory page.

To print the report, click on the 'Printer Friendly' link on the top-right corner of report. To save the report in PDF format, click 'Export as PDF' link in top-right corner of report.

Top N Availability

Top N Availability reports are generated for both Fabric switch as well as switch ports. By default fabric switch report is presented. By clicking on the FCSwitchPort link, user can navigate to availability report for ports.

Availability reports are generated based on calculated uptime of each switch or switch port. Users can see the uptime in bargraph % and total downtime in Hours-Minutes along with Mean Time To Repair [MTTR] and Mean Time Between Failure [MTBF] for top n devices in the tabular form. By default, table is sorted on descending order of uptime. You can sort on any of the columns. To view the details of each device, click on the device name link.

To print the report, click on the 'Printer Friendly' link on the top-right corner of report. To save the report in PDF format, click 'Export as PDF' link in top-right corner of report.

Top N Performance

OpStor generates Top N performance reports for the fabric switch ports for the Performance parameters like :

- Bandwidth Utilization

- Total Throughput
- Tx Throughput
- Rx Throughput
- Tx Traffic
- Rx Traffic
- Port DropIn rate
- Port DropOut rate
- Errors
- Rx Utilization
- Tx Utilization

Report shows switch name, switch port name, minimum, maximum and average value for the selected parameter in the selected report period. By default the table is sorted in descending order based on average value. You can sort it on any of the columns.

To print the report, click on the 'Printer Friendly' link on the top-right corner of report. To save the report in PDF format, click 'Export as PDF' link in top-right corner of report.

Storage Array Reports

Summary

This report fetches the latest capacity information for all the storage arrays in the Storage environment and generates a consolidated report on

- Total Number of Storage Arrays
- Total Number of Disk Drives
- Total Capacity
- Total Configured Capacity
- Total Used and Free Capacities

In addition, individual storage array consolidated report is presented with information such as

- Array Name
- No. of Drives
- System Capacity
- Configured capacity
- Used and Free capacities

By clicking on the name link, user can quickly navigate to storage array detailed inventory page.

To print the report, click on the 'Printer Friendly' link on the top-right corner of report. To save the report in PDF format, click 'Export as PDF' link in top-right corner of report.

Top N Availability

Top N Availability reports are generated for RAIDs, RAID Controllers and RAID controllers ports. By default RAID report is presented. By clicking on the RAIDController and RAIDControllerPort links, user can navigate to respective availability reports.

Availability reports are generated based on calculated uptime of each device or its subcomponent. Users can see the uptime in bargraph % and total downtime in Hours-Minutes along with Mean Time To Repair [MTTR] and Mean Time Between Failure [MTBF] for top n devices in the tabular form. By default, table is sorted on descending order of uptime. You can sort on any of the columns. To view the details of each device, click on the device name link.

To print the report, click on the 'Printer Friendly' link on the top-right corner of report. To save the report in PDF format, click 'Export as PDF' link in top-right corner of report.

Tape Library Reports

Summary

This report fetches the latest inventory information for all the tape libraries managed by OpStor in the Storage environment and generates a consolidated report on

- Total Number of Tape Libraries
- Total Number of Tape Drives
- Tape drive models
- Total Number of active tape drives
- Total Number of inactive tape drives

In addition, individual tape library consolidated report is presented with information such as

- Library Name
- Library State
- No. of Drives
- Tape Drive models
- Active Tape Drives
- Inactive Tape Drives

By clicking on the name link, user can quickly navigate to tape library detailed inventory page.

To print the report, click on the 'Printer Friendly' link on the top-right corner of report. To save the report in PDF format, click 'Export as PDF' link in top-right corner of report.

Top N Availability

Top N Availability reports are generated for Tape Libraries based on overall library state.

Availability reports are generated based on calculated uptime of each device or its subcomponent. Users can see the uptime in bargraph % and total downtime in Hours-Minutes along with Mean Time To Repair [MTTR] and Mean Time Between Failure [MTBF] for top n devices in the tabular form. By default, table is sorted on descending order of uptime. You can sort on any of the columns. To view the details of each device, click on the device name link.

To print the report, click on the 'Printer Friendly' link on the top-right corner of report. To save the report in PDF format, click 'Export as PDF' link in top-right corner of report.

