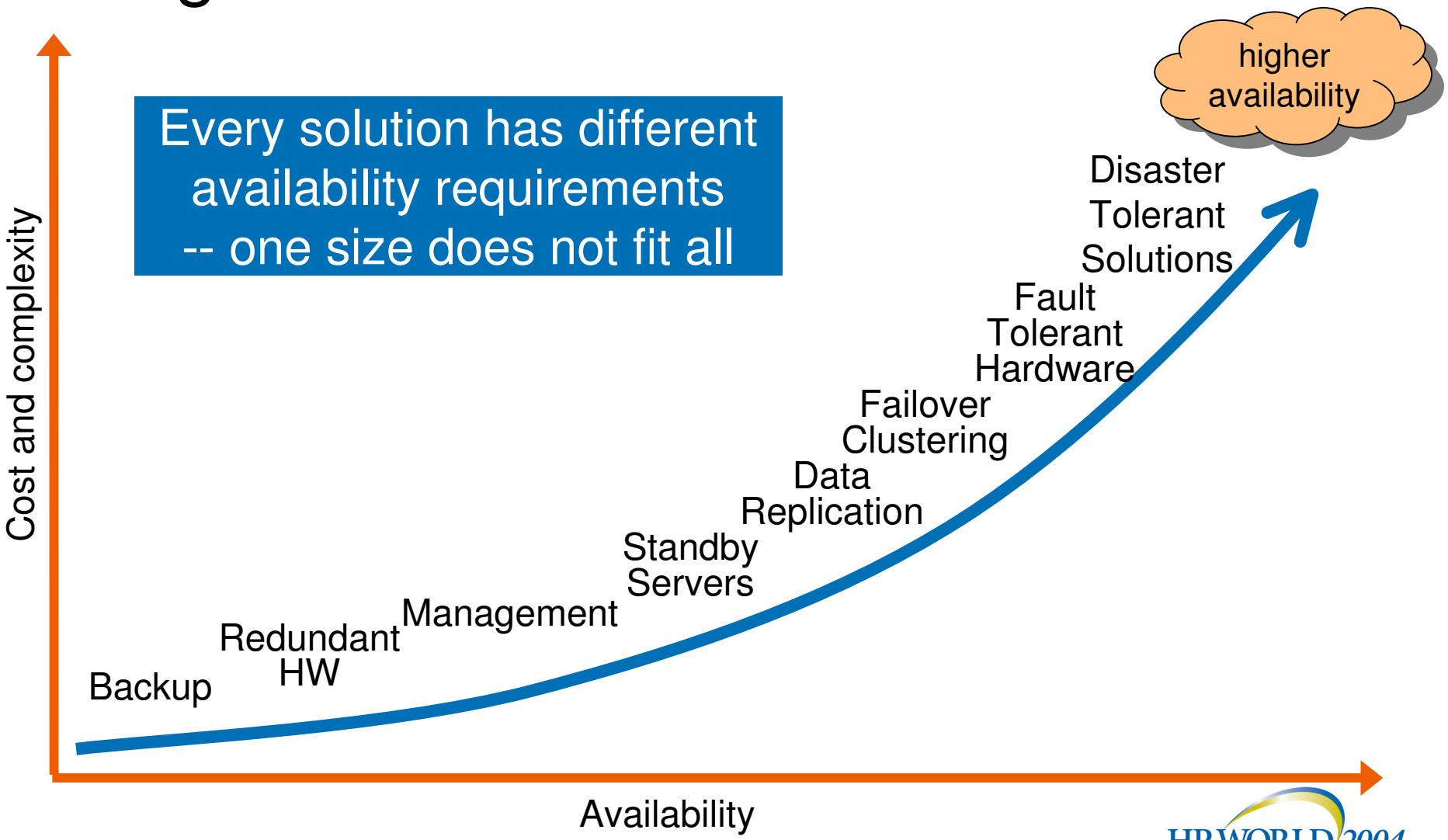
ProLiant Clusters – Product Line Overview

Doug de Werd
HA Technical Marketing Manager
Industry Standard Servers

Availability is about Reducing Business Risk

- Driving factors for High Availability
  - Increased demands on IT departments to meet end-user service level agreements
  - Unexpected outages that adversely effect customer satisfaction
  - Changing business models that demand 24x7 availability regardless of the industry
  - Stricter governmental rules and regulations
- The goal to establish a stable IT environment that helps ensure a company's critical business processes are available to meet the needs of the business

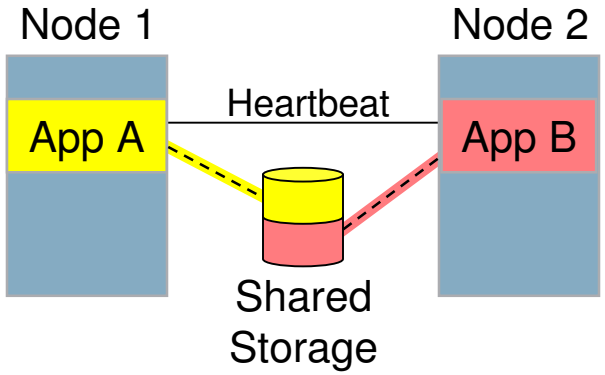
Range of HA Solutions



How Do Failover Clusters Work?

