

Smart Array Competitive Analysis

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Systems Manager, Product Development

ISS Server Storage

Part 3 of 3



Firmware distinctions and storage software

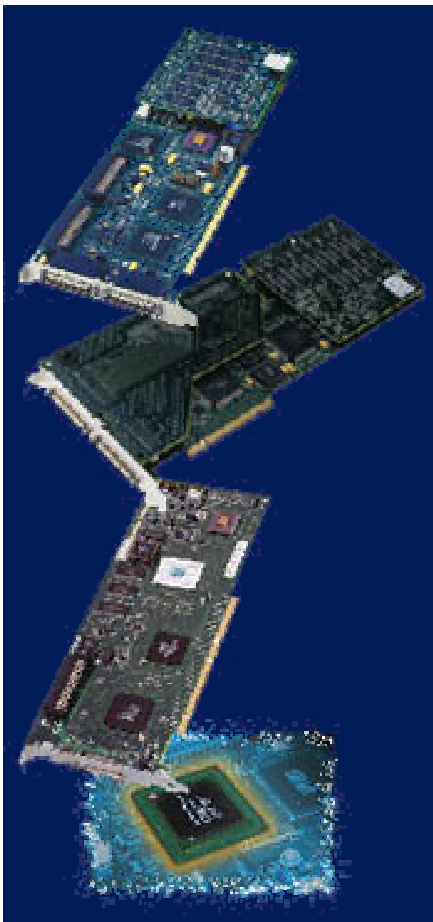


Upgrade to a newer controller

■ Upgrade to a Newer Controller

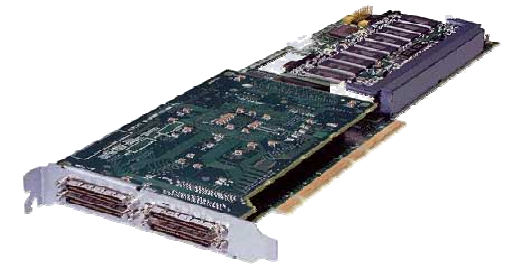
- Smart Array configuration information and data is migrated seamlessly.
- Difficult and confusing upgrade from 3D/i to PERC3/QC or PERC3/DC. Very treacherous from PERC2 (ultra2) to PERC3 U160)

Upgrading your Smart Array



instant upgrade:

1. Power down the server.
2. Replace the old controller and cables with the new controller and cables.
3. Re-power up the server.
2. Ensure that you are running the latest device driver and Smart Array firmware. Can obtain both from the SmartStart CD.
4. Data will be seamlessly recognized.