Host Server Reports

Summary

This report fetches the latest inventory information for all the host servers managed by OpStor in the Storage environment and generates a consolidated report on

- Total Number of Host Servers
- Total Number of Host Bus Adapters
- Host OS

In addition, individual host server consolidated report is presented with information such as

- Host Name
- OS Name
- No. of HBAs
- Disk Storage Capacity
- Used capacity

By clicking on the name link, user can quickly navigate to host server detailed inventory page.

To print the report, click on the 'Printer Friendly' link on the top-right corner of report. To save the report in PDF format, click 'Export as PDF' link in top-right corner of report.

Top N Availability

Top N Availability reports are generated for Host servers based on ping or snmp ping reachability status.

Availability reports are generated based on calculated uptime of each device or its subcomponent. Users can see the uptime in bargraph % and total downtime in Hours-Minutes along with Mean Time To Repair [MTTR] and Mean Time Between Failure [MTBF] for top n devices in the tabular form. By default, table is sorted on descending order of uptime. You can sort on any of the columns. To view the details of each device, click on the device name link.

To print the report, click on the 'Printer Friendly' link on the top-right corner of report. To save the report in PDF format, click 'Export as PDF' link in top-right corner of report.

Host Bus Adapter (HBA) Reports

Summary

This report fetches the latest inventory information for all the HBAs managed by OpStor in the Storage environment and generates a consolidated report on

- Total Number of HBAs
- Total Number of HBA ports
- HBA driver names
- Total Number of Operational ports
- Total Number of Problematic ports

In addition, individual HBA's consolidated report is presented with information such as

- HBA Name
- HBA Driver Name
- Number of ports
- Number of Operational ports
- Number of problematic ports

By clicking on the name link, user can quickly navigate to HBA detailed inventory page.

To print the report, click on the 'Printer Friendly' link on the top-right corner of report. To save the report in PDF format, click 'Export as PDF' link in top-right corner of report.

Top N Availability

Top N Availability reports are generated for HBA Ports based on port availability during the selected period.

Availability reports are generated based on calculated uptime of each device or its subcomponent. Users can see the uptime in bargraph % and total downtime in Hours-Minutes along with Mean Time To Repair [MTTR] and Mean Time Between Failure [MTBF] for top n devices in the tabular form. By default, table is sorted on descending order of uptime. You can sort on any of the columns. To view the details of each device, click on the device name link.

To print the report, click on the 'Printer Friendly' link on the top-right corner of report. To save the report in PDF format, click 'Export as PDF' link in top-right corner of report.

Miscellaneous Reports

Vendor

The report shows the various vendors and the devices supplied by each of the vendors. For example, the devices in an organization can be supplied by different vendors such as brocade, EMC, StorageTek, etc.

- A stacked-bar chart is plotted to represent the device distribution.
 - The X-axis in the graph lists the various device vendors.
 - The stacks in the bar shows each of the devices. Placing the mouse pointer on a stack shows the device name.
- The table below lists the devices with their category, vendors, manufacturer and model. You can sort the table based on any of the columns.

To print the report, click "Printer Friendly" link in the top-right corner. To save the report in PDF format, click "Export as PDF" link in the top-right corner.

Location

The report shows the various locations and the devices in each of the locations. For example the devices can be different floors, or different data-center in the same floor.

- A stacked-bar chart is plotted to represent the device distribution in various locations.
 - The X-axis in the graph lists the various physical locations.
 - The stacks in the bar shows each of the devices. Placing the mouse pointer on a stack shows the device name.
- The table below lists devices with their type and location. You can sort the table based on any of the columns.

To print the report, click "Printer Friendly" link in the top-right corner. To save the report in PDF format, click "Export as PDF" link in the top-right corner.

Problem Tickets

The report shows

- The first bar chart shows the problem tickets filed against each of the vendors. The x-axis shows the vendors and y-axis shows the count of problem tickets.
- The second bar chart shows the problem tickets filed against each of the device category. The x-axis shows the device categories and y-axis shows the count of problem tickets.
- The table below shows the matrix problem tickets of vendors against each of the device categories. If you want to see the problem tickets between a specific time period, you can select the from and to dates (option, just above the table) and submit.