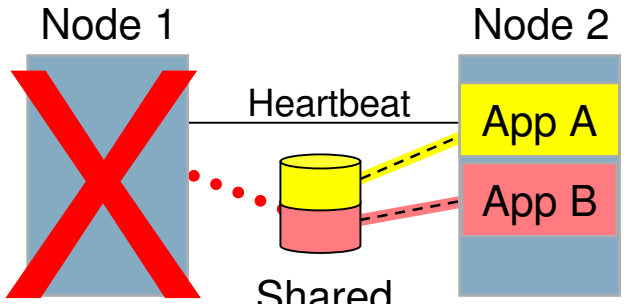
- Applications run on separate servers
- Disk subsystem (SCSI or fibre channel) is connected to all servers, but each server "owns" its own disks
- Cluster software monitors server hardware and applications and detects faults and errors

Normal Operation

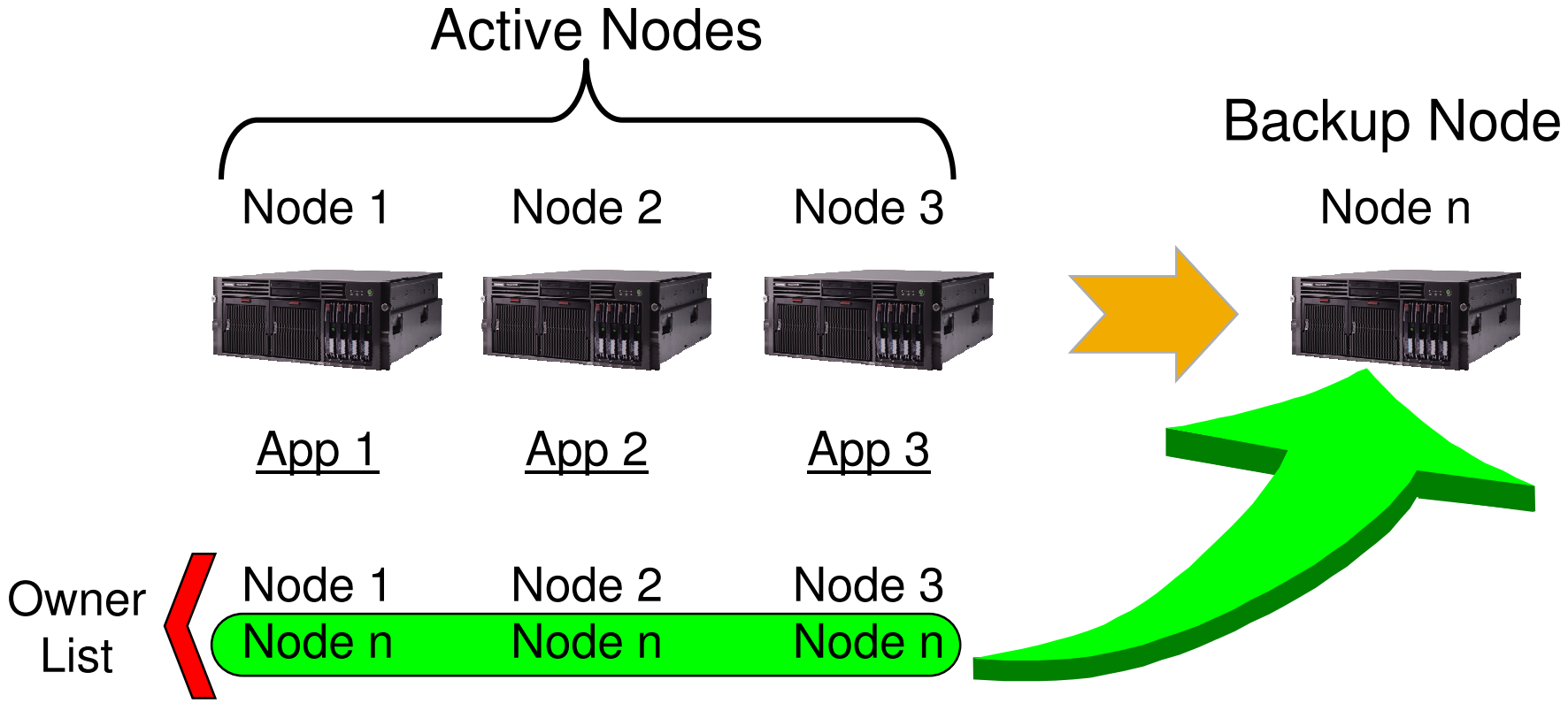


- In the event of a failure, applications will automatically restart on the other server without administrator intervention
- Clients will automatically reconnect to the new server with minimal or no user downtime
- Protects against server/HW and software/OS failures

After Failover



Multi-Node Failover Model (n+1)