→ Smart Array 53xx

- faster performance
- greater capacity
- higher availability

RAID configuration utilities

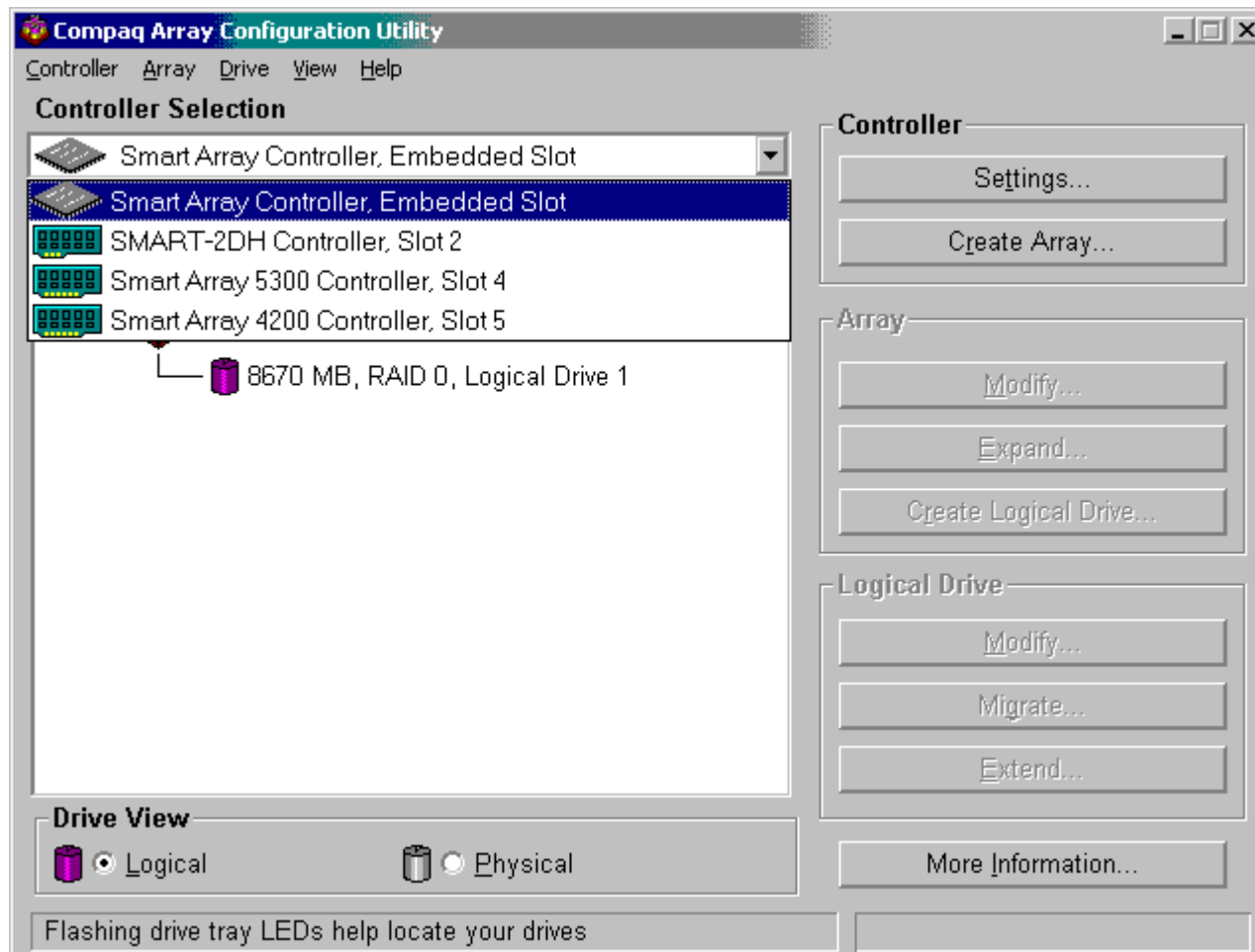
HP – two methods:

1. ACU/XE – started with SmartStart 6.0
 - Browser based

2. ORCA – Option ROM Configuration for Arrays
 - ROM based
 - Available at POST
 - Same user interface for all HP RAID controllers
 - Begun with SA-5300 and all SA RAID controllers subsequent
 - Easy way to configure drives before entering O/S

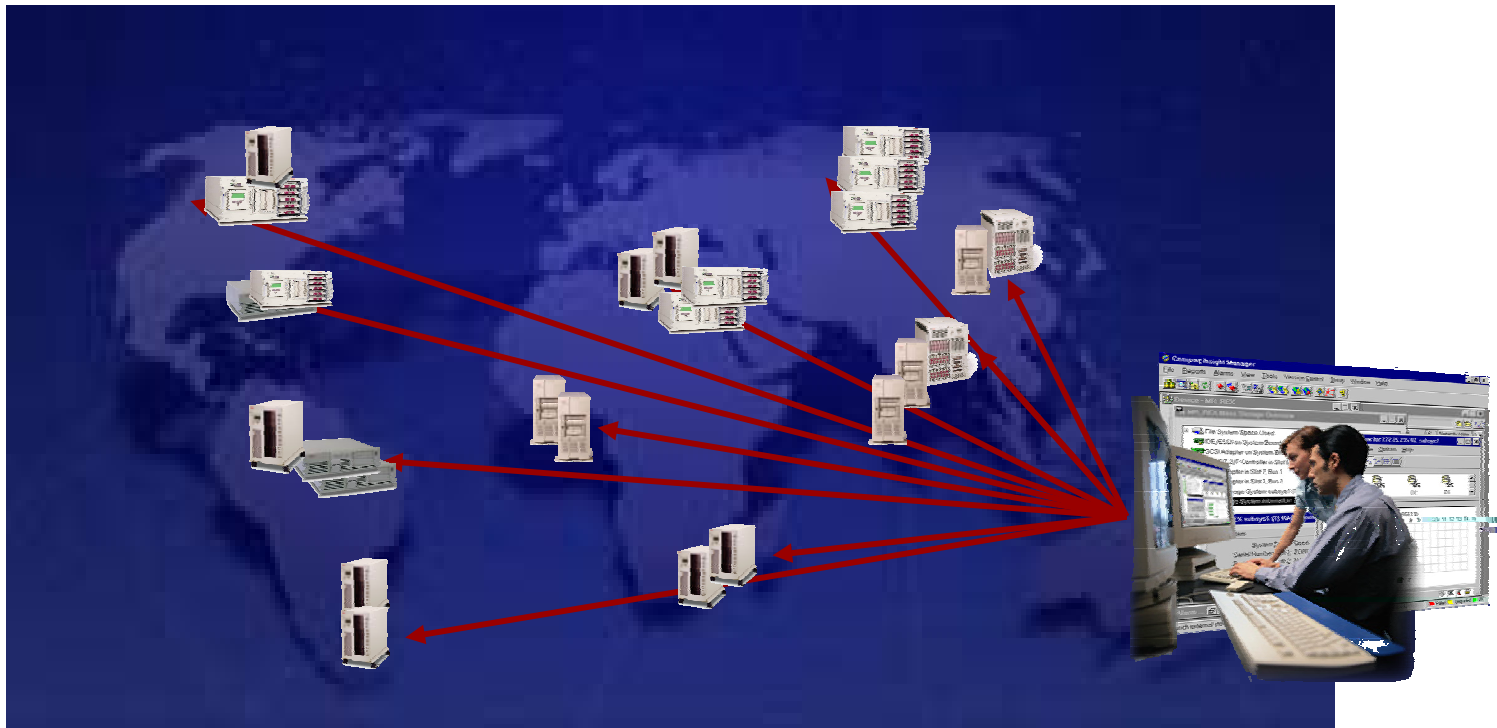
Array Configuration Utility (ACU)