To print the report, click "Printer Friendly" link in the top-right corner. To save the report in PDF format, click "Export as PDF" link in the top-right corner.

Live Graphs

OpStor provides an option to troubleshoot devices, by watching live data collected from the device ports. The data collected is SNMP based and does not interrupt the regular functioning of the devices.

This section describes how to plot real time graphs.

Plotting Live Graphs

To plot the live graphs or real time graphs, follow these steps:

1. Go to 'Device Info' page of the switch.
2. Under 'Switch Ports', you can find the 'Live Monitor' icon beside each of the ports that is connected to other device.
3. Click on the Live Monitor icon. The variables for which you can collect data are shown.
4. Select the variables for which you want to collect data and plot the graph. For selecting all the variables, you can choose **Select All** check box present below the variables.
5. Set the polling interval, i.e., time interval between two consecutive polls.
6. Set the page refresh interval, i.e., time interval between two consecutive page refresh.
7. Set the poll duration, i.e., the maximum time for which the data collection must happen. Maximum time is 60 minutes.
8. Click 'Start' to start the plotting. The graphs appear in a new window which will automatically refresh in the specified time interval.
9. Click 'Stop' to stop the plotting.

To print the report, click "Printer Friendly" link in the top-right corner of the screen.



Note: The graphs can be plotted only for FC switch ports.

Configuration

OpStor provides options to launch the WebApp (Web Application / Device Management System) and/or Telnet session, to connect to the devices, for device configuration. In addition, OpStor also packages MIB Browser application to carry out SNMP based configurations.

Launching WebApp

Most of the storage devices such as tape libraries and RAIDs have their own web-based Device Management System (DMS) bundled in the box. OpStor identifies DMS applications running in the devices and marks application URLs against the devices in the GUI. Thus OpStor provides a single point of access whereby you can launch DMS / Web application with a single click, from the OpStor client.

To launch a Web Application, follow these steps:

1. Connect OpStor client
2. In the Home page, click on the device for which you want to launch web application. This will open device specific inventory page
3. On the right hand side menu under the 'Actions', you will find 'Launch WebApp' link. If device does not support web app, link will not be present.
4. Click 'Launch WebApp' . The Web Application / DMS will be opened in a new window/browser.
5. Make the required configuration changes
6. Close the browser to exit the configuration

This option is available only for 'Admin' users.

Telnet

Storage devices support Telnet for menu based configurations. OpStor provides an option to launch a remote Telnet session with the device from within the OpStor client.

To launch a Telnet, follow these steps:

1. Click the device name link from the "Home" tab. The device properties page is shown
2. Click 'Telnet' link under 'Actions' in the RHS of the screen
3. Enter a valid username and password.
4. Default telnet port number and prompts are shown. Change them if necessary
5. Click 'Connect'. New Telnet page is launched.
6. Type the commands to query and/or to make configurations (press 'Enter' after typing in the command)
7. To close Telnet page, type device telnet termination command (say 'exit') and press 'Enter'
8. Close the telnet browser window



Note: Do not close Telnet browser window without terminating the Telnet session.

SNMP

To facilitate configuration in SNMP enabled devices, OpStor packages the MIB Browser along with the product. You can load the device MIB files in the MIB Browser and configure SNMP parameters in the devices.

To launch MIB Browser, follow these steps:

In Windows:

1. Go to <OpStor Home>\bin directory
2. Run MibBrowser.bat

In Linux:

1. Go to <OpStor Home>/bin directory
2. Execute MibBrowser.sh

OpStor Administration

OpStor administration provides options to configure the users, devices, database, alarm actions and escalations, from the Admin tab in the client GUI. This tab is shown only to 'admin' users and hidden for normal users.

