Storage Area Network (SAN) Training Presentation

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IBM PC CLUB

Jose Medeiros
Storage Systems Engineer

MCP+I, MCSE, NT4 MCT

Agenda

- Training Objectives
- Basic SAN information – Terminology
- SAN Infrastructure Overview
- Live Demo of SAN

Training Objectives

- Why do we need a SAN?
- Clear understanding of the basics of SAN design
- Basic understanding of a SAN infrastructure and design
- Live Demonstration

Basic SAN Terminology

Objective:

Each of you will be familiar with the building blocks of Fiber Based SAN.

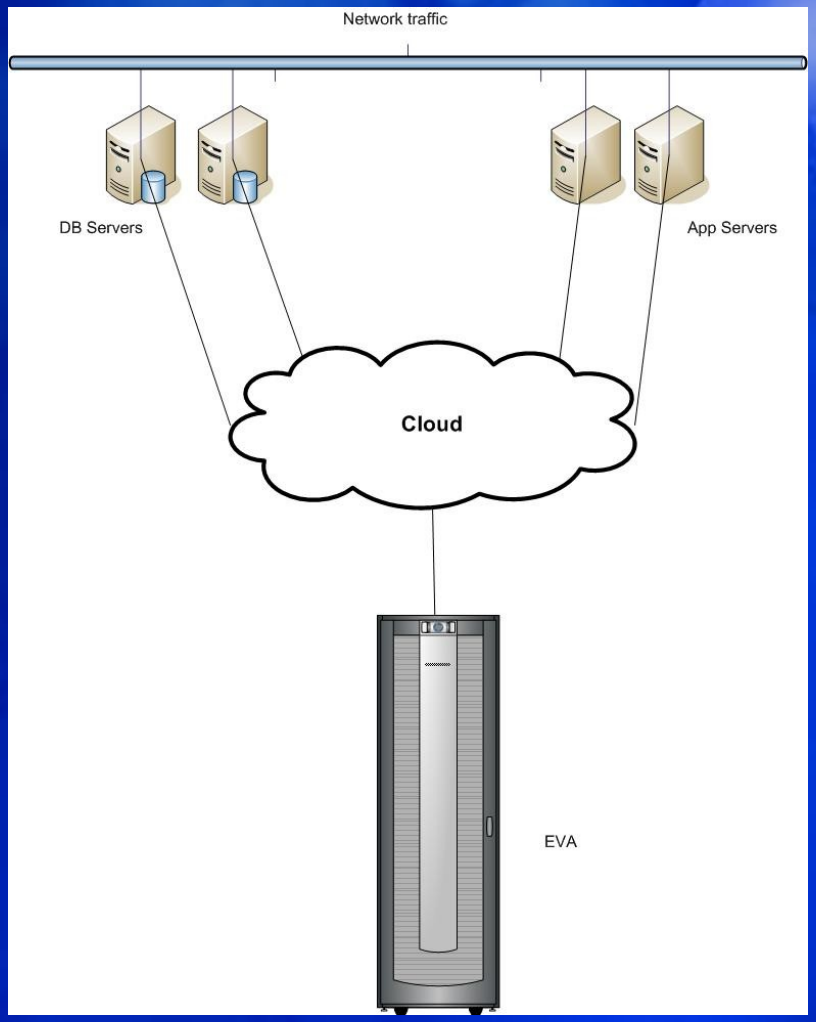
Why do I need a SAN?

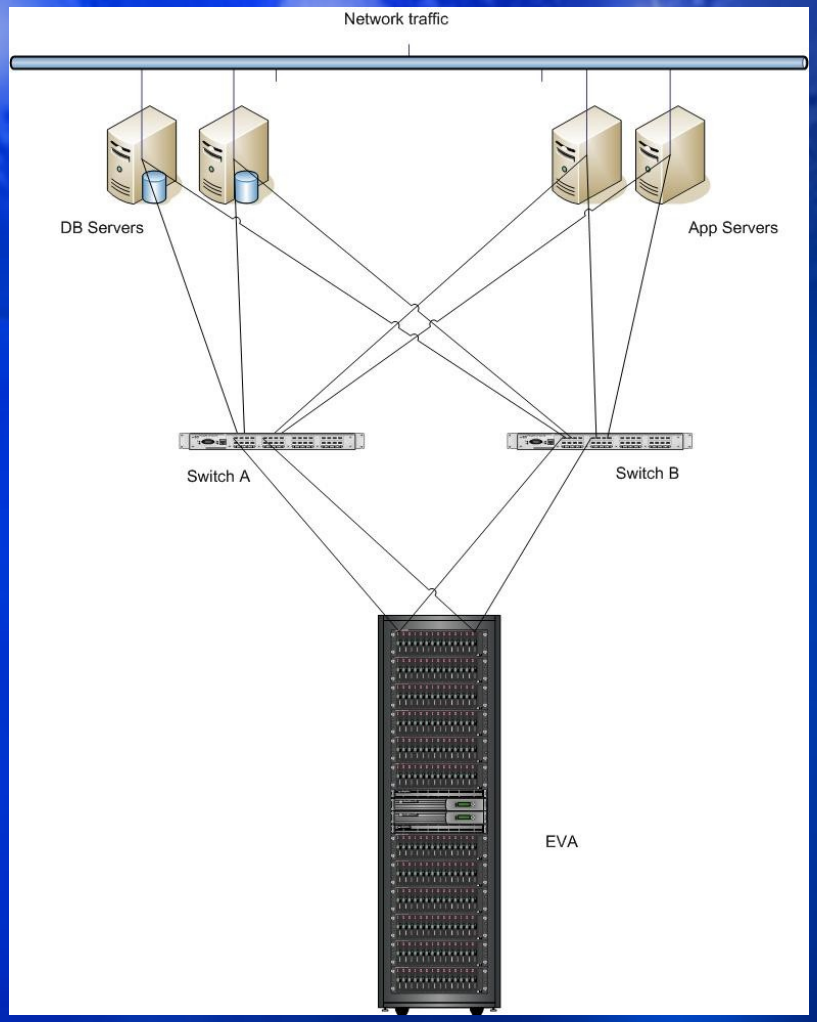
- What is Clustering?

Basic SAN Terminology

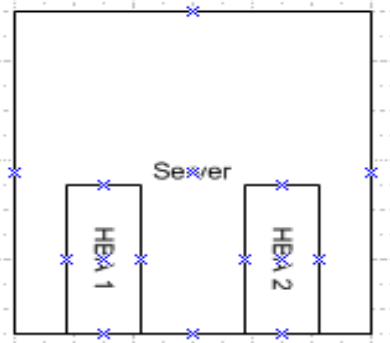
- How does a Cluster attach to a SAN?
- DAS SCSI, Fiber SAN, ISCSI SAN
- Fiber Networks, FDDI 100MB
- Fiber Connector Types GBIC 1GB, SFP 2GB &4GB LC
- Fiber Channel Switch & Fiber Channel HBA (Host Bus Adapter)
- ISCSI can also be used. Recommend a dedicated 1GB network switch with MS Exchange or MS SQL and a ISCSI HBA on the Target and ISCSI Initiator Client Node.

