Smart Array Cluster Storage Setup and Configuration
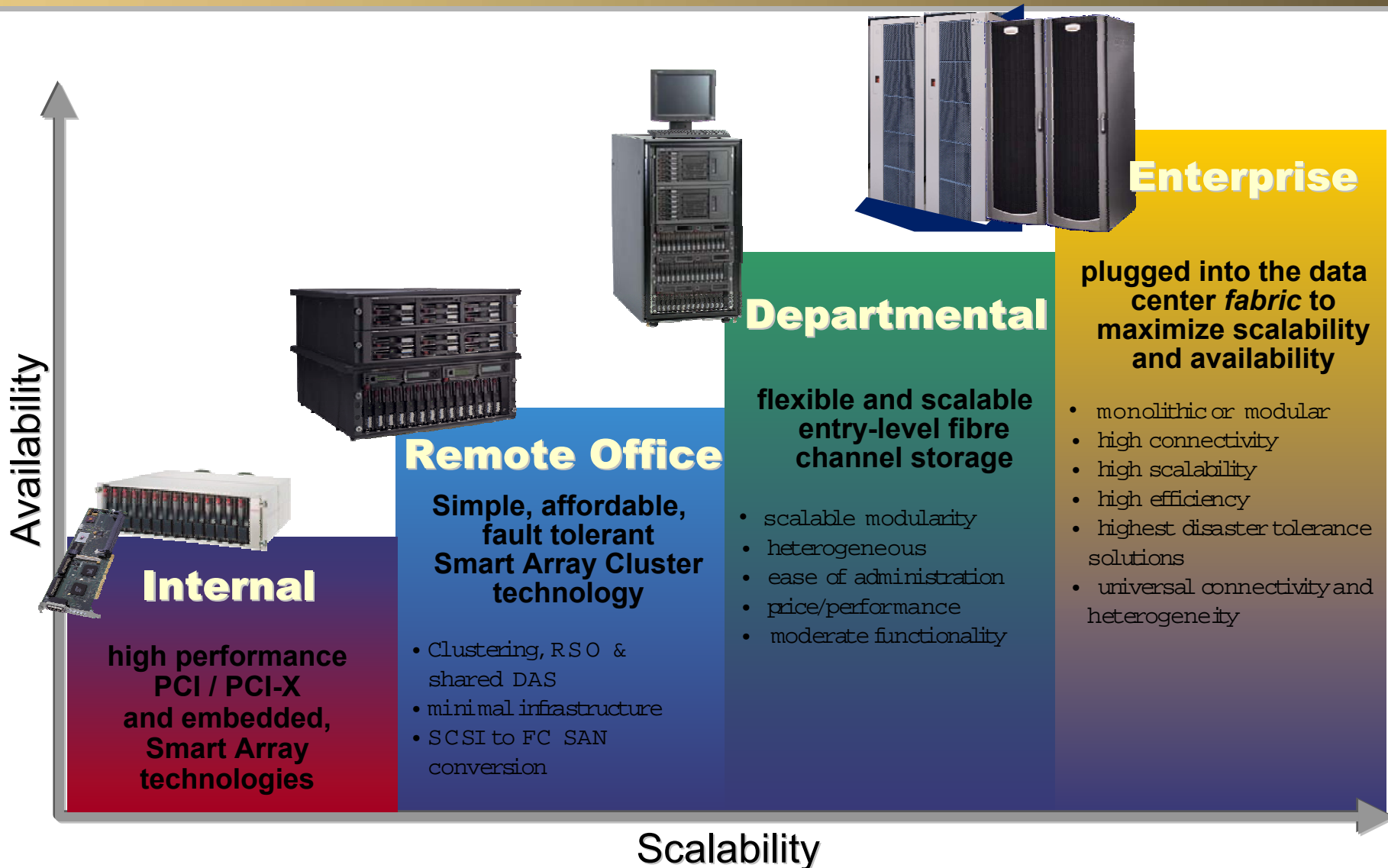
Joe Whalen

Server Storage & Infrastructure

August, 2003

HP WORLD 2003
Solutions and Technology Conference & Expo

ProLiant Storage – full range offerings

Availability →

Enterprise

plugged into the data center *fabric* to maximize scalability and availability

- monolithic or modular
- high connectivity
- high scalability
- high efficiency
- highest disaster tolerance solutions
- universal connectivity and heterogeneity

Departmental

flexible and scalable entry-level fibre channel storage

- scalable modularity
- heterogeneous
- ease of administration
- price/performance
- moderate functionality