The admin options are:

- Discovery
 - Manage Storage Devices: To add a new device that is not already discovered and delete devices from the list.
- Alarm Reporting
 - Schedule Alarm Actions: To run a program or send email/SMS, when a particular type of alarm occurs in the system. You can add multiple rules to capture different sets of alarms.
 - Escalate Unattended Alarms: To configure OpStor to send email/SMS when an alarm is not resolved within a specified time. This helps in escalating important alarms that are not resolved in time. You can add multiple rules to escalate different sets of alarms to different people with different messages.
 - Email Alarm Reports: To send daily or weekly alarm reports to administrators.
- Global Settings
 - Manage OpStor Users: To add, modify, or delete users and their privileges with this option.
 - Set Monitoring Intervals: To configure the polling time interval (in minutes) for storage devices.
 - Clear Old Data: To specify the time for which data (related to alarms, events, and performance) needs to be maintained in the database.
 - Configure Mail Server: To configure the mail server settings that will be used to send an email.
 - Set Threshold Limits: To configure the threshold limits for different parameters for the storage devices, at which OpStor should raise an alarm.

Manage Storage Devices

OpStor provides options to add new devices or delete devices that are already discovered.

To add devices, refer to 'Adding a device' page under 'Discovering Storage Devices' section.

To delete a device, follow these steps:

- Select 'Admin' tab.
- Click 'Manage Storage Devices' under 'Discovery'.
- Click the delete icon (trash can) against the particular device, in the table below the 'Add Device(s)' form.
- Click OK in the confirmation dialog.
- A message confirming the deletion is displayed and the device disappears from the table.

When you delete a device, all its sub-components (such as ports), its alarms, and its events are also deleted permanently from the database.

Schedule Alarm Actions

Refer 'Schedule Alarm Actions' page under 'Fault Monitoring And Escalation' section.

Email Alarm Reports

Refer 'Email Alarm Reports' page under 'Fault Monitoring And Escalation' section.

Manage OpStor Users

OpStor supports two levels of user authentication namely Admin and user. The Admin get all the privileges while the user is restricted from admin functions such as the options in this section and other device configuration options.

You can add, delete, change password, or change privilege for a user.

To add a new user, follow these steps:

- Select 'Admin' tab.
- Click 'Manage OpStor Users' under 'Global Settings'.
- In the 'Add User' form, specify the new user name, password, and select the type of privilege (Admin or User).
- Click 'Add User' button.
- A message confirming the addition is shown and the user name is listed in the table above.

To delete a user, follow these steps:

- Select 'Admin' tab.
- Click 'Manage OpStor Users' under 'Global Settings'.
- Click the delete icon (trash can) against the particular user.
- A message confirming the user deletion is shown and the user name is deleted from the table.

To change the password of a user, follow these steps:

- Select 'Admin' tab.
- Click 'Manage OpStor Users' under 'Global Settings'.
- Click on the 'User name' for whom you need to change the password.
- Enter the new password and confirm the same.
- Click 'Modify User'
- A message confirms the change in password.

To change the privilege for a user (from user to admin or vice versa), follow these steps:

- Select 'Admin' tab.
- Click 'Manage OpStor Users' under 'Global Settings'.
- Click on the 'User name' for whom you need to change the privilege.
- Select the other option in the 'Group'
- Click 'Modify User'
- A message confirms the change in user privilege.

Set Monitoring Intervals

The status polling interval for each of the devices can be configured using this option.

To configure the interval, follow these steps:

- Select 'Admin' tab.
- Click 'Set Monitoring Intervals' under 'Global Settings'.
- Specify the time interval value in minutes for the required devices.
- Click 'Save'.
- A message confirms the change in monitoring intervals.

Clear Old Data

OpStor provides an option to delete old data from the database. This makes sure that the database does not grow out of limit.

To delete old events, follow these steps:

- Select 'Admin' tab.
- Click 'Clear Old Data' under 'Global Settings'.
- Under 'Events Database', specify the number of days after which the events can be deleted.
- Click 'Submit'.

To delete old performance data, follow these steps:

- Select 'Admin' tab.
- Click 'Clear Old Data' under 'Global Settings'.
- Under 'Performance Database', specify the number of days after which the daily and weekly statistics data can be deleted.
- Click 'Submit'.

Configure Mail Server

The mail server is used for sending mails to IT personnel as part of alarm action or escalation. The configurations are centrally maintained here.

To configure the mail server

- Select 'Admin' tab.
- Click 'Configure Mail Server' under 'Global Settings'.
- Enter the mail server name, port, user name and password for sending the mail.
- Click 'Save'.



Note: To test the mail server configuration, click on 'Test' button. This should be done after saving the mail server configuration.

To modify the configuration, use the same form and overwrite the values.