Basics of SANs





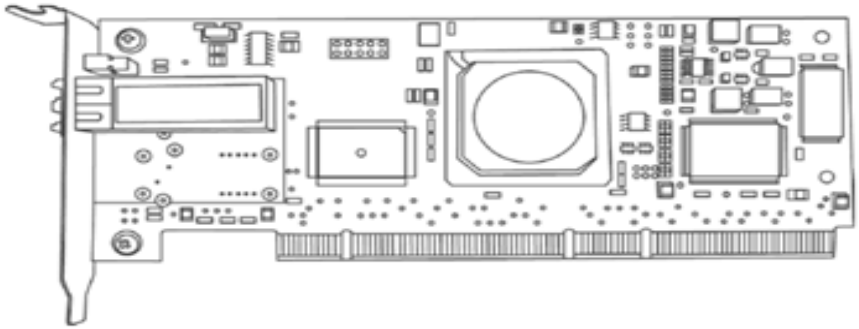
Server Components of a SAN



Software:
O/S
Windows 2000 SP4 or higher
Windows 2003

Multi-pathing software
Secure Path agent(now)
MPIO agent(SAN 6.1)

Business Continuance
Business Copy Agent
RSM Agent / CA Agent



Certified with SAN 6.0:
LP8000 (older 1GB)
LP952
LP9802DC
LP1050

Emulex LightPulse Utility

LightPulse Utility/NT

File Edit View Adapter Help

- Adapter 0 - LP1050
- Adapter 1 - LP1050

Category: Adapter Revision Levels

Component	Revision
BIU Revision	1001206D
Sequence Manager Revision	00000000
Endec Revision	00000000
Current Operational Firmware	SLI-2 Overlay
Kernel	1.40a0
Initial Firmware	Initial Load 1.91a1
SLI-1	SLI-1 Overlay 1.91a1
SLI-2	SLI-2 Overlay 1.91a1
Max FC-PH Version	4.3
Min FC-PH Version	4.3
IEEE Address	00-00-C9-52-01-CE

Ready NUM

SAN Switch components

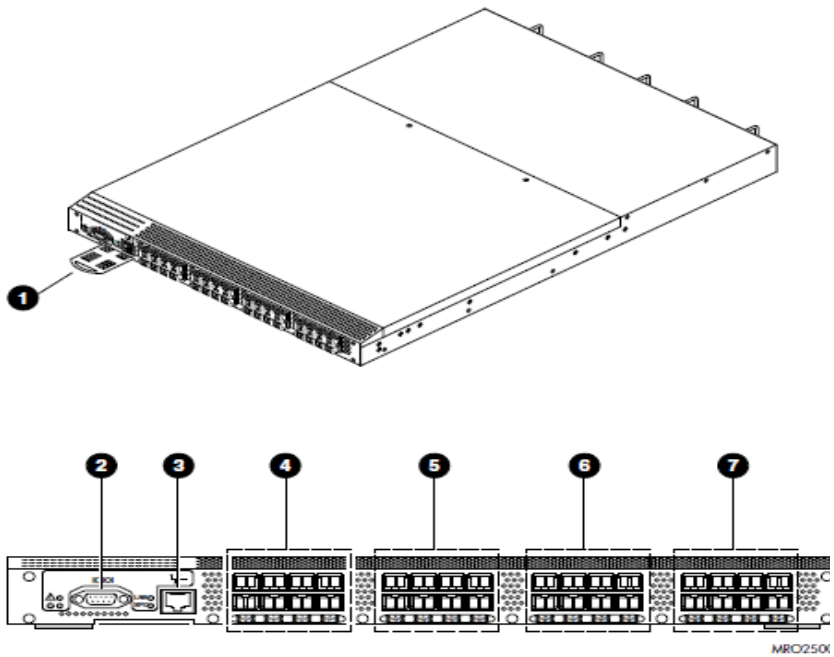
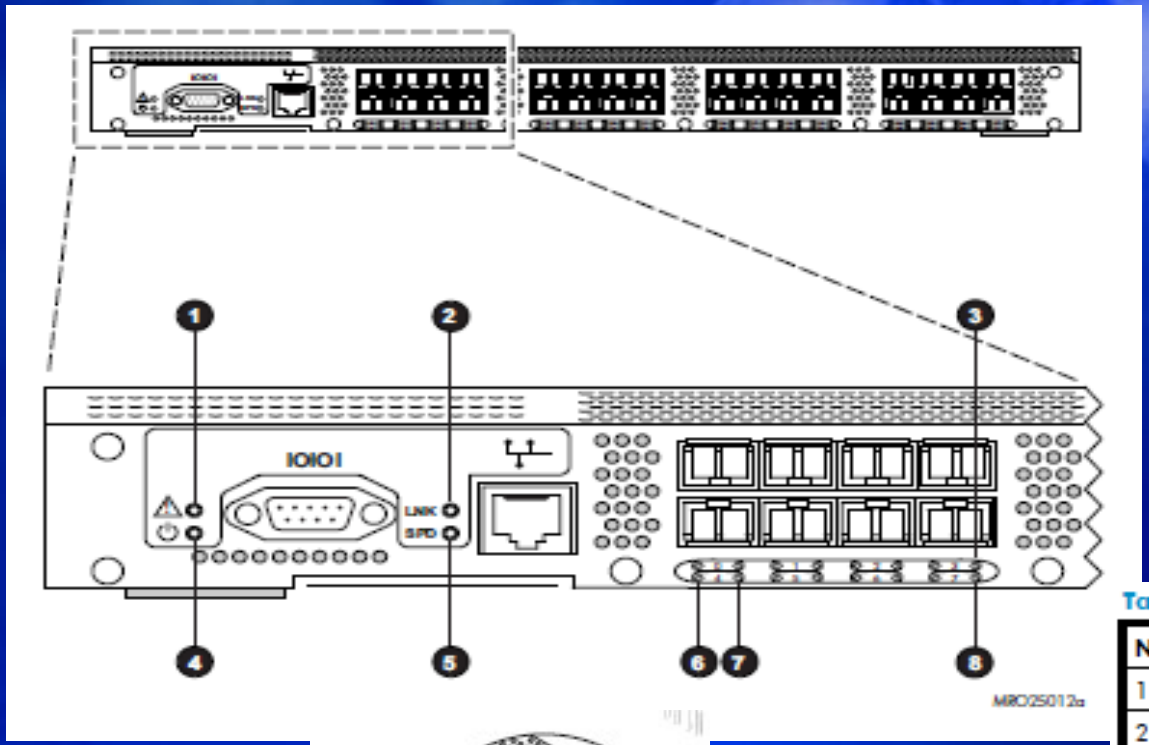
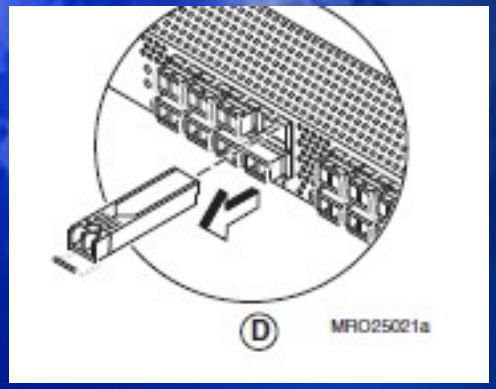