Remote Office

Simple, affordable, fault tolerant Smart Array Cluster technology

- Clustering, R S O & shared DAS
- minimal infrastructure
- S C S I to FC SAN conversion

Internal

high performance PCI / PCI-X and embedded, Smart Array technologies

Scalability →

High Performance IO

- Highest performance, lowest latency solutions for database and other performance driven applications

ProLiant 8-processor server

U320 SCSI

Ultra320 SCSI Enclosure

Drives	1-14
Capacity	2TB (14 x 146GB drives)
Dimensions	3U
Drive type	Ultra320, Ultra160, Ultra2
Host Connections	Single or Dual Bus U320 SCSI
RAID support	Smart Array PCI-X cards, MSA1000
Redundant features	Power supplies and cooling fans (both hot pluggable)

DL380 Packaged Cluster

- simple – 1 SKU, fully integrated, one price, 1 box
- integrated & shipped in a configuration fixture – re-deploy into rack
- cable management with color code identification
- high availability – redundant features throughout the cluster
- RSO capability – hot standby server
- future "Build to Order" 14U rack solution

2 DL380 Servers   **Smart Array Shared Storage**   **Packaged Cluster**

Smart Array Cluster Storage

- ## high performance
- multipath IO - static load balancing
- Ultra160 smart array controllers
- up to 512MB battery backed cache

- ## high availability
- multipath IO – HBA & cable redundancy
- redundant controllers
- redundant power supplies & fan
- advanced data guarding
- Microsoft, Novell, and Linux clustering
- RSO (recovery server) software
- pre-failure warranty

- ## zero cost connectivity
- attaches to embedded smart array 5i controller or 2nd channel on SA-532
- everything included: cables, documentation

- ## easy to deploy
- familiar direct attached setup (DAS)
- ACU (Array Configuration Utility)
- packaged cluster option

- ## DtS conversion path to FC SAN
- MSA1000 FC controller kits

Smart Array Cluster Storage

cluster

recovery server

direct attached
shared storage
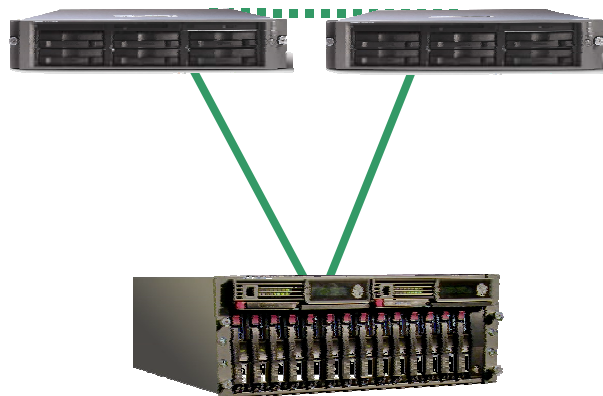
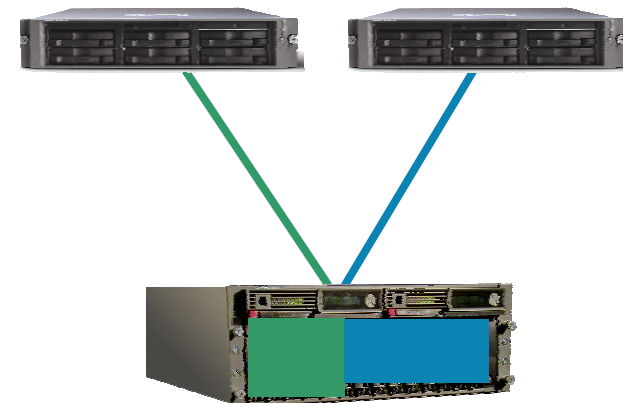supports Microsoft,
Novell, and
Linux clustering
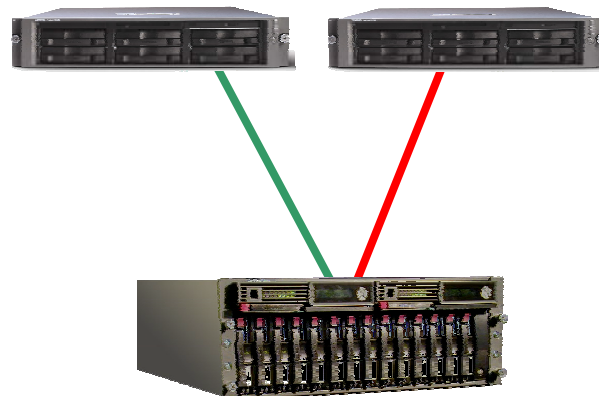
standby recovery
server
(software sold separately,
reduced total software licensing costs)