Say goodbye to an old friend...




Next generation software

- Web based Array Configuration Utility (ACU-XE)
 - Browser based interface
 - Manage all Smart Arrays from one central location.



ACU/XE


Array Configuration Utility XE - Microsoft Internet Explorer







 Array Configuration Utility XE 2.0.1.0 FIVE_I_PLUS
127.0.0.1

invent


Configure Help Exit

Configuration View Show Physical View








 **Smart Array Cluster Controller in 9J1BJN72K54LC6**

-  9.1 GB Unassigned Drive at Box 1 : Bay 1
-  9.1 GB Unassigned Drive at Box 1 : Bay 2
-  9.1 GB Unassigned Drive at Box 1 : Bay 3
-  9.1 GB Unassigned Drive at Box 1 : Bay 12
-  9.1 GB Unassigned Drive at Box 1 : Bay 13
-  9.1 GB Unassigned Drive at Box 1 : Bay 14

Create Array

 Note: To avoid wasting drive capacity, select physical drives that are the same size for the new array.

Select the Physical Drives for the New Array

-  Select All
-  9.1 GB Drive at Box 1 : Bay 1
-  9.1 GB Drive at Box 1 : Bay 2
-  9.1 GB Drive at Box 1 : Bay 3
-  9.1 GB Drive at Box 1 : Bay 12
-  9.1 GB Drive at Box 1 : Bay 13
-  9.1 GB Drive at Box 1 : Bay 14

Smart Array 5300 Controller in Slot 1

Smart Array 5i Controller in Embedded Slot

Smart Array 532 Controller in Slot 3

Smart Array 5312 Controller in Slot 2

Smart Array Cluster Controller in 9J1BJN72K54LC6

Rescan Controllers

ACU/XE

Array Configuration Utility XE - Microsoft Internet Explorer

hp Array Configuration Utility XE 2.0.1.0

invent

Configure

- Smart Array 5300 Controller in Slot 1
- Smart Array 5i Controller in Embedded Slot
- Smart Array 532 Controller in Slot 3
- Smart Array 5312 Controller in Slot 2
- Smart Array Cluster Controller in 931BJN72K54LC6

Rescan Controllers

Configuration View [Show Physical View](#)

Smart Array Cluster Controller in 931BJN72K54LC6

Array A

Unused Space, 52067 MB

Create Logical Drive

Note: The size may be automatically adjusted slightly to optimize performance.

Fault Tolerance: RAID ADG

Stripe Size: 16 KB

Size: 34707 MB (34707 MB max)

Max Boot

Disable

Enable

Array Accelerator

Disable

Enable

OK Cancel

FIVE_I_PLUS 127.0.0.1

Help Exit

Dell's RAID configuration utilities:

- PERC BIOS
 - Accessed by <Ctrl> <M> key sequence at POST
 - Comparable to HP's ORCA – text based
 - Now has same utility look across 3 different OEM RAID offerings –
 - Adaptec, AMI and LSI
- PERC WebBIOS
 - Graphical HTML-BIOS based utility originally from AMI
 - Versatile – can access and configure multiple Dell RAID controllers
- Open Manage Array Manager
 - Veritas version of Windows Disk Manager
 - Comprehensive – all controllers accessed here
 - Takes awhile to get used to as some options not intuitive

Dell OpenManage Array Manager

The screenshot displays the Dell OpenManage Array Manager interface. The left pane shows a tree view of the system's storage configuration for 'DELL_4400'. The right pane shows the 'General' tab for the selected 'PERC 3/DC Controller 0'.