Set Threshold Limits

You can specify the initial set of Thresholds using the 'Set Threshold Limits' option.

For EVADiskUsage, NetAppVolumeUsage , HostMemUtilization , EMCRAidGroupUsage , used capacity percentage is compared with the threshold value configured.

To configure threshold, follow these steps:

- Select 'Admin' tab.
- Click 'Set Threshold Values' under 'Global Settings'.
- Specify the ThresholdValue, the RearmValue, WarningMessage and the ClearMessage.
- Click 'Save'.
- A message confirms the change in threshold limit.

Note :

ThresholdValue - The value to be compared with the current usage and if exceeded generates alarm

RearmValue - The value at which clear alarm will be generated

WarningMessage - The message to be displayed when the threshold value is exceeded.

ClearMessage - The message to be displayed when RearmValue is achieved.

Registering With A License

OpStor has a file based license system. You must get a registered license file to register your copy of OpStor.

When you want to move from evaluation to registered license, you must follow the steps below to apply OpStor Registered License.

Before the expiry of your trial / evaluation license

- Start OpStor server by executing **StartOpStorServer.sh/bat** present in *<OpStor Home>/bin* directory.
- Connect OpStor Web Client at appropriate port. For instance, if the web server port is 9010, you need to connect as <http://<hostname>:9010> and login into the client
- Click the "Register" link present in the top right corner of the client
- Browse and pick the registered license file
- Click "Register"
- The license is applied
- To check the license details, click the "About" link in the right corner of the client to see the licensing details

After the expiry of the trial / evaluation license

- Start OpStor server by executing **StartOpStorServer.sh/bat** present in *<OpStor Home>/bin* directory
- Click "OK" in 'Trial period expired' dialog
- Browse through the registered license you have and click "Next"
- Click "Finish"
- The License file is applied
- You can start the server and see the license details by clicking the "About" link in the right corner of the client

FAQ

1. Can I configure the port in which OpStor server starts?
 2. If port 80 (or the user specified port) is used by other application. Will the OpStor server start?
 3. I have a supported device in my environment. It is not showing up in client. What is the problem?
 4. Does OpStor server listen for SNMP Traps?
 5. Does OpStor have the capability of forwarding the SNMP Traps to a specific host?
 6. Why Windows installation is suggested over Linux installation?
-

1. Can I configure the port in which OpStor server starts?

Answer: Yes. During installation, OpStor prompts the user to specify a port in which the server must start. By default it shows 80. If you want to change the port, you can specify a different port number and proceed with the installation.

If you want to change the port after installation, please follow the procedure given below :

- Open a command prompt and navigate to <OpStor Home>\bin
- Now execute the batch file as follows

ChangeWebServerPort.bat <port number> (In Windows)

sh ChangeWebServerPort.sh <port number> (In Linux)

Example : **ChangeWebServerPort.bat 9070**

sh ChangeWebServerPort.bat 9070

- Now start the OpStor server and it would be starting at the port **9070**.

2. If port 80 (or the port that I specified) is used by other application, will the OpStor server start?

Answer: No, when ever the specified port is used by other application, OpStor server fails with the following message

OpStor as a Standalone Application :

"Failed to establish connection with web server, Gracefully shutting down Web NMS

Trying to Shutdown OpStor Server"

OpStor as a Service :

A message box appears.. *"Could not start the ManageEngine OpStor service on Local Computer.*

Error 1068: The dependency service or group failed to start."

In this case you need to either free the corresponding port or configure OpStor server to start in another port.(For the procedure refer FAQ 1)

3. I have a supported device in my environment. It is not showing up in client. What is the problem?

Answer: OpStor is by default configured to discover supported devices on their default port and community. SNMP enabled devices, default port is 161 and the community is 'public'. Check if your device SNMP agent runs on different port or the community string is other than 'public'. Re-configure device discovery via Admin UI.

4. Does OpStor server listen for SNMP Traps?

Answer: Yes. OpStor server receives SNMP Traps on Port 162. Ensure that OpStor is configured as manager for your device SNMP agents. Refer Prerequisites For Device Discovery under 'Discovering Storage Devices' section for more information.

5. Does OpStor have the capability of forwarding the SNMP traps to a specific host?

Answer: Yes. OpStor does have the capability of forwarding the SNMP traps to a specific host. This is configurable.