storage sharing through
Selective Storage
Presentation (SSP)
– LUN masking

Supported servers ML330, ML350, ML370, DL360, DL380, DL560, DL580, DL740, DL760

Recovery Server Option Pack

- **entry-level high availability, standby server**

- standby server takes over in the event of a server or OS failure
  - is <u>Not</u> Clustering
  - supports non cluster OS and applications
- easy to configure with familiar Smart Array configuration utilities
- simple to manage
  - servers must be similarly configured
  - OS, applications and data located on external storage – no quorum drive
- low total deployment cost vs. clustering
  - reduced software licensing costs*
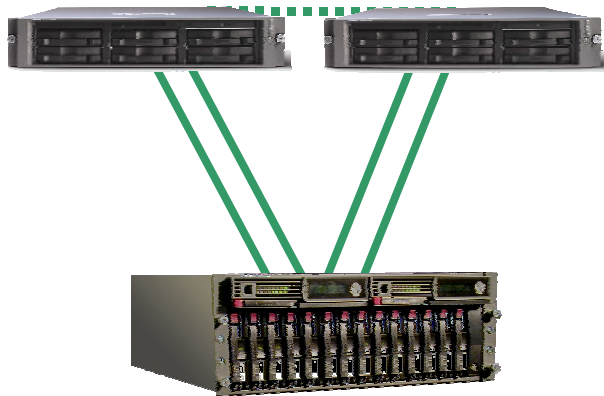 - runs on affordable Smart Array Cluster Storage, no additional HW required

| active | standby |
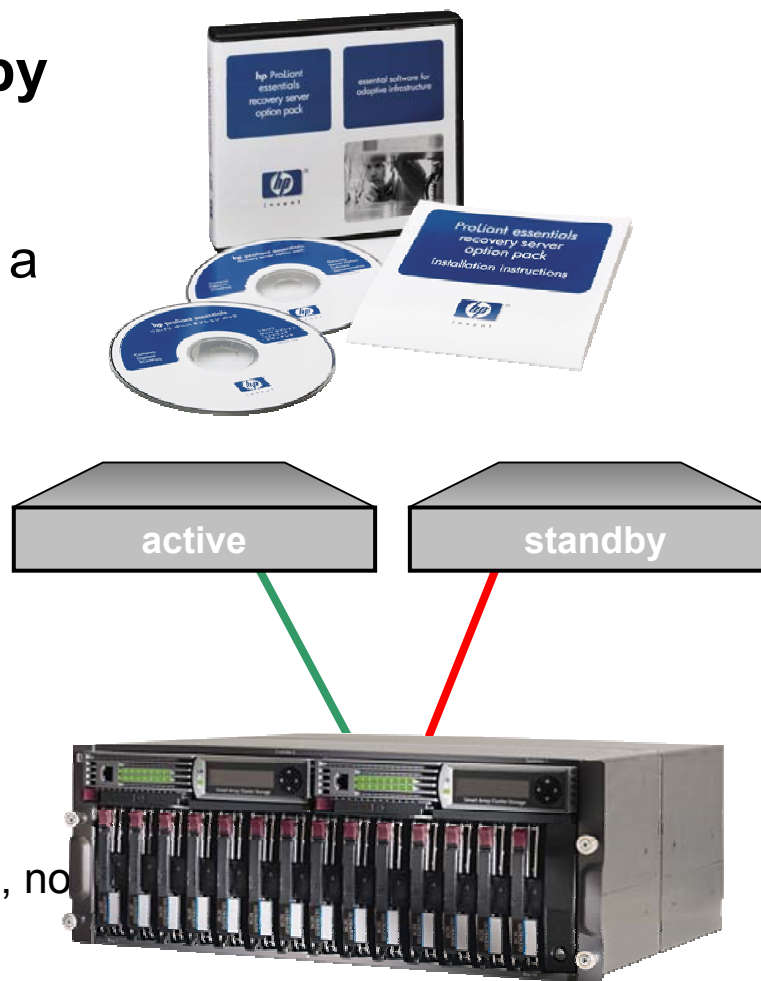
* Some Operating System licensing agreements may not allow for only one license, please consult your end user license agreement .
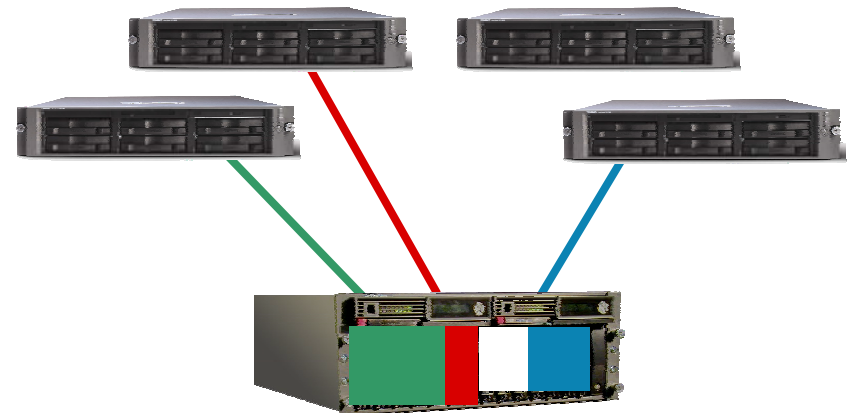
SACS Optional Enhanceme...