Table 3 4/32 SAN Switch port side components

Number	Description
1	Switch ID pull-out tab
2	Serial port
3	Ethernet port
4	FC ports 0–7
5	FC ports 8–15
6	FC ports 16–23
7	FC ports 24–31

SAN Switch Components (cont)





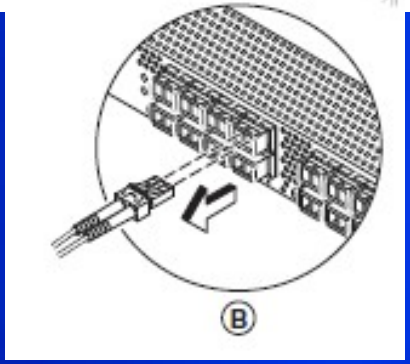


Table 17 4/32 SAN Switch port side LEDs

Number	Description
1	System status LED
2	Link LED
3	Top port LEDs (0 through 3)
4	Power status LED
5	Speed LED
6	Port status LEDs
7	Port speed LEDs
8	Bottom port LEDs (4 through 7)

Switch GUI Interface

c2mstar6b9 - SwitchExplorer - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://[redacted]/switchExplorer.html Go

View by: Name

Fabric

[redacted]6B4

[redacted]9

Segmented Switches

Status Events Admin Telnet Perf Beacon Fan Temp Power

Switch Information for c[redacted]9 **Status:** Marginal

Polled at:	Wed Mar 29 2006 00:07:00 UTC	**Name:**	[redacted]
Fabric OS version:	v5.0.1	**Domain ID:**	11
Ethernet IP:	[redacted]	**Ethernet Mask:**	255.255.255.0
FC IP:	0.0.0.0	**FC NM:**	0.0.0.0
Gateway IP:	143[redacted]	**WWN:**	10:00:00:05:1e:35:cf:f9
Manufacturer Serial #:	LX[redacted]	**Supplier Serial #:**	USB0543P0W
LicenseID:	10:00:00:05:1e:35:cf:f9	**Role:**	Principal
Switch Type:	32		

Effective Zone Config : No configuration in effect

Status Legend : Healthy Marginal Critical Unmonitored

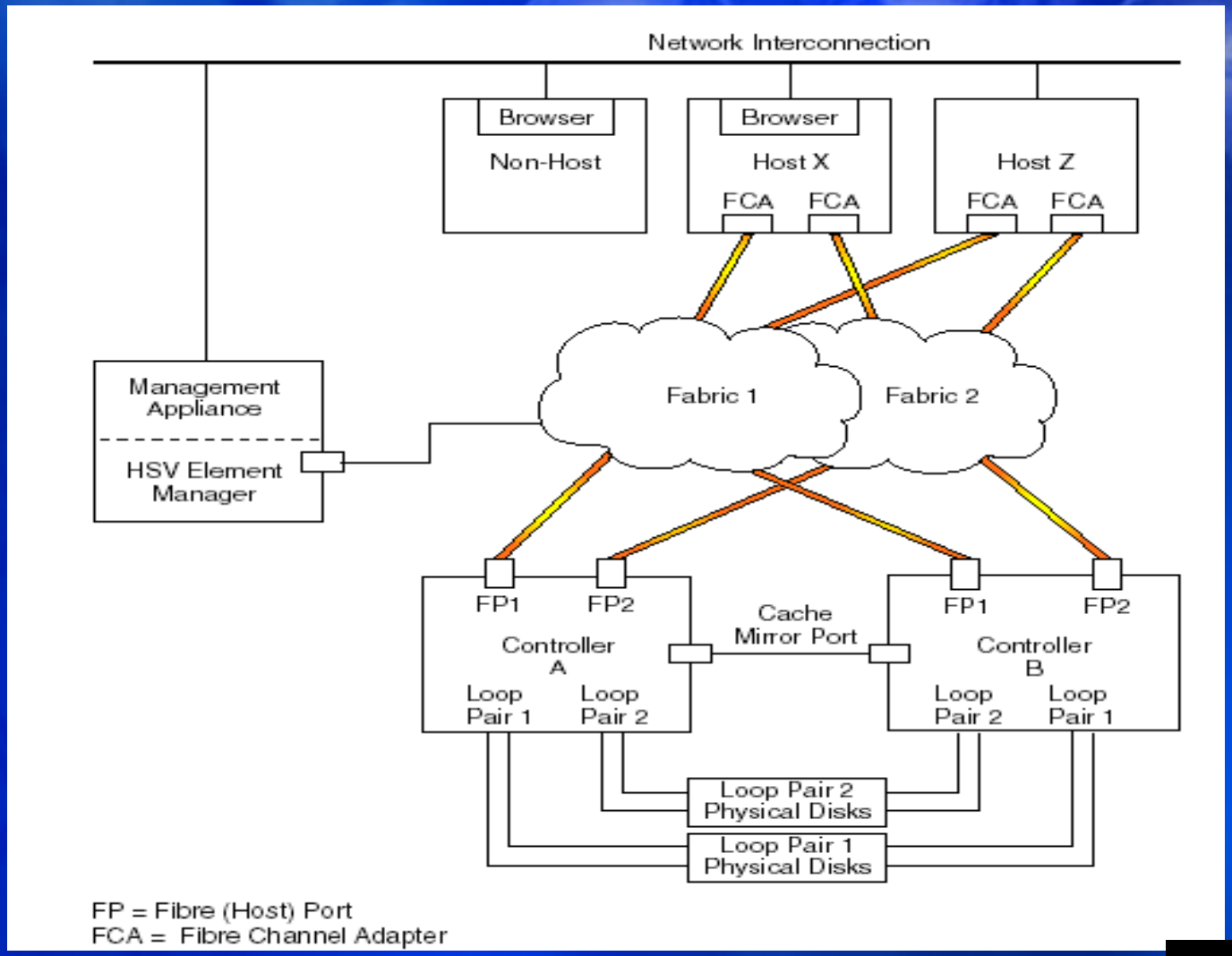
Applet com.brocade.web.switchview.SwitchExplorerApplet started