Tree View Structure:

- DELL_4400
 - Arrays
 - PERC Subsystem
 - Physical Array
 - PERC 3/DC Controller 0
 - Logical Array
 - Array Group 0
 - Array Disk 0:10
 - Array Disk 0:11
 - Array Disk 0:12
 - Array Disk 0:13
 - Virtual Disk 0 (Disk 0)
 - Array Disk 0:10
 - Array Disk 0:11
 - Array Disk 0:12
 - Array Disk 0:13
- Dell4400
 - Disks
 - Disk 0 (Virtual Disk 0)
 - Disk 1
 - Disk 2
 - Disk 3
 - Disk 4
 - CdRom 0
 - Volumes
- My Network Places
- Favorites
- History

IBM configuration- ServeRAID Manager

ServeRAID Manager - [Logical drive 1 information for controller 1]

File View Remote Actions Help

The interface shows a tree view on the left with the following structure:

- Managed systems
 - ibm8500r (Local system)
 - Controller 1
 - Arrays
 - Logical drives
 - Logical drive 1 (208284 MB)**
 - Hot-spare drives
 - Physical drives

The main area displays the following drive information table:

Drive information	Description or value
Logical drive	1
Array letter	A
State	Okay
RAID level	5
Data space in MB	208284
Parity space in MB	17357
Date created	9/25/02
Write-cache mode	Write back
Merge group number	207
Merge group state	Non-shared

The bottom status bar shows a log of events:

Date	Time	Source	Description
09/25/2002	10:15:26 AM CDT	ibm8500r	Synchronizing logical drive 1 on controller 1.
09/25/2002	10:15:24 AM CDT	ibm8500r	Successfully applied the new configuration to controller 1.
09/25/2002	10:15:24 AM CDT	ibm8500r	Added logical drive 1 on controller 1.
09/25/2002	10:12:16 AM CDT	ibm8500r	Deleted all of the arrays from controller 1.
09/25/2002	10:12:16 AM CDT	ibm8500r	Synchronization complete on logical drive 2 of controller 1.
09/25/2002	10:11:44 AM CDT	ibm8500r	Synchronizing logical drive 2 on controller 1.

ibm8500r/Controller 1/Logical drives/Logical drive 1 01% Synchronizing logical drive 1 on controller 1.

IBM's ServeRAID Manager

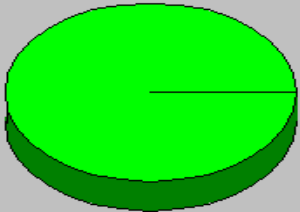
ServeRAID Manager - [Configure the ServeRAID controller]

File View Remote Actions Help

Create logical drives. Set the RAID level and data size. Click 'Create new logical drive' to create an additional logical drive, or click 'Delete' to delete a logical drive; then, click 'Next.'

Array A

Logical drive	RAID level	Data (MB)	Parity (MB)	Total (MB)	
1	5	225641	17357	242998	Delete



Total 242998 MB
Used 242998 MB
Free 0 MB

Create new logical drive

< Back Next > Cancel Help

xseries360/Controller 1

Adaptec's storage manager

Adaptec Storage Manager Browser Edition - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites History Print

Address <https://localhost:3513/adaptec> Go Links >>

MR_WILDCAT Events Options Help

Rescan Logout Properties Tasks

adaptec
ADAPTEC STORAGE MANAGER
BROWSER EDITION

AAC0 Adaptec 2200S, 64.0 MB

Physical Devices View T [] [] + Spare

Create Array: 102 GB, 4 drives selected

Step 1 of 3: Select Array Type

- RAID-0 (striping)
- RAID-1 or RAID-10 (mirroring)
- RAID-5 or RAID-50 (parity redundant)
- Simple Volume (individual drive segment)

Cancel Next >> Advanced >

Ultra 320 Channel 0: 320 MB/s (6 devices found)

Ultra 320 Channel 1: 320 MB/s (0 devices found)

No devices found.