multipath clusters

direct attached
shared storage

improved availability and performance

Connectivity redundancy
Static load balancing

optional 4-port module

Flexible storage portioning
Maximize capacity utilization

Smart Array Demonstration

- Controller Failover – How fast was that?

- Advanced Data Guarding – HP exclusive

- Multipath IO – integrated in MS native MPIO functionality

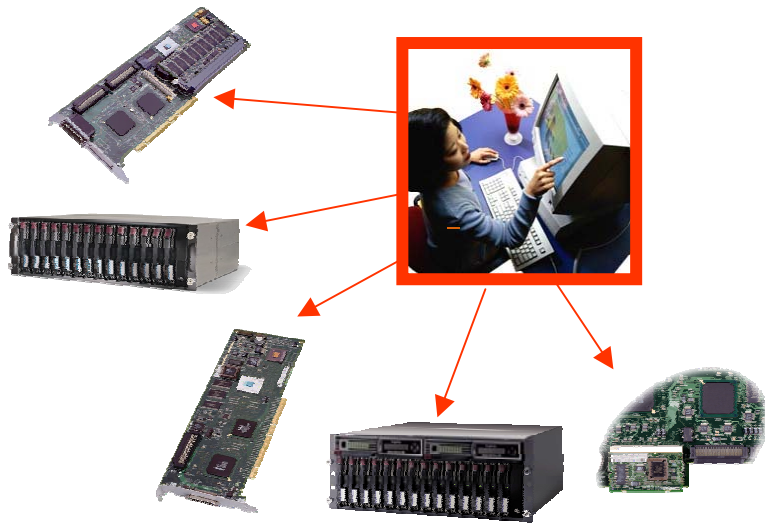- Microsoft Cluster Failover – continuous access

Consistent Management with Array Configuration Utility (ACU)

