

# Storage Area Networks And File Systems

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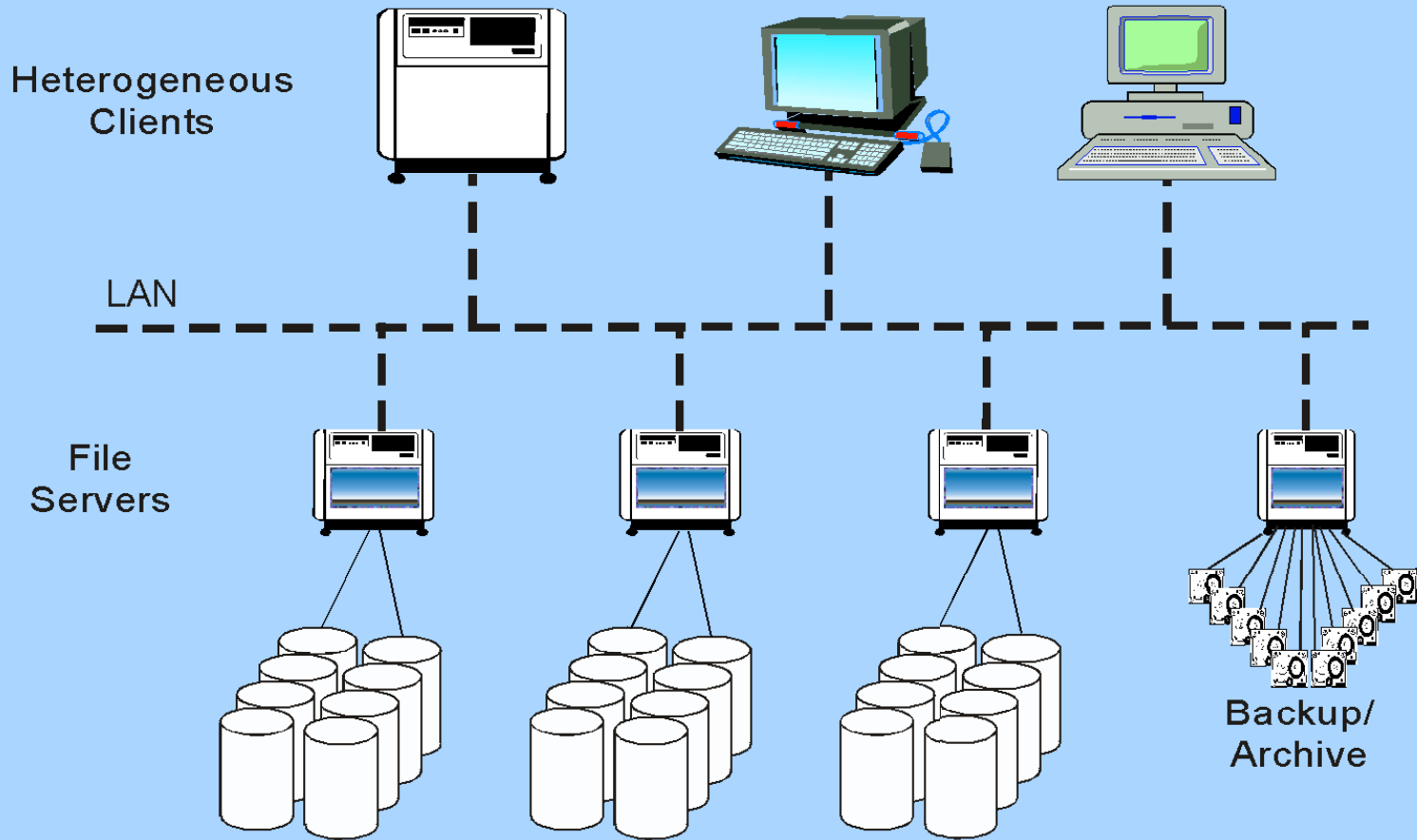
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**Presented at the THIC meeting at the Sheraton Barcelo Hotel**