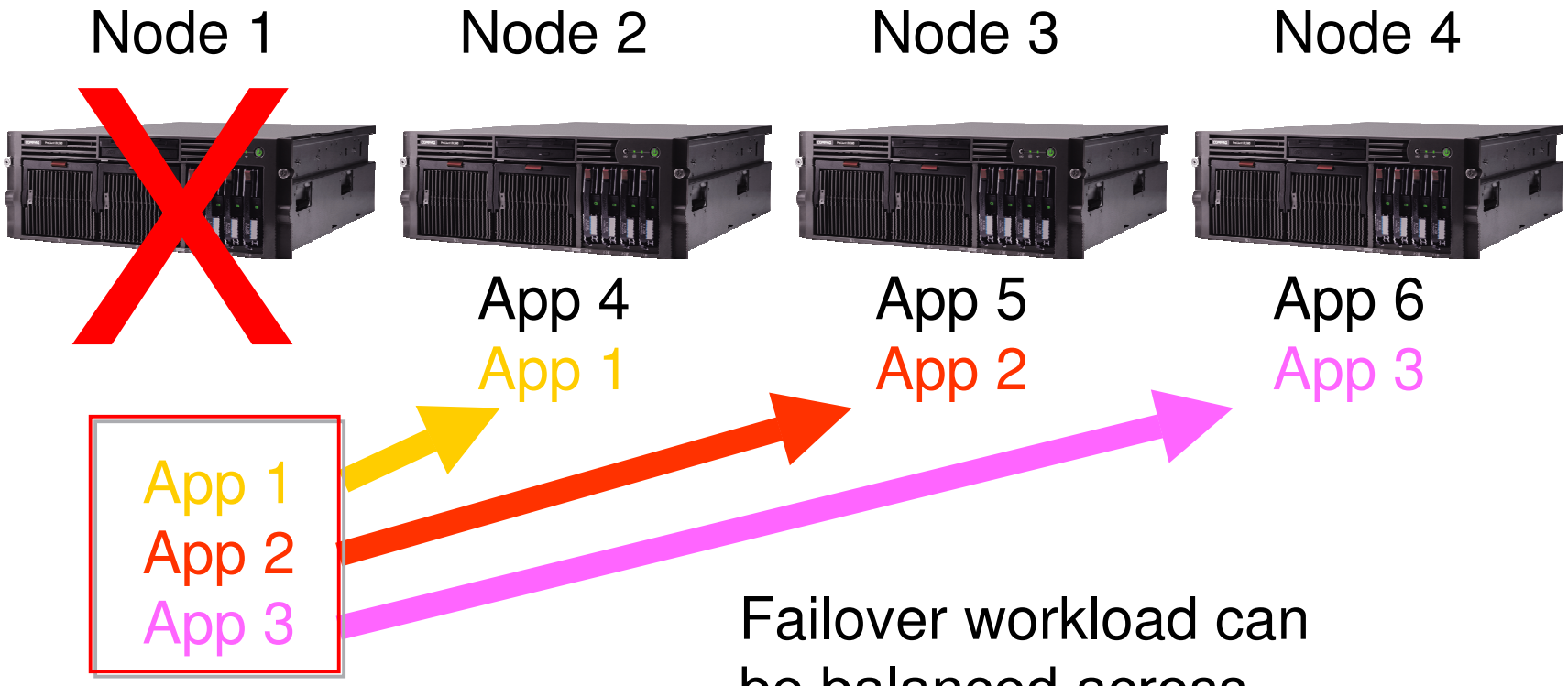


- One server acts as hot standby for all others
  - Maintains performance levels after failover
  - Share one standby spare with multiple active nodes
    - No longer a 1:1 ratio for active/standby

Multi-Node Clusters
Load Distribution Before Failover

Node 1	Node 2	Node 3	Node 4
			
App 1 App 2 App 3	App 4	App 5	App 6

Multi-Node Clusters
Load Distribution After Failover



Failover Cluster Benefits

- Availability - automated switchover after software or hardware failure
  - Typical failover time is 2 – 5 minutes
  - Reduces time to reinstate services
  - Minimal or no user downtime
    - No user reconfiguration required after failover
    - Repairs can be done offline without disrupting service
- Planned maintenance upgrades with minimized downtime
- Multi-node clusters can share standby server (n+1)

ProLiant Clusters Full Range Offering

Cost-effective HA for the volume enterprise

How much availability do you need?