- Manage all Smart Arrays from one central location
- Consistent compatibility over 12 years allows for simple 3-step data migration
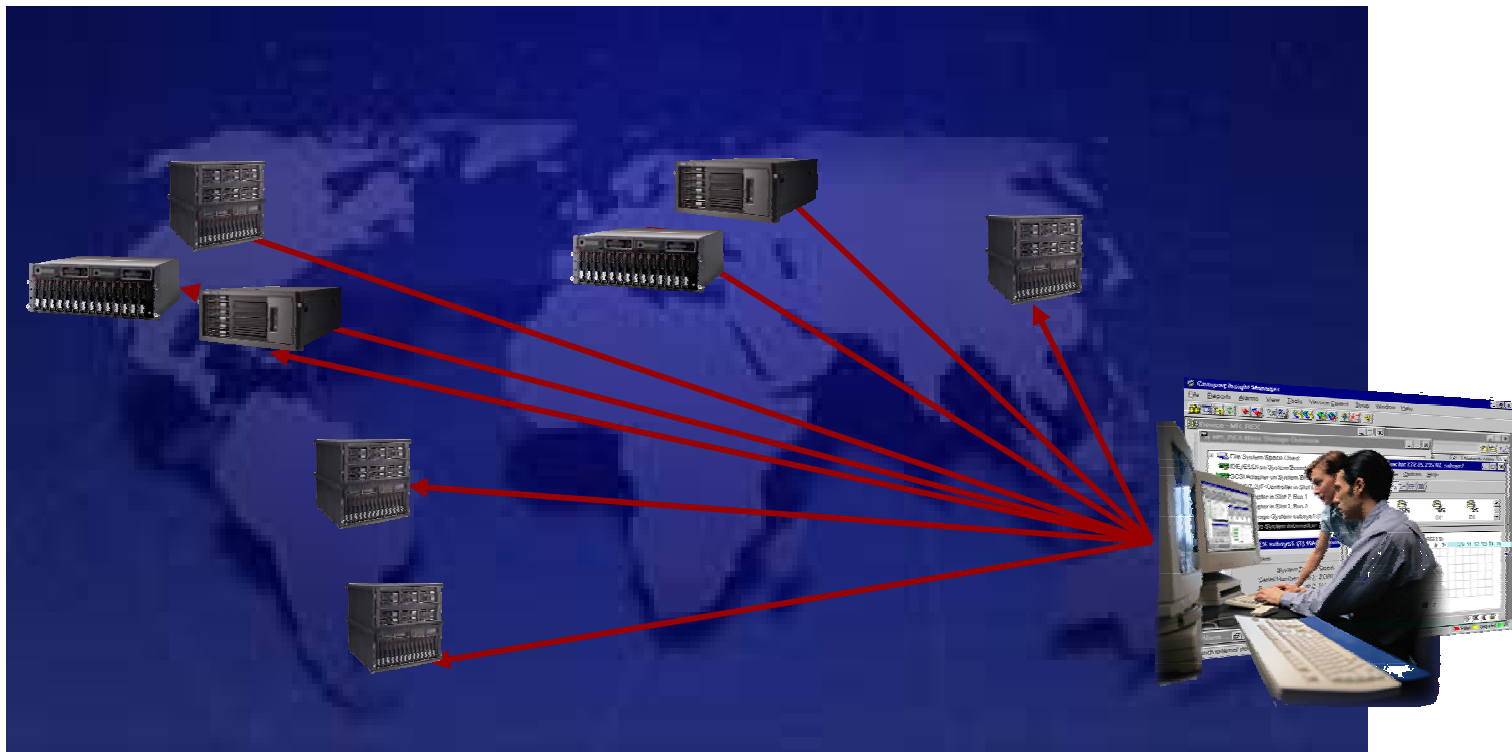
hp's consistency advantage

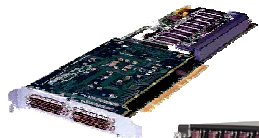– one array configuration utility for all Smart Array's

- new array configuration tool introduced for every new OEM product

  – pre 1995 DAC controller and Dell utility

  – 1995-96 Mylex controller with GAM utility

  – 1997-98 AMI controller with MegaManager

  – 1999-2001 Adaptec controller with F.A.S.T. utility

  – 2002 LSI controller with LSI utility

DtS seamless data migration
investment protection for ProLiant customers

Smart Array Cluster Storage
Remote & Distributed Environments

Smart Array plus

Enclosures
4200/4300

**seamless
data/drive migration**

**Conversion
to the SAN**

Smart Array plus
internal drives

RA 4100
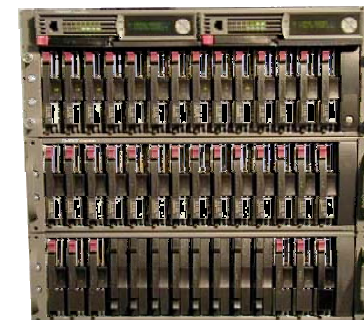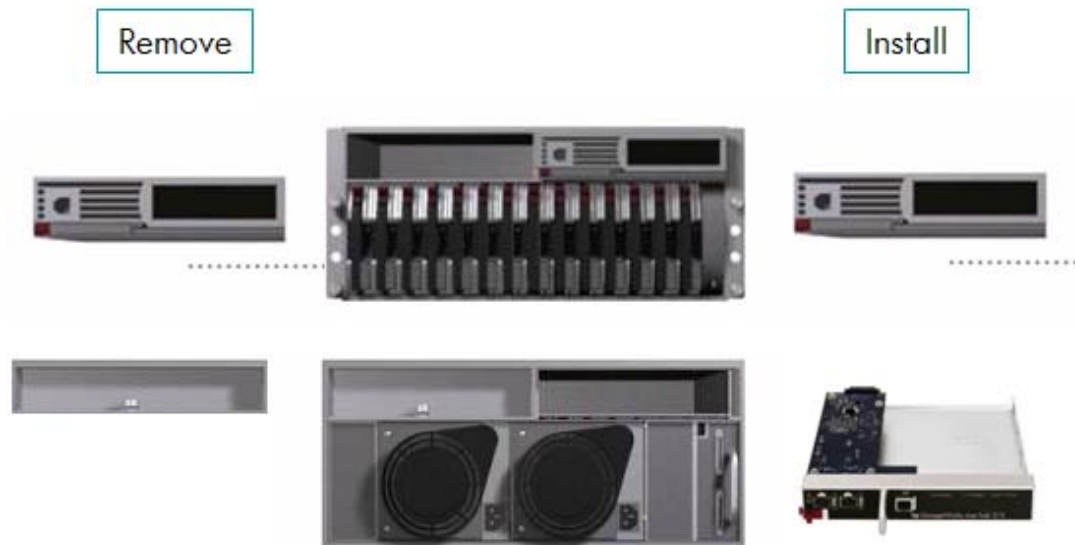
Modular SAN Array 1000
Departmental/Data Center