Local intranet

Physical Layout

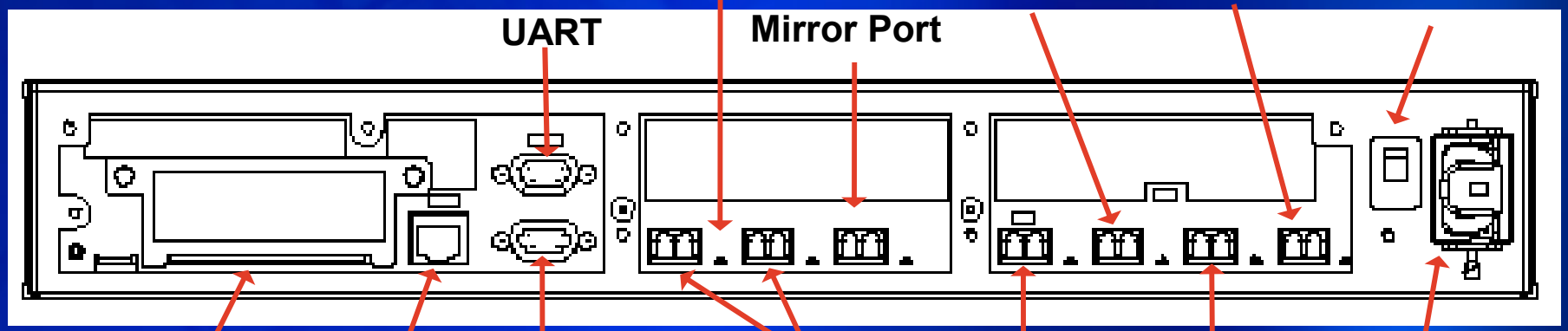
- Rack
- Pair of HSV110 controllers
- Drive enclosures containing array of physical disk drives
- Loop switches
  - Enclosures connect to FC loop switches in switched configurations (shown)

Overview of Enterprise Virtual Array Connections

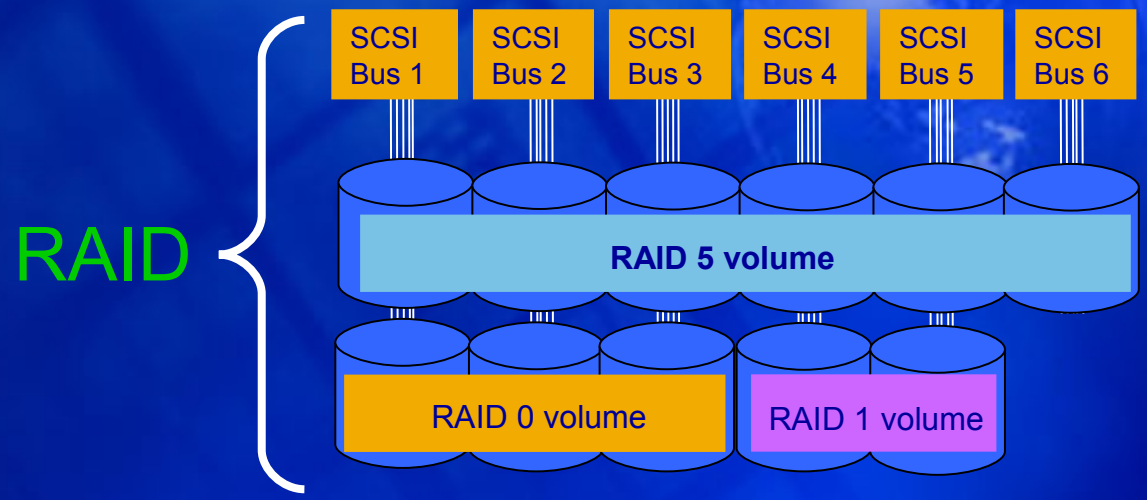


rear connections of EVA Controller

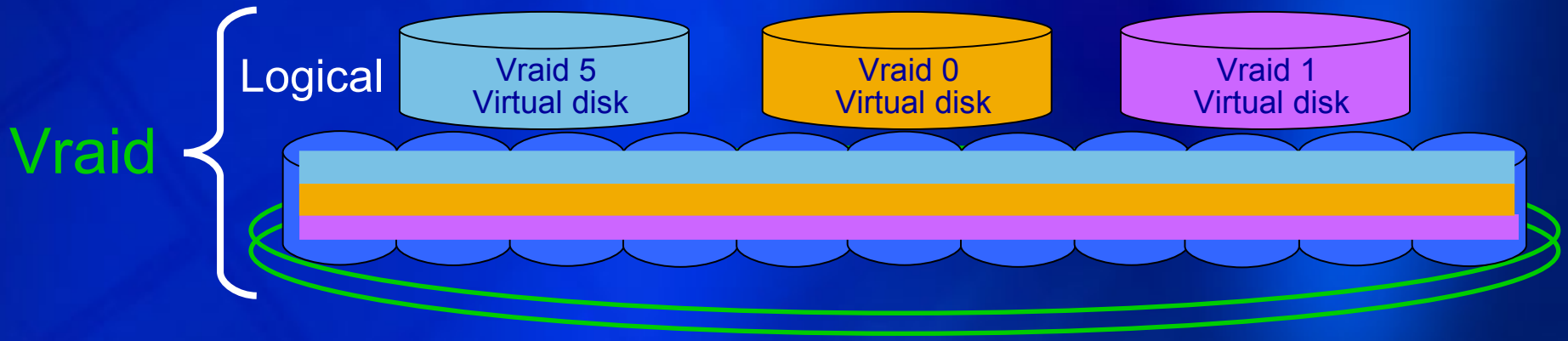
- Two 2Gb/s FC-Switch fabric host ports
- Four 2Gb/s FC-AL device ports
- 2Gb/s FC cache mirroring port (device ports as backups)