Enterprise Clusters

Plugged into the data center fabric to maximize scalability and availability

(EVA, XP)

Infrastructure Clusters

Flexible and scalable entry-level fibre channel cluster powered by full range of ProLiant servers and Modular Smart Arrays

(MSA1000, VA)

Departmental Clusters

Simple and affordable, powered by ProLiant servers and Smart Array technology

(MSA500)

Availability

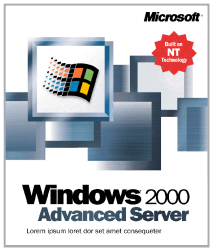
Scalability/Performance

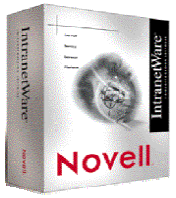
Choose your:

- ✓Storage System
- ✓ProLiant Servers
- ✓Operating System

ProLiant Clusters - Overview

- **Server and Storage Platforms**
  - ProLiant Servers
    - ProLiant DL, ML, and BL Servers (2-8 CPUs per server)
  - StorageWorks Storage
    - Modular Smart Array (MSA) 500 (SCSI)
    - Modular Smart Array (MSA) 1000 (FC)
    - Enterprise Virtual Array (EVA) 3000/5000 (FC)
    - Virtual Array (VA) and XP storage
- **Clustered Operating Environments**
  - Microsoft Cluster Services (Windows 2000/2003)
  - Linux (Red Hat, SuSE)
    - HP Serviceguard for Linux
    - LifeKeeper for Linux
  - Oracle 9i/10g RAC (Windows and Linux)
  - Novell Cluster Service
- **Most Common Applications Supported**
  - Messaging and Collaboration (Exchange, SendMail, Domino, GroupWise)
  - Database (SQL Server, Oracle)
  - File and Print
  - ERP/CRM apps (SAP, PeopleSoft, JD Edwards, Siebel)





ProLiant DL380 Packaged Cluster

- Two ProLiant DL380 G3/G4 servers (cluster nodes)
- MSA500 (SCSI) or MSA100 Storage (fibre)
- Sturdy, recyclable configuration fixtures
- Easy to connect SCSI and fibre cables
- Easy to order, single part number, single box
- Other ProLiant servers supported, but not "Packaged"
  - Buy servers and storage separately

2 ProLiant DL380
G3 or G4 Servers

MSA500 or
MSA1000 Storage

Package
d Cluster

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MSA 500 Storage (G1)

Familiar, Affordable Direct Attached or Shared Storage

Zero Cost Connectivity

- Attaches to embedded Smart Array 5i Controller
- Everything included: cables, documentation

Easy to Deploy

- Familiar direct attached setup
- ACU (Array Configuration Utility)
- ProLiant Rapid Deployment Pack
- Managed from Insight Manager

High Performance

- Ultra160 Smart Array Controllers
- Up to 512MB battery backed cache
- Up to 14 drives per cabinet

High Availability

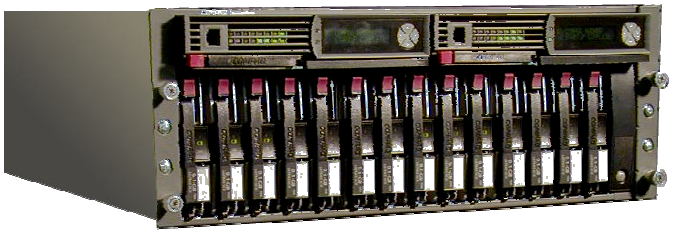
- Redundant controller capability
- Redundant power supplies and fans
- Advanced Data Guarding ~ 2 simultaneous drive failures
- Microsoft, Linux, and Novell Clustering
- Pre-failure warranty

Other Cluster Configurations

- Packaged Cluster only with ProLiant DL380 servers
- “Build your own” clusters with other ProLiant servers

Conversion Path to Fibre Channel SAN (MSA1000)

Modular Smart Array 500 G2



What's NEW!

- **4-node clustering support**
- **2x Performance Increase**
- **5x Drive Rebuild Acceleration**
- **Ultra320 SCSI**
- **256MB Cache Standard**

Easy to deploy

- Familiar Smart Array setup
- ACU (Array Configuration Utility)
- Packaged Cluster Option

High performance

- Multipath I/O - load balancing
- Ultra320 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 (RAID ADG)
- Pre-failure warranty

Zero cost connectivity

- Everything included: SA-642 adapters, cables, documentation

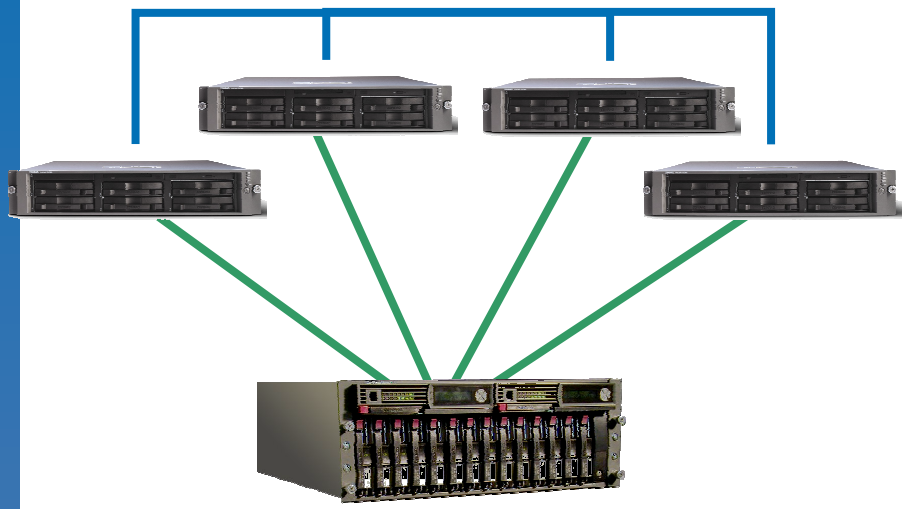
DL380 G4 Packaged Cluster

Simple & affordable packaged cluster powered by ProLiant server & Smart Array technology. Our packaged cluster offers high performance, industry leading manageability and uptime in an 8U footprint