Logical Devices Create Modify Delete

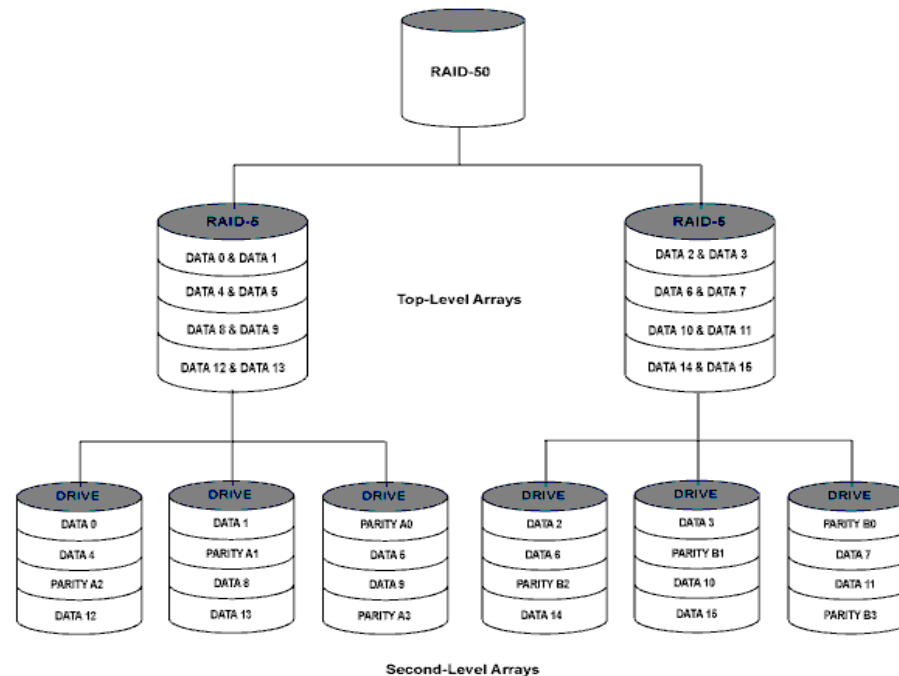
Top level logical devices (0)

No logical devices configured.

Done Local intranet

Adaptec's RAID level 50

A RAID-50 is a dual-level array created by using two or more equal-sized RAID-5s to create a RAID-0.



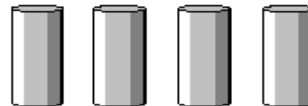
The top-level RAID-0 shares the load among the second-level RAID-5s, improving both read and write performance. The second-level RAID-5s use of parity provides efficient redundancy.

IBM's RAID-5E

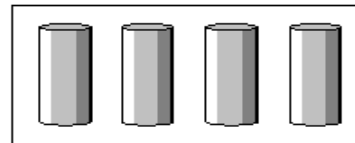
The following illustration is an example of a RAID level-5E logical drive.

RAID level-5 Enhanced example

Start with four physical drives.

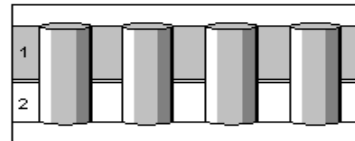


Create an array using all four physical drives.



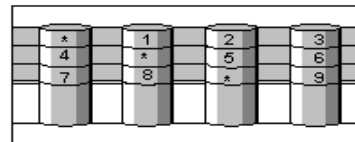
Then create a logical drive (labeled as 1) within the array.

Notice that the distributed spare drive is the free space (labeled as 2) shown below the logical drive.



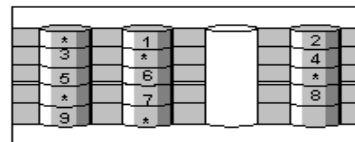
The data is striped across the drives, creating blocks in the logical drive.

The storage of the data parity (denoted by *) is striped, and it shifts from drive to drive as it does in RAID level-5.