Traditional RAID vs Vraid



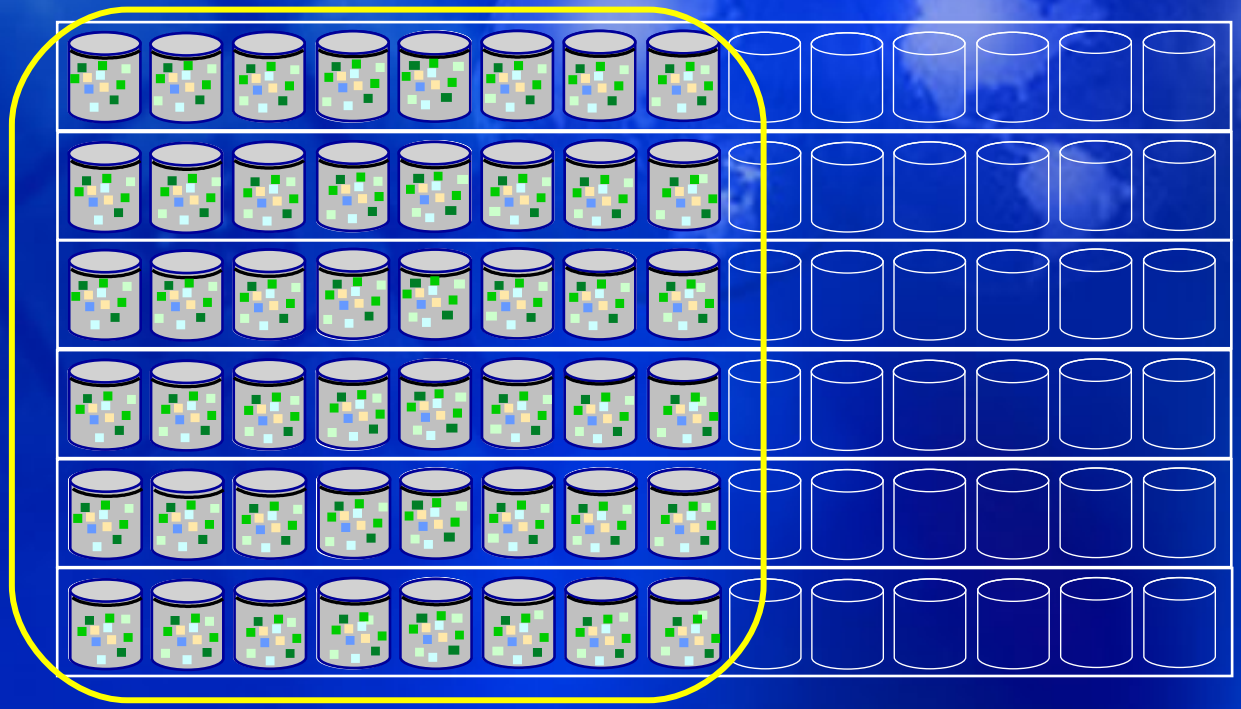
Tedious, manual volume placement and management



Traditional Storage Array

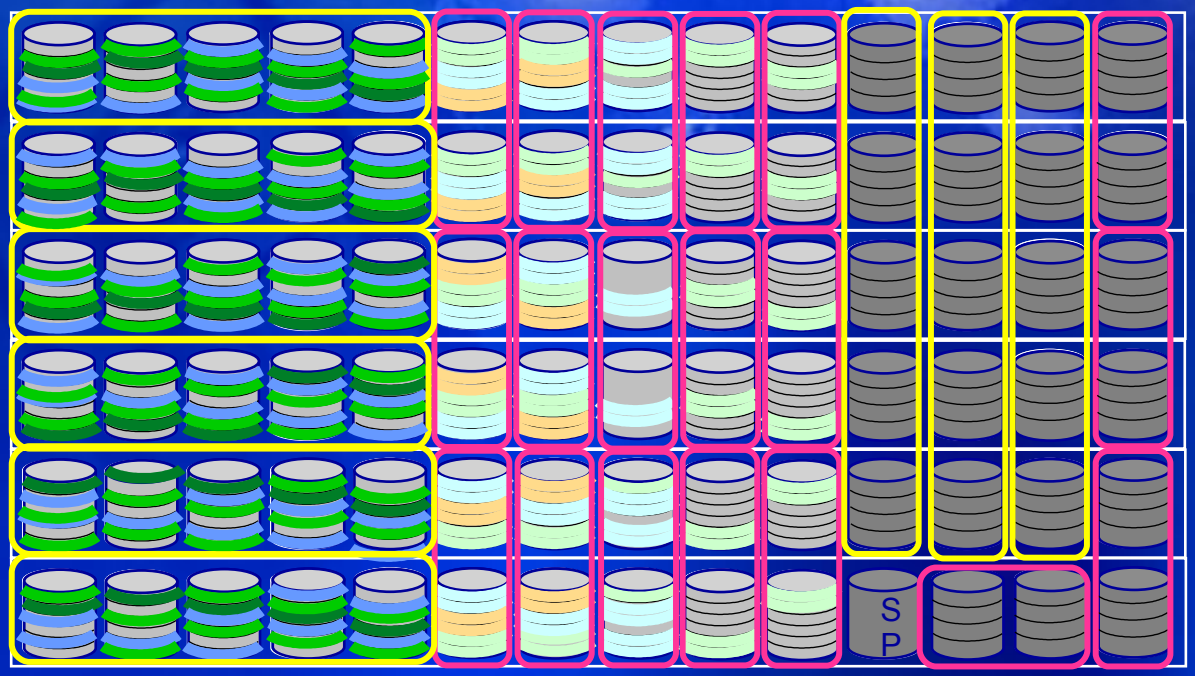
1. Adding drives – next they must be grouped together in disk groups by RAID level
2. Carving out disk groups based on RAID level
3. Laying out data
4. Leaving stranded capacity – RAID-5 disk groups can't access unused capacity from RAID-1 disk groups

Enterprise Virtual Array



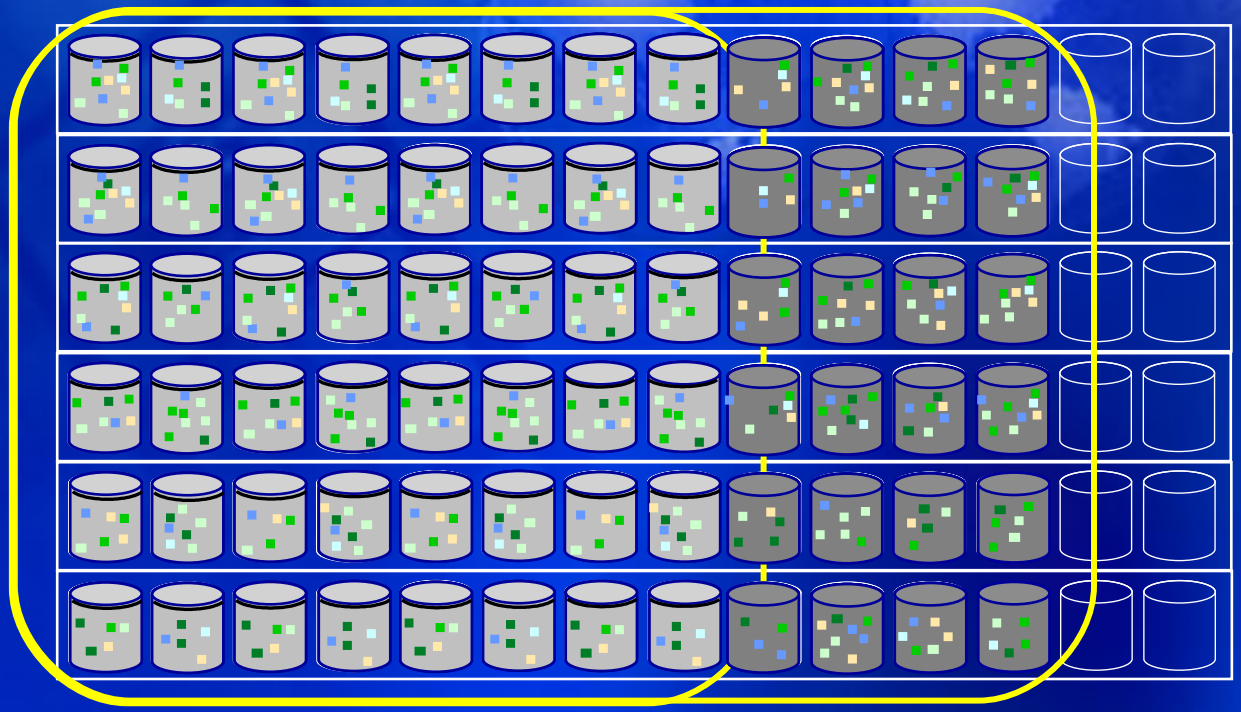
1. Adding drives – next they must be grouped together in disk groups
2. Carve out the disk group(s) - typically EVAs are configured with only one or two disk groups
3. Lay out the data – all RAID-5 and RAID-1 data are sprinkled across all the drives in the group – EVA disks format on the fly.