- What's New?
- ProLiant DL380 G4 Servers
  - Intel® Xeon™ processors with X86 Extensions
  - 3.4 GHz processors w/1MB of L2 Cache (Nocona)
  - 400MHz DDR-II Memory, 6 sockets, 12GB Max
  - Ultra 320 Smart Array 6i w/transportable BBWC (128MB) option
- MSA500 G2 Storage
  - 2x Performance Increase
  - 5x Drive Rebuild Acceleration
  - 256 MB cache standard in storage controller
  - Ultra320 SCSI
- Packaged Cluster with DL380 G4 and MSA1000 available in October 04

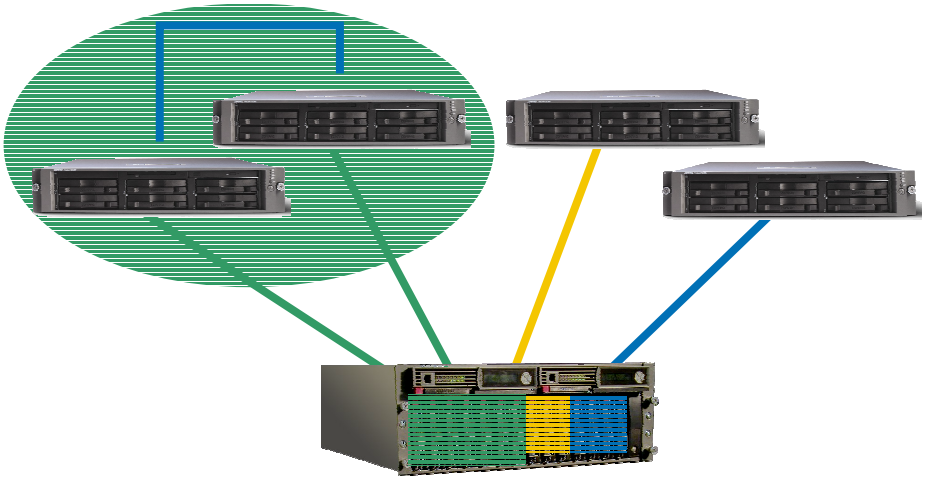
New Supported Configurations

4-Node Cluster



- Single path
- Microsoft Windows Server 2003, Enterprise Edition, HP ServiceGuard for Linux, Steeleye Lifekeeper for Linux

Mixed Clustering & Shared Storage



- Up to 4 hosts
- Selective Storage Presentation (SSP)
- Supports up to 32 LUNs

Infrastructure Clusters (MSA 1000)

- Broad range of ProLiant Servers
- MSA1000 Storage
  - Entry level SAN
  - Multiple servers/multiple clusters can share one MSA1000
  - MSA1500 support in Sept 04
- Dual storage path capability via SecurePath
- Supports:
  - Windows NT, Windows 2000/2003
  - Oracle 9i/10g RAC (Windows and Linux)
  - Novell
  - Linux
- Also available in Packaged Cluster configuration with ProLiant DL380 servers

ProLiant Servers

Fibre Channel Switches

MSA1000 Storage

Packaged Cluster with MSA1000

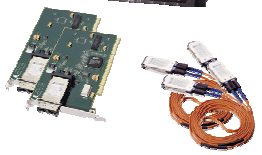
MSA 1000 High Availability Features

- 4U rack mount base unit plus two additional 3U expansion trays optionally – 42 drives total
  - 144 GB drives qualified
- Integrated Ultra3 Smart Array controller(s)
  - Optional Redundant Controller (mirrored cache) with front access hot replacement (used with dual path option)
  - Array Configuration Utility consistent with Smart Controllers
  - Battery backed 256 MB cache, 512 MB optional
- 2 Gb fibre speed
- Hot plug, redundant power supplies and fans standard
- Optional integrated 8-port switch

MSA1500 Storage

- Separate 2u controller shelf
  - Supports redundant RAID controllers
  - Hot plug, redundant power supplies and fans standard
- Flexibility to support either SCSI or SATA drives
  - 56 SCSI drives via MSA30
    - 8 TB with 146 GB drives
  - 96 SATA drives via MSA20
    - 24 TB with 250 GB drives
  - Mixed SCSI/SATA configurations supported later this year
- Connectivity for up to 16 servers via fibre channel
- Clusters based on MSA1500 will be available in September