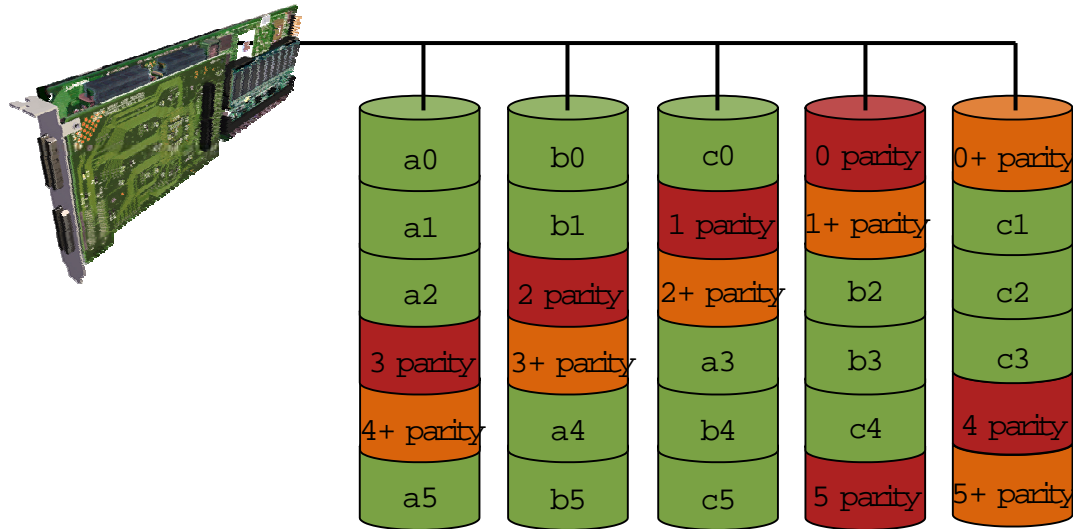
Notice that the spare drive is **not** striped.

If a physical drive fails in the array, the data from the failed drive is reconstructed. The array undergoes compression, and the distributed spare drive becomes part of the array. The logical drive remains RAID level-5E.



When you replace the failed drive, the data for the logical drive decompresses and returns to the original striping scheme.

RAID ADG



- similar to RAID 5, data and parity is distributed across all drives
- the capacity equal to two drives is reserved for parity data
- RAID ADG can withstand two simultaneous drive failures with out downtime or data loss
- supports online RAID level migration from RAID 1 or RAID 5
- supports online spares

Smart Array can change cache ratios

The screenshot displays the HP Array Configuration Utility (ACU) web interface. The browser title is "Array Configuration Utility - Microsoft Internet Explorer". The HP logo and "invent" tagline are visible in the top left. The page title is "Array Configuration Utility 6.20.9.0". In the top right corner, the user is identified as "MR_WILDCAT" with version "127.0.0.1".

The main interface is divided into several sections:

- Configure:** A sidebar on the left with a tree view showing "Smart Array 5i Controller in Embedded Slot" and "Smart Array 642 Controller in Slot 1". A "Rescan Controllers" button is located below the tree.
- Configuration View:** The main content area shows a tree view for "Smart Array 642 Controller in Slot 1". Underneath, it displays "Array A" containing "Logical Drive 1 (86803 MB, RAID 5)". A "Show Physical View" link is present.
- Controller Settings:** A panel on the right containing several settings:
 - Expand Priority:** Radio buttons for High, Medium, and Low. "Low" is selected.
 - Rebuild Priority:** Radio buttons for High, Medium, and Low. "Low" is selected.
 - Cache Ratio:** Radio buttons for "0 % Read, 100 % Write", "25 % Read, 75 % Write", "50 % Read, 50 % Write", "75 % Read, 25 % Write", and "100 % Read, 0 % Write". "50 % Read, 50 % Write" is selected.
 - Surface Scan Delay:** A text input field with "sec" next to it. Below it, the text "Valid range: 1 - 30 seconds" is displayed. "OK" and "Cancel" buttons are at the bottom.

Drive Roaming

- If drives inadvertently get mixed up (even across different channels), during a move for example, controller performs a self discovery during POST and re-maps the drives in the correct order.
- How is it done? RIS (Redundant Information Sectors) on each drive in the array that keeps track of the array it belongs to and it's parameters.

Remote SA controller firmware flash

The screenshot shows the Compaq Insight Manager 7 web interface in Microsoft Internet Explorer. The browser title is "Compaq Insight Manager 7 - Microsoft Internet Explorer provided by Compaq Computer Corporation". The address bar shows "https://sege1:50000/ui/jsp/appFrame2.jsp".

The main interface has a navigation bar with "Home", "Devices", "Tools", and "Settings". A status bar at the top right shows "Device Status" with 98 devices (red), 19 devices (yellow), and 13 devices (green), and "Uncleared Events" with 611 events (red), 714 events (yellow), and 436 events (green). The last update is "Monday February 25, 2002 - 3:19:55 PM".