Adding Disks to the Traditional Array



1. Add drives
2. Configure disk groups – format disks
3. Lay out data – RAID-5 data in RAID-5 LUNs, etc.

Adding Disks to the EVA



1. Add disks
2. Enlarge disk group to include the extra disks
3. LUNs are stretched across new disks – data is re-leveled across all disks

EVA Virtual Disk Mapping

Disk 1	Disk 2	Disk 3	Disk 4	Disk 5	Disk 6	Disk 7	Disk 8
Allocated Space for Distributed Sparing							
Mirror4	Mirror4	Mirror5	Mirror5	Mirror6	Mirror6	Mirror7	Mirror7
Stripe9	Strip10	Mirror1	Mirror1	Mirror2	Mirror2	Mirror3	Mirror3
Stripe1	Stripe2	Stripe3	Stripe4	Stripe5	Stripe6	Stripe7	Stripe8
Mirror5	Mirror5	Mirror6	Mirror6	Mirror7	Mirror7	Mirror8	Mirror8
Mirror1	Mirror1	Mirror2	Mirror2	Mirror3	Mirror3	Mirror4	Mirror4
Data7	Data7	Parity7	Data8	Data8	Data8	Data8	Parity8
Parity5	Data6	Data6	Data6	Data6	Parity6	Data7	Data7
Data4	Data4	Data4	Parity4	Data5	Data5	Data5	Data5
Data2	Parity2	Data3	Data3	Data3	Data3	Parity3	Data4
Data1	Data1	Data1	Data1	Parity1	Data2	Data2	Data2

VDisk4
Raid 1+0

VDisk3
Raid 0

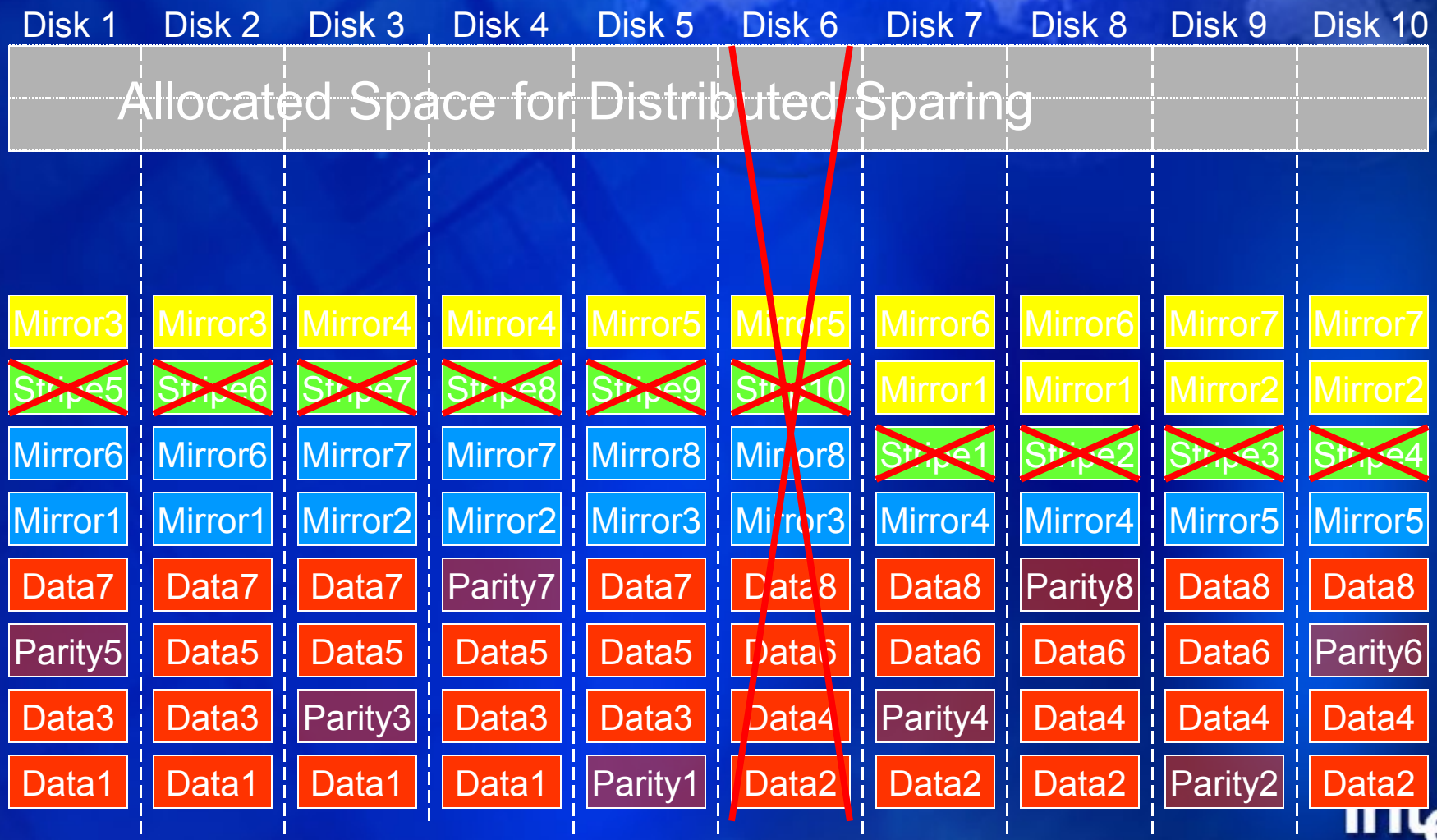
VDisk2
Raid 1+0

VDisk1
Raid 5

EVA Virtual Disk Leveling

Disk 1	Disk 2	Disk 3	Disk 4	Disk 5	Disk 6	Disk 7	Disk 8	Disk 9	Disk 10
Allocated Space for Distributed Sparing									
Mirror4	Mirror4	Mirror5	Mirror5	Mirror6	Mirror6	Mirror7	Mirror7		
Stripe9	Strip10	Mirror1	Mirror1	Mirror2	Mirror2	Mirror3	Mirror3		
Stripe1	Stripe2	Stripe3	Stripe4	Stripe5	Stripe6	Stripe7	Stripe8		
Mirror5	Mirror5	Mirror6	Mirror6	Mirror7	Mirror7	Mirror8	Mirror8		
Mirror1	Mirror1	Mirror2	Mirror2	Mirror3	Mirror3	Mirror4	Mirror4		
Data7	Data7	Parity7	Data8	Data8	Data8	Data8	Parity8		
Parity5	Data6	Data6	Data6	Data6	Parity6	Data7	Data7		
Data4	Data4	Data4	Parity4	Data5	Data5	Data5	Data5		
Data2	Parity2	Data3	Data3	Data3	Data3	Parity3	Data4		
Data1	Data1	Data1	Data1	Parity1	Data2	Data2	Data2		

EVA Distributed Sparing



Command View EVA – Simple Management

Enter the Name of the Virtual Disk.