ProLiant Servers



Fibre Channel Switches

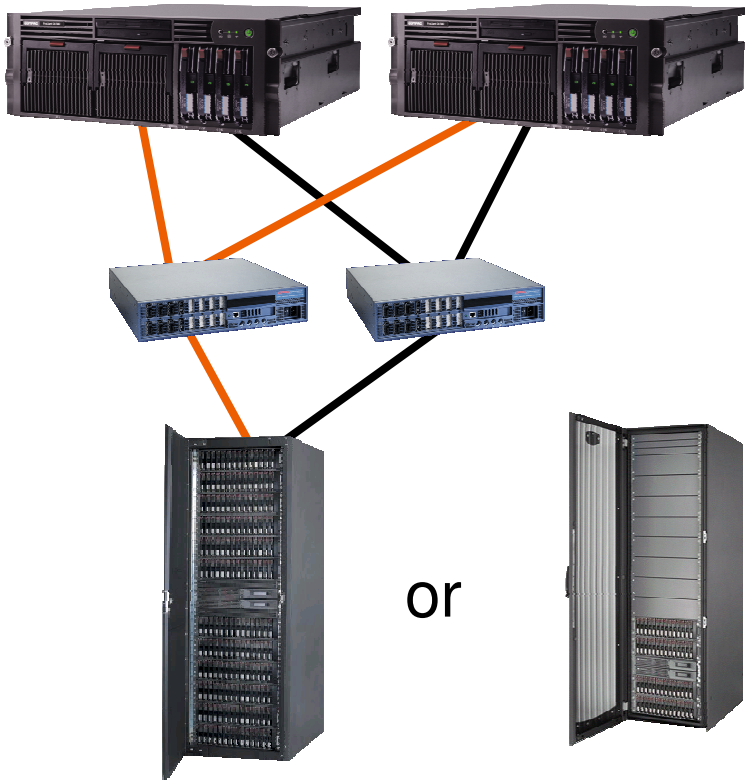
MSA1500 Controller Shelf

OR

MSA20
- Up to 8 cabinets
- 12 SATA drives per MSA20

MSA30
- Up to 4 cabinets
- 14 SCSI drives per MSA30

Enterprise Clusters (EVA)



- Wide range of ProLiant Servers
- Fibre Channel SAN
  - Enterprise level SAN
  - Up to 35 TB per storage box
  - Multiple servers/multiple clusters can share one EVA
- Enterprise Virtual Array (EVA)
  - Flexible and scalable Virtual RAID
  - EVA 5000 – up to 240 drives
  - EVA 3000 – up to 56 drives
  - Managed by HP SAN Management Appliance
- Supports dual path HBAs
- Clusters supported:
  - Microsoft, Linux, Oracle, Novell
  - Also Serviceguard for HP-UX, TruClusters, OpenVMS, Solaris

ProLiant BL Failover Cluster Support

BL10e

- Load balanced web servers
- Utility apps *(firewall, gateway)*
- Computational cluster node

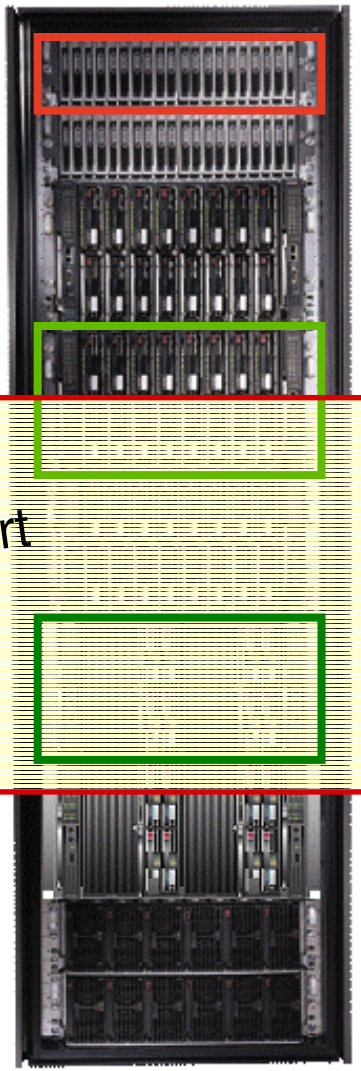
BL20p
BL20p G2

- Mid-tier application servers
- Computational cluster node
- Failover clusters
- Dynamic web / ASP hosting
- Terminal server farm

Cluster Support

BL40p

- Enterprise applications
- Failover clusters
- Fibre SAN attach



Infrastructure Clusters

MSA1000

Enterprise Clusters

EVA5000

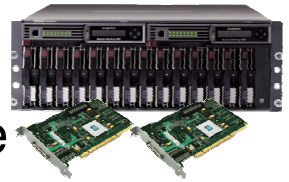
EVA3000

MSA500 and MSA1000 Packaging Options

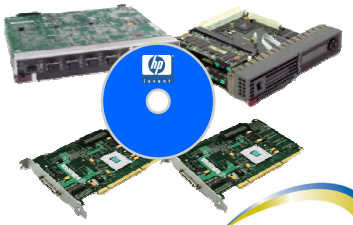
- Packaged (MSA500 or MSA1000)
  - Easily re-deployable in configuration fixture
  - 2 ProLiant DL380 servers + storage + configuration fixture