3 step to convert from DAS to SAN

- Remove Smart Array Cluster Controller(s) and replace with MSA1000 Controller(s)

- Remove blanking panel from rear of box and replace with MSA fabric switch 8

- Connect Fibre cables from switch to HBA's and power on

Modular SAN Array 1000

- Built upon Smart Array technology
- Storage consolidation
- High availability cluster support
- Low SAN price point
- Outstanding SAN performer

Drives	1-14 standard, up to 42
Capacity	2TB (14 x 146GB drives), up to 6TB
Dimensions	4U
Drive type	Ultra160 SCSI,
Host Connections	Redundant 2GB fibre channel
RAID support	0,1,5,10 & ADG
Redundant features	Controllers, IO & Switches, Power supplies and cooling fans

Data Protection – Remote Replication

Remote site

Smart
Array
Cluster

Remote site

Smart
Array
Cluster

Remote site

DSL, T3, T1

HP Open View Storage Mirroring

- Asynchronous data replication for disaster recovery
- Elimination of down time due to back up window
- Quick data restore
- Offsite repository

SAN

Modular SAN Array1000

- 2GB FC SAN Storage
- Hot-plug SCSI disk storage
- 2 TB/enclosure, up to 6TB/system
- $.012/MB*

* Dual Controllers included

Tape Auto Loader or Library

MSA1000

Compaq confidential

Consolidating Backup Operations

Remote site

Smart Array Cluster

Remote site

Smart Array Cluster

Remote site

DSL, T3, T1

ProLiant

Enhanced Data Protection

- Disk to Disk back up & 2 stage back up
- Minimize back up windows
- Quicker restores
- Remove media (tape) for off site storage
- Improved reliability

SATA Bulk Storage in 2004

- Single Smart Array Controller
- Hot-plug SATA enclosure
- $.005/MB solutions
- 3.6TB/enclosure
- Supported behind MSA1000

Tape Archival

SATA Storage Enclosure

Station Configuration

Each Station is equipped with:

2 servers running Windows 2003 Advanced Server (both are configured as Domain Controllers)

2 monitors

1 Smart Array Cluster Storage box with 6 drives

Software-Including Smart Start, Smart Array Multipath Software and MSA 1000 Support Cd's

KVM switches or Keyboard and Video Extender cables

Lab Procedures

Lab is divided into 4 sections

Self Paced

2-3 persons per station

Section 1

- Driver and Application Installation

  – Use Smart Start to install all array drivers and ACU utility

  – Use Smart Array Multipath CD to update array drivers and install Multipath utility

    • Configures internal 5i and 532 controllers to offer redundant paths to the storage box on each server

Section 2

- HP Smart Array Cluster Array Configuration

  – This section will:

    - prepare all arrays for Section 3 (Clustering)

    - Allow the user to become familiar with the Multipath software and configure static load balancing

Section 3

- Microsoft Cluster Installation

  – This section will provide a brief introduction to MS
    Clustering and allow for the tuning of a generic
    application to fail over in the Cluster

  – It will also show how the redundant features of the
    storage box and the cluster complement each other

Section 4

- DAS to SAN Conversion

- This section will cover the process of converting a SA Cluster Storage to an MSA 1000

  - Install I/O Module and MSA 1000 Controller in Storage Box

  - Install HBA in Server

  - Connect cabling

  - Install Drivers

Reset

- These servers will be reset after each classroom so feel free to play with any features of the OS or Storage you like.

- Please make sure to reset the hardware to its original state including:

    - Removing Fibre Channel HBA from the server

    - Replace MSA Cluster Controller with the SA Cluster Controllers

    - Delete all arrays created on the storage box.

- Thanks and Have Fun!

# departmental clustering demands

- **challenge**
  - branch offices with no onsite IT support
  - critical to be up when business is open
  - cost a primary issue

- **solution**
  - packaged cluster
  - price competitive
  - integrated solution

WELLS FARGO

Example: Wells Fargo

Division of Wells Fargo responsible for automotive financing has offices across the U.S. that have to be able to provide customer service 24 hours a day.