Select the appropriate Disk Group from the pull down list.

Select Virtual Disk Redundancy Level.

Enter the size of Virtual Disk in GB.

Select a Host from the pull down list.

Select the Preferred controller from the pull down list.

Finish | Cancel | Page Help

Create a Virtual Disk Family

Virtual disk name: TransactionLog

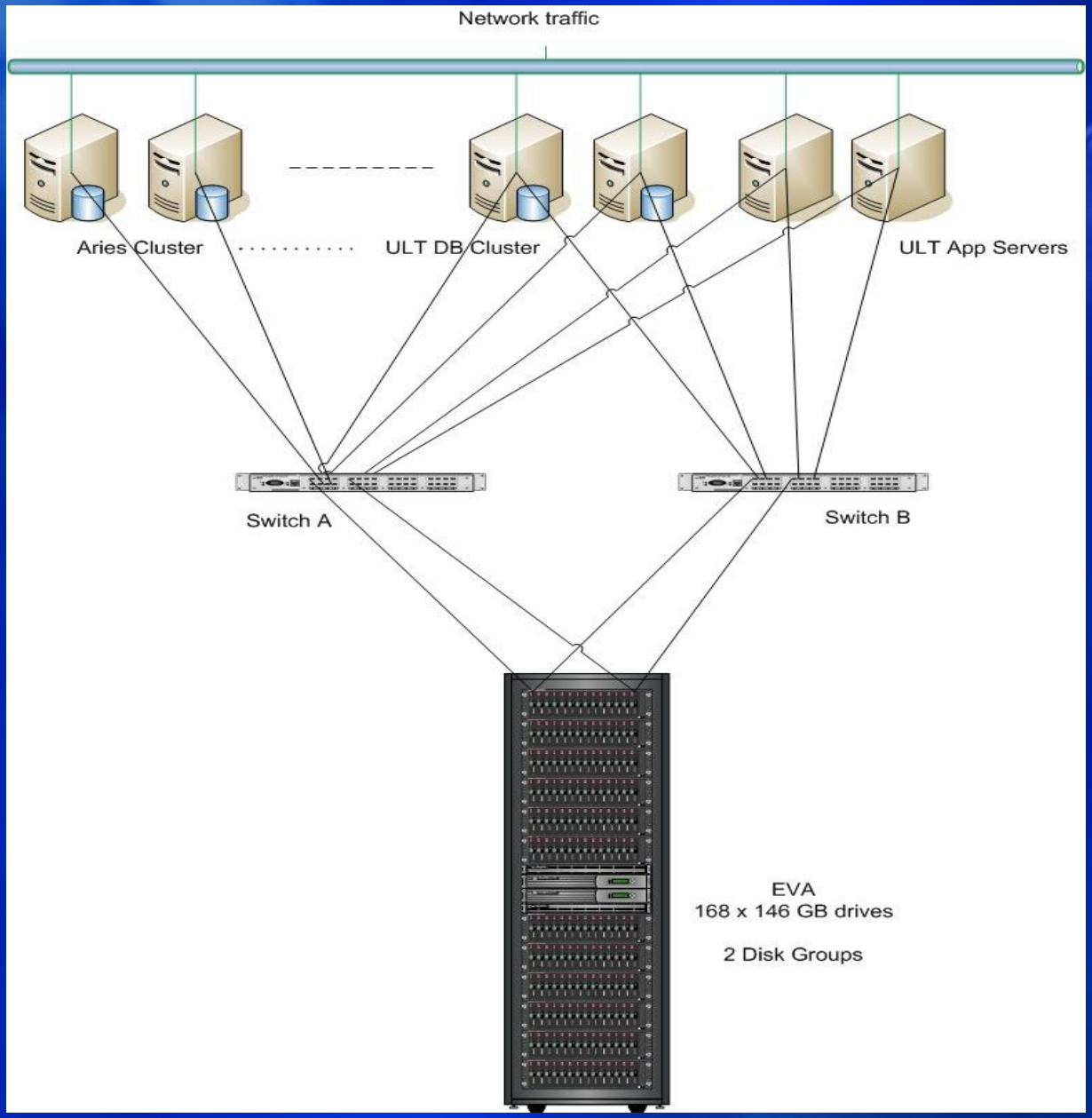
Scratch Disks 201.52 161.25 100.79
Scratch Disks 201.52 161.25 100.79
Default Disk Group 50.16 40.13 25.08

Vraid0 — Space available 201.52 GB
Vraid5 — Space available 161.25 GB
Vraid1 — Space available 100.79 GB