- Racked Integrated Solution (MSA500 only)
  - Total solution including small rack
  - 2 ProLiant DL38 servers + storage + rack (14U)

- Starter Kit (MSA500 or MSA1000)
  - Enables existing servers to connect to external storage
  - Storage + HBAs + cables (single path)



- HA Kit (MSA500 or MSA1000)
  - Upgrades single storage path to dual path
  - Redundant storage controller + HBAs + cables + multi-path software (dual path)



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Cluster Kits for Microsoft

- ProLiant Cluster Starter Kit
  - Cluster How-to Guide, multi-media animation, and documentation
  - Single path support for StorageWorks MSA1000/RA4100, EVA5000/3000, MA8000
  - Includes two 60 day trial licenses of OVSM (Note: This Kit does not include SecurePath Software)
- ProLiant Cluster HA/F200 for the Entry Level SAN
  - Dual path support for StorageWorks MSA1000/RA4100
  - Includes SecurePath software for dual path
- ProLiant Cluster HA/F500 for the Enterprise SAN
  - Dual path support for StorageWorks EVA5000/EVA3000/MA8000
  - Includes SecurePath software for dual path
- ProLiant Cluster with Open View Storage Mirroring
  - OVSM provides replication capabilities to make one or more copies of the cluster data
  - Replication can take place between a cluster and standalone configuration or between two clusters

HP Parallel Database Clusters (PDC) for Oracle RAC

PDC for **Windows**	DL380	DL560	DL850	DL740	DL760	*rx2600*	*rx4640*
EVA3000 / 5000 FC PDC/O5000-EVA Kit	Y	Y	Y	Y	Y	*Y*	*Y*
MSA1000 FC PDC/O2000-MSA Kit	Y	Y	Y	Y	Y	*Y*	*Y*
DL380 G3 Packaged Cluster MSA500 *tbd Cluster Kit*	*Y*	na	na	na	na	na	na

PDC for **Red Hat**	DL380	DL560	DL850	DL740	DL760	*rx2600*	*rx4640*
EVA3000 / 5000 FC PDC Linux RAC Kit	Y	Y	Y	Y	Y	*Y*	*Y*
MSA1000 FC PDC Linux RAC Kit	Y	Y	Y	Y	Y	*Y*	*Y*
DL380 G3 Packaged Cluster MSA500 PDC Linux RAC Kit	Y	na	na	na	na	na	na

PDC Implementation options

‘do-it-yourself’
PDC cluster kit options

- range of supported servers, 2, 4, and 6 way
- 2 to 8 nodes supported
- MSA1000 storage in full SAN configurations
- available on Windows and Linux
- available direct from HP or through HP resellers

‘pre-installed’
PDC ready to run solutions

- fully pre-installed HW & SW
  - 2 to 6 ProLiants
  - MSA1000 FC storage
  - EVA 5000 / 3000 FC
  - OS and Oracle
- offered via select integration partners or HP Consulting

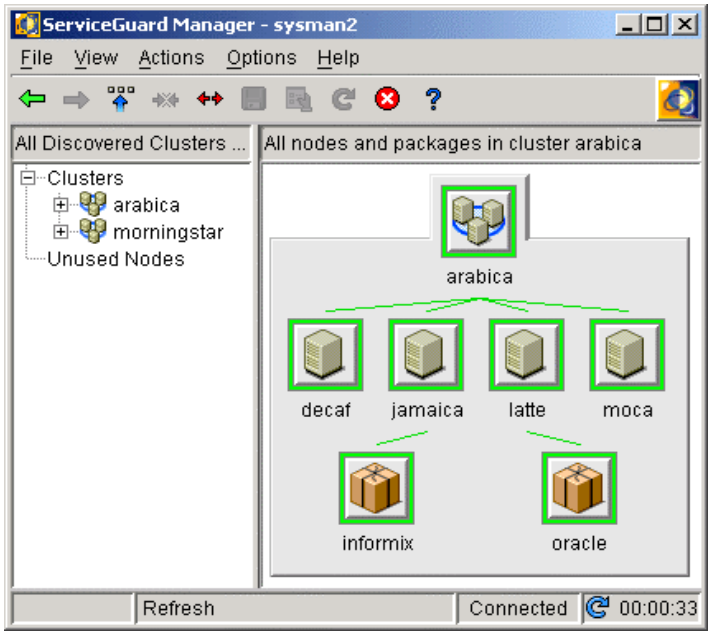
custom solutions from HP global service

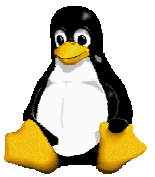
for other RAC options and solutions contact HP service
- ProLiant with EMC RAC
- PDC with PolyServe
- etc.