"Wells Fargo's Auto Finance and Sales business unit depends on Compaq to help our customers make auto ownership fast and easy through convenient online financing, sales and insurance options. The *ProLiant* DL380 G2 Packaged Cluster is an essential tool in making sure our critical on-line applications are constantly available so customers can submit loans and leases 24 hours a day."

*Rowdy Van Cleave,
Wells Fargo*
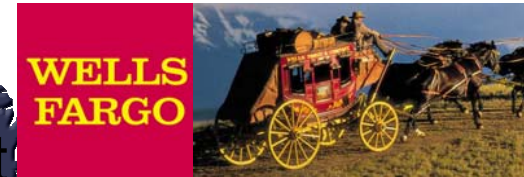
Advanced Data Guarding RAID
improves deployment cost, fault tolerance, density

- greater fault tolerance than RAID 1, 10, 5, 50

- lower implementation cost than RAID 1, 10, 50

- ideal for:
    - large capacity drives
    - business critical data
    - large RAID volumes
   - remote server installations
    - dense storage deployments

Can tolerate 2 simultaneous drive failures
No down time , No data loss

Drive Rebuild Time (Medium prioritization with background activity, up to 3X longer with high IO background activity)

| Time/Hours	2	4	6	8	10	12	14	16
Capacity/GBs	18	36	54	72	90	108	126	145
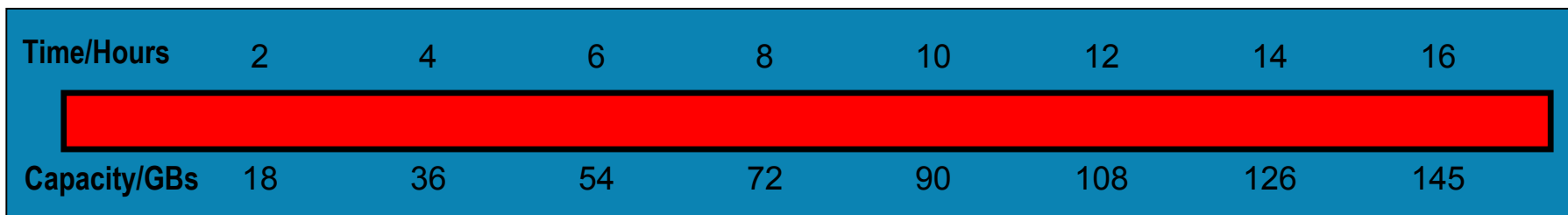
why Smart Array 5i/532 as the HBA?

- zero cost connectivity – no extra HBA cost

- no host utility for SA-Cluster Controller failover
  - failover utility embedded in the 5i/532
  - reduced server CPU burden
  - improved controller failover performance

SA-532

Integrated Smart Array 5i
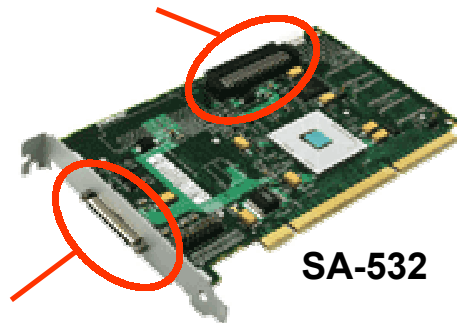
Windows 2003 Ready Cluster Storage

- **Simple, affordable, fault tolerant Smart Array Cluster technology**

- Ideal for remote office & distributed computing

- Clustering & shared DAS

- Remote management & configuration (ACU, IM7, iLO/RiLOE)

- Minimal/low cost infrastructure

- SCSI to FC SAN conversion

- Windows Server 2003 integration:
  - 2-node Clustering
  - Load balancing Multi-path I/O using Windows native Multi-path support
  - *Future* HW Snapshot functionality plug in to Volume Shadow Copy/Restore functionality
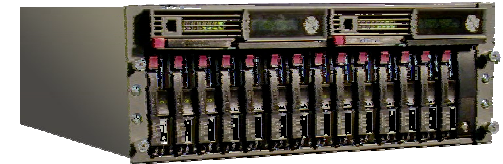
Smart Array Cluster Storage –
Up to 2TB of high availability storage.