Steps for configuring :

- Shutdown OpStor server, if it is running
- Go to <OpStor_Home>\conf directory
- Open the file trap.forwarder and make the corresponding entries as follows

```
<TRAP_REDIRECTION
  Dest_Addr="192.168.1.49"
  Dest_Port="162"/>
```

Where <192.168.1.49> is the address to which the trap has to be forwarded.
<162> is the Port to which trap has to be forwarded.

Note : Uncomment the above lines(in step 3) of code in the file.

If you want to forward the traps to more than one system then please include multiple entries with the corresponding addresses.

- Save the entries
- Start OpStor server.

This will enable OpStor to forward the traps to a specific host.

6. Why Windows installation is suggested over Linux installation ?

Answer: OpStor uses different management interfaces available, like SNMP MIB, SMI-S provider and Command Line Interface for monitoring different devices. For the CLI based devices the client needs to install the CLI utilities on the OpStor running machines. For example, for monitoring EMC Clariion arrays, OpStor uses the NaviCLI utility which needs to be installed on the OpStor running machine. Similarly for EVA performance monitoring, EVAPerf utility and for IBM DS / Fastt or Sun StorageTek devices SMcli utility needs to be installed. All these utilities are available only for windows and without which you would not be able to monitor those devices in OpStor.

Troubleshooting Tips

The various troubles that can occur in OpStor are listed below, classified as

- Server
- Client
- Discovery

Symptom	Problem	Solution
Server		
OpStor server not starting in Port 80.	Either Port 80 is already in use by other application or In Linux platform OpStor is started with 'user' permissions which does not allow usage of well known ports.	<ul style="list-style-type: none"> • If Port 80 is already in use, please free the port and try restarting OpStor server. • If 'user' permissions is the problem, please start OpStor with 'superuser' privileges.
Product does not come up and CPU utilization shoots up to 100%.	Windows XP and 2000 base versions have compatibility issue with jdk 1.5.	Install service pack 1 for Windows XP and service pack 4 for Windows 2000.
In windows, when I start the server, it says "Unable to start MySQL daemon" (or) I see some other MySQL related error messages.	<ul style="list-style-type: none"> • OpStor is not able to start MySQL on port 53306. • In Linux, the installation directory might not have the execute permission for others. 	<ul style="list-style-type: none"> • Port 53306 is required. So clear up the port and restart the server. • Lets assume that the product is installed under /root directory. To solve the problem provide execute permission for others to root directory.
Forbidden error when accessing server started under root login.	The installation directory might not have the execute permission for others.	Lets assume that the product is installed under /root directory. To solve the problem provide execute permission for others to root directory.
Client		
Sometimes the map image does not get updated when I add/delete a device.	Sometimes the browser would maintain a cache of the map image and might not get the new image.	<ul style="list-style-type: none"> • Do a ctrl+refresh of the map page. • Add '?reload=true' to the map page url and reload the page.
Client shows "Page cannot be displayed".	Server is not running in the specified port or not running at all.	<ul style="list-style-type: none"> • If the server is not running, restart the server. • If the port in which the server is started is different, reconnect your client to the new port. (http://<server name>:<port>)
I see 'not available' in some columns in Device Details page.	Particular fields are not accessible or not available in the device to query by OpStor.	Use 'Edit' option under 'Admin' login to populate such fields manually.

Symptom	Problem	Solution
Discovery		
I added a device, but it is not discovered by OpStor.	<ul style="list-style-type: none"> The devices specified are not supported by OpStor or the agent in them might not be configured and running. The server might not have access permission to the network in which the specified devices exist. The details specified (like port, etc.) might be incorrect. 	<ul style="list-style-type: none"> Check 'supported devices list' for the list of OpStor supported devices and the instructions to configure the agent in the devices. Install OpStor in the same network as that of the storage devices or provide permission for the OpStor server to access the other network. Add the devices again using the 'Manage Storage Devices' option in 'Admin' tab.

Known Issues

The list of known Issues in OpStor 6 are:

- Closing the Telnet browser window will not terminate the Telnet session. The work around is to use the exit command to terminate the Telnet session and then close the Telnet browser window.