Parallel Database Clusters

HP Serviceguard for Linux

- HP Serviceguard for Linux - HP developed Linux clustering software
  - Supports Red Hat AS 2.1, Red Hat EL 3, SuSE SLES 8
  - Supports wide variety of ProLiant and Integrity servers (2-16 nodes)
  - Storage supported: MSA500, MSA1000, EVA, VA, XP
- Solution portfolio
  - Provide free toolkits for leading Linux applications
  - Serviceguard for Linux Oracle toolkit
  - Serviceguard Extension for SAP for Linux
  - Disaster tolerance with Cluster Extension





redhat

SuSE

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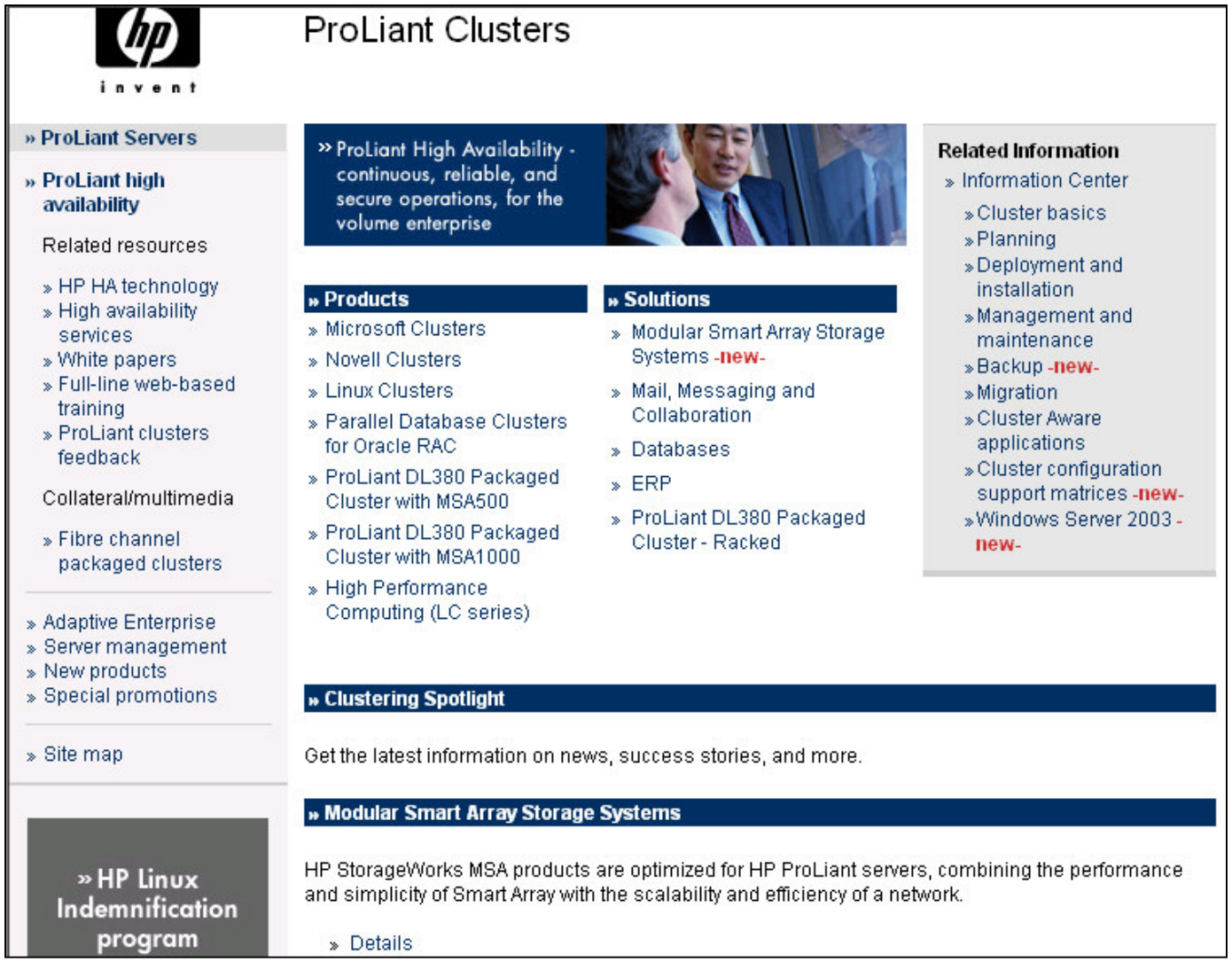
ProLiant Clusters – Management Tools

- Deployment via SmartStart or Rapid Deployment Pack
  - Scripts for Blades and Packaged Cluster, MSA1000 and EVA
- Monitoring and alerting through Insight Manager 7 and Systems Insight Manager
  - Cluster Monitor
  - Management Agents
  - Version Control
- Remote Administration via Remote Insight Lights Out
- Performance Management
  - Workload Management Pack (Resource Partitioning Manager)
    - Availability through memory containment and failover “Landing Zones” for CPU and Memory usage
  - ProLiant Performance Analyzer

ProLiant Cluster Web Site

www.hp.com/servers/proliant/highavailability



Summary

- Breadth and depth of offerings
  - Choice of servers, storage, and OS
- Packaged Clusters and Starter Kits
  - Simplified ordering and delivery
- Multi-Cluster Support
  - Storage sharing reduces overall costs
- Blade Cluster Support
  - Innovative support for leading edge technologies
- Management Tool Integration
  - Management tools provide additional elements of availability

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