DL380 Packaged Cluster –
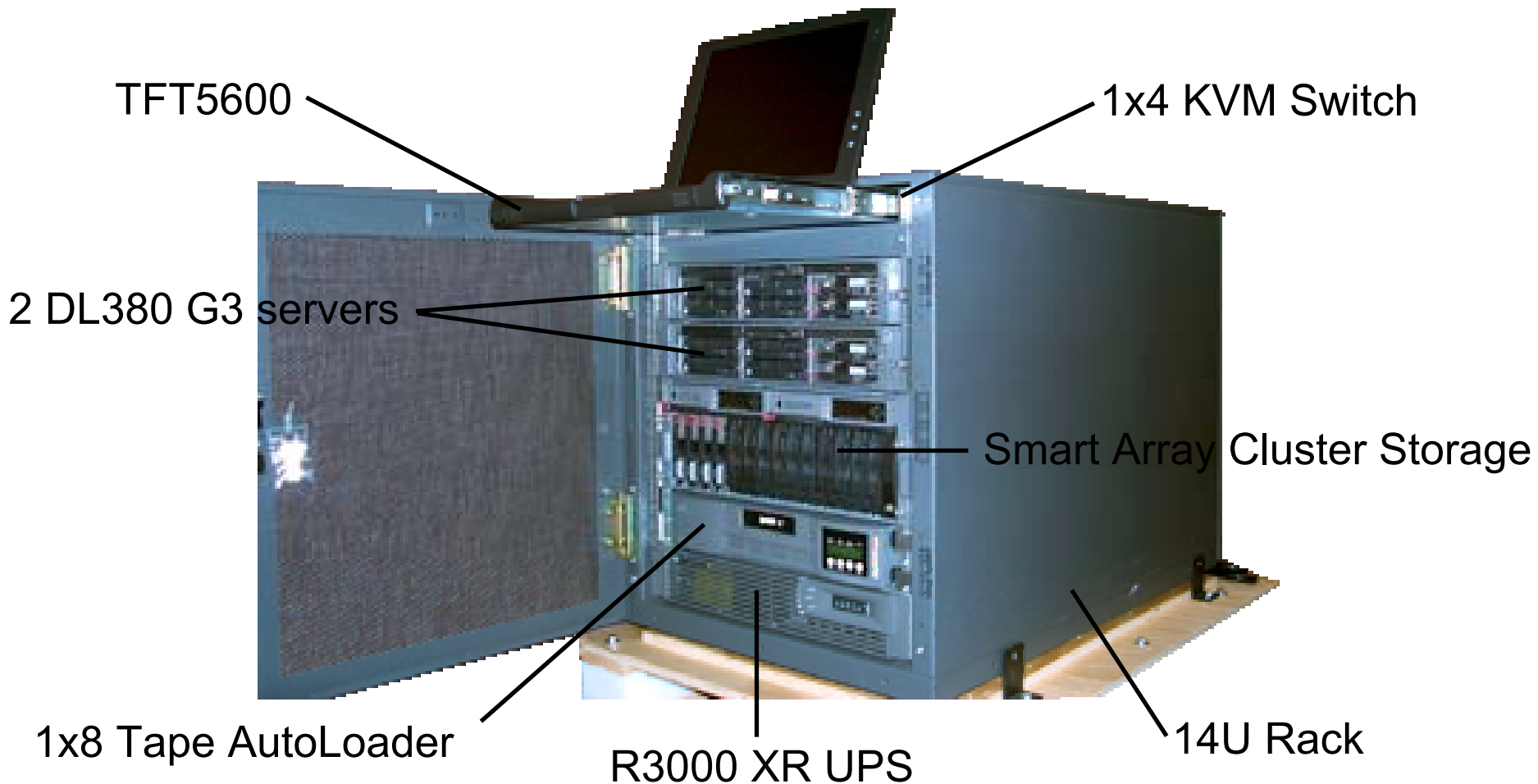Pre-packaged server and storage
clustering solutions

Serial-ATA Reference Storage – 2H'04

Low-cost, high capacity, external storage ideal for bulk reference data, archival, and disk-to-disk backup

U320 SCSI

Drives	1-12
Capacity	3TB (Twelve 250GB drives)
Dimensions	2U
Drive type	Serial-ATA
Host Connections	1 - U320 SCSI
RAID support	0,1,5,10 & ADG
Redundant features	Power supplies and cooling fans (both hot pluggable)

Complete Remote Office/Small Office   High Availability Solution

TFT5600

1x4 KVM Switch

2 DL380 G3 servers

Smart Array Cluster Storage

1x8 Tape AutoLoader

R3000 XR UPS

14U Rack

Preconfigured Solution - Local & Remote Management

Interex, Encompass and HP bring you a powerful new HP World.