The "Create/Edit Task" window is open, titled "Update Software and Firmware Task Setup". It shows a "Select a Repository" dropdown set to "sege1". Under "Select Items from List of Repository Contents", the following items are listed:

- Microsoft Windows 2000
 - Management Agents
 - Storage - Controllers
 - Compaq Smart Array 5x Controller Driver For Windows 2000 (English (US))
 - Compaq Array Configuration Utility XE for Windows (English (US))
 - Compaq Smart Array 3x00 Controller ROM Flash for Windows (English (US))
 - Compaq 64-Bit/66-Mhz Dual Channel Wide Ultra3 SCSI Controller Driver for Windows 2000 (English (US), Japanese)
 - Storage - Disk

The "Selected Items (Items installed in the order listed)" table is as follows:

Name	Version	Force Downgrade
Compaq Array Configuration Utility XE for Windows (English (US))	1.30.7.0	<input type="checkbox"/>
Compaq Smart Array 3x00 Controller ROM Flash for Windows (Eng...	4.50A	<input type="checkbox"/>

Buttons at the bottom of the window include "Previous", "Next", "Save", "Save As", and "Cancel".

Can update controllers, one server at a time

The screenshot shows the Dell OpenManage Server Administrator web interface in a Microsoft Internet Explorer browser window. The address bar shows the URL: <https://127.0.0.1:1311/servlet/OMSASStart?mode=omsa>. The page title is "Dell OpenManage Server Administrator". The navigation menu includes "Preferences", "Support", "Help", "About", and "Log Out". The user is logged in as "PowerEdge 6600 administrator, Admin".

The main content area is titled "Properties" and "Volumes". On the left, a tree view shows the system structure: System, Main System Chassis, Software, Storage, Array Subsystem, OS Disks, and Volumes. The "Volumes" section is selected.

The "Volumes" table shows the following information:

Status	Label	State	File System	Size	Free Space
✓	New Volume (E:)	Online	NTFS	101.22 GB	101.16 GB

Below the volumes table is the "Virtual Disk Information" section, which contains the following table:

Status	Name	State	Read Cache	Write Cache	Cache Policy	Layout	Size
✓	Virtual Disk 0	Ready	Enabled Read-Ahead	Write Back (Enabled)	Cache I/O	RAID 10	101.24 GB

There is a "[Back to top]" link below the virtual disk information.

The "Array Disks" section contains the following table:

Status	Label	State	Controller
✓	Array Disk 0:0	Online	PERC 3/QC Controller 0
✓	Array Disk 0:1	Online	PERC 3/QC Controller 0
✓	Array Disk 0:2	Online	PERC 3/QC Controller 0
✓	Array Disk 0:3	Online	PERC 3/QC Controller 0
✓	Array Disk 0:4	Online	PERC 3/QC Controller 0
✓	Array Disk 0:5	Online	PERC 3/QC Controller 0
✓	Array Disk 0:8	Online	PERC 3/QC Controller 0
✓	Array Disk 0:10	Online	PERC 3/QC Controller 0
✓	Array Disk 0:11	Online	PERC 3/QC Controller 0
✓	Array Disk 0:9	Online	PERC 3/QC Controller 0
✓	Array Disk 0:12	Online	PERC 3/QC Controller 0
✓	Array Disk 0:13	Online	PERC 3/QC Controller 0

good detail - remotely

Compaq Insight Manager 7 - Microsoft Internet Explorer provided by Compaq Computer Corporation

File Edit View Favorites Tools Help

Address <https://sege1:50000/ui/jsp/appFrame2.jsp>

Compaq Insight Manager 7

Home **Devices** Tools Settings

102 19 9 768 784 472

Device Status Uncleared Events

Last Update: Friday March 1, 2002 - 2:14:49 PM

Compaq Management Agents for Servers v5.30

Agent Help Summary Device Home Options

Condition Legend
 Unknown OK
 Degraded Failed

Logical Drives:

- Logical Drive 1 - Advanced Data Guarding

Storage Boxes:

- External Storage System on Port 3

Manually Refreshed @ Friday, March 01, 2002 2:32:08 PM

Logical Drive 1 - Advanced Data Guarding

Status: OK

Fault Tolerance: Advanced Data Guarding **Total:** 0 /sec

Capacity: 104131 MB **Reads:** 0 /sec

Percent Rebuild Complete: Not Available **Writes:** 0 /sec

Accelerator: Enabled **Sectors Read:** 0 /sec

Stripe Size: 16 KB **Sectors Written:** 0 /sec

Physical Drives

- Port 3 Drive 0 8678 MB
- Port 3 Drive 1 8678 MB
- Port 3 Drive 2 8678 MB
- Port 3 Drive 3 8678 MB
- Port 3 Drive 4 8678 MB
- Port 3 Drive 5 8678 MB
- Port 3 Drive 8 8678 MB
- Port 3 Drive 9 8678 MB
- Port 3 Drive 10 8678 MB
- Port 3 Drive 11 8678 MB