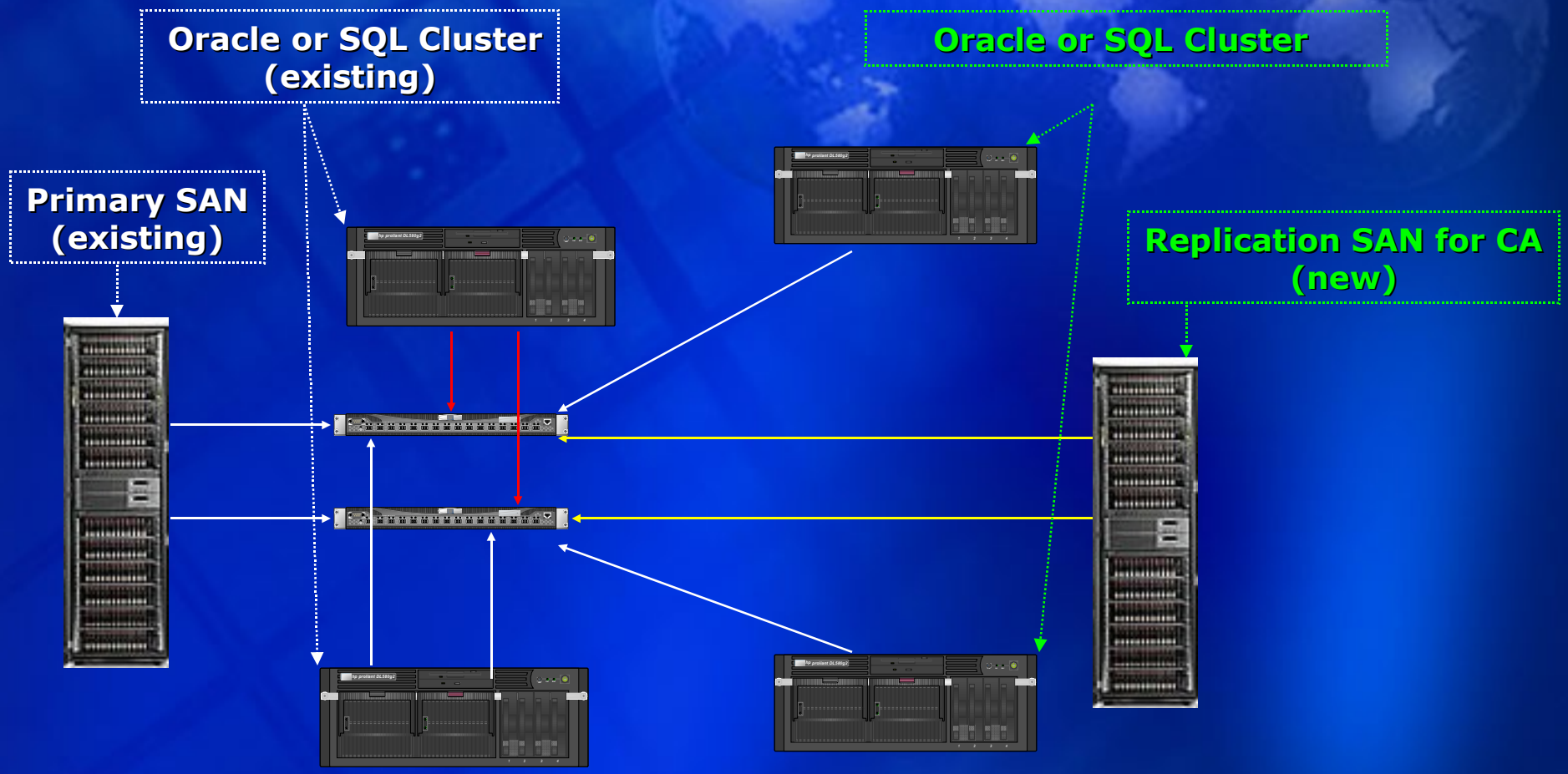
Size: 0 GB — 20

Write cache policy: Mirrored write-back
Read cache policy: On
Read/write | Read only
Enable I/O | Disable I/O
Present to host: None
None
SWMAN1K215
Ultra1
OS unit ID:
Preferred path/mo
No preference
No preference
Path A-Failover only
Path A-Failover/failback
Path B-Failover only
Path B-Failover/failback

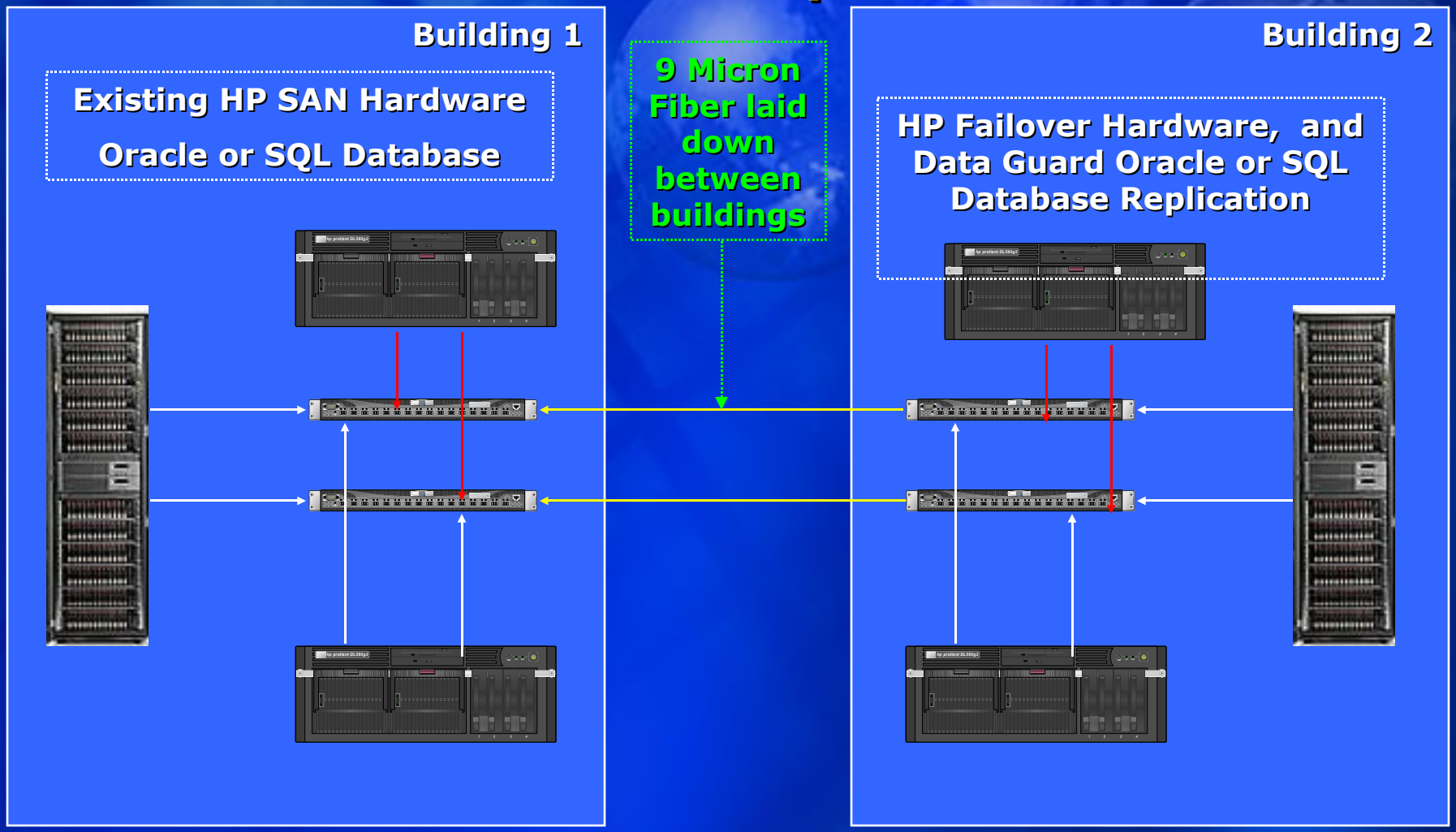
Finish


Network traffic
Aries Cluster
ULT DB Cluster
ULT App Servers
Switch A
Switch B
EVA
168 x 146 GB drives
2 Disk Groups

Disaster Recovery
Single Datacenter Architecture



Cross Building Architecture Hardware Replication



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- HP Education
  http://www.hp.com/education
- Brocade Education
  http://learning.brocade.com
- Qlogic
  http://www.qlogicswitchnet.com/training/training.cfmg
- Emulex
  http://www.emulex.com

Thank you for your Time!

- Dilbert (The Contractor)