Done Local intranet

Dell IT Assistant – sparse controller detail

The screenshot shows the Dell OpenManage IT Assistant web interface in a Microsoft Internet Explorer browser. The browser's address bar shows the path: C:\Program Files\Dell\OpenManage\IT Assistant\UserInterfaceComponents\ui\omaBaseFrame.htm. The interface has a top navigation bar with buttons for BACK, HOME, SYSTEMS, INVENTORY, ALERTS, SEARCH, HELP, PRINT, EXIT, and DELL. A left sidebar contains a tree view for 'IT Assistant' with categories like Management, Configuration, and Preferences. The main content area is divided into several sections:

- Summary:** A list of system components with status indicators (green checkmarks for good, red X for error). Components include Main System Chassis (error), Temperature Probes, Fan Probes, Voltage Probes, Current Probes, Power Supply, Memory, Processors, Add-in Cards, Embedded Devices, and Disk Storage.
- Refresh View** and **Reset Thresholds** buttons.
- dell_4400: Add-in Cards** section header.
- Individual Element Status:** A table showing details for a PERC 3/DC card.

Attribute	Value
Card Manufacturer	Dell Computer Corp. http://www.dell.com
PCI Slot Number	6
PCI Data Bus Width	64 bits
PCI Bus Speed	33 MHz
Adapter Speed	33 MHz
Slot Length	Long

At the bottom of the interface, there is a status bar with 'IT Assistant Access: <Read-Write>' and a 'My Computer' icon.

ProLiant Universal HDD Features

Available height converter
easily snaps onto the top of 1"
high drives, providing disk
compatibility for legacy
systems requiring 1.6" high
LVD drives

Capacity & RPM to suit you

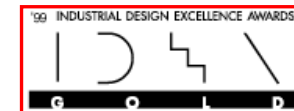
Universal drive designed for use
across all Compaq enterprise class
systems ... ProLiant, Alpha,
StorageWorks ... DAS, NAS, & SAN
ready ... you decide

Ergonomically
designed ejector
button and handle
allow for single handed
removal and carrying



Fiber optic lights for
easy visibility of drive
status

Rock solid spares
strategy



Award winning
design

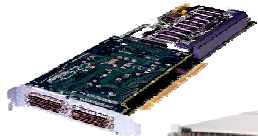
Easily recognizable tray
label clearly shows capacity
points, RPM level, and
interface level

Ribbed design for increased
cooling capacity allows
customers to easily upgrade
to new, hotter hard drives

DtS seamless data migration

investment protection for ProLiant customers

Smart Array plus



*Enclosures
4200/4300*



*Smart Array plus
internal drives*



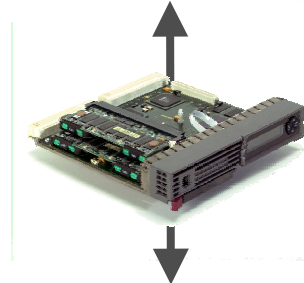
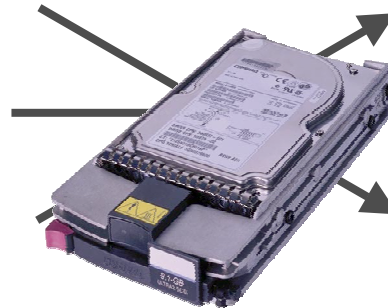
RA 4100



Smart Array Cluster Storage
Remote & Distributed Environments



**seamless
data/drive migration**



**Conversion
to the SAN**



Modular SAN Array 1000
Departmental/Data Center

Hp disk drive features

- Ability to flash disk drive firmware
- SmartStart 6.3 allows controller and disk drive firmware upgrades
 - No more 15 minutes to make RomPaq's 11 floppy disk set
- "Smart Components" available at www.hp.com
- At POST, controllers detect if attached drives need to be upgraded

Summary: ideas, dedication and action



Summary of HP Key Storage Benefits



- ✓ **Performance Engineered by dedicated Smart Array Engineering team.**
- ✓ **Easiest one utility to configure all controllers**
- ✓ **Storage Software – Versatile web enabled agents ie. firmware group updates tied to version management**
- ✓ **Upgrade seamlessly to newer controllers**
- ✓ **Unique firmware enhancements – ie. ADG, cache ratios, drive roaming.**



i n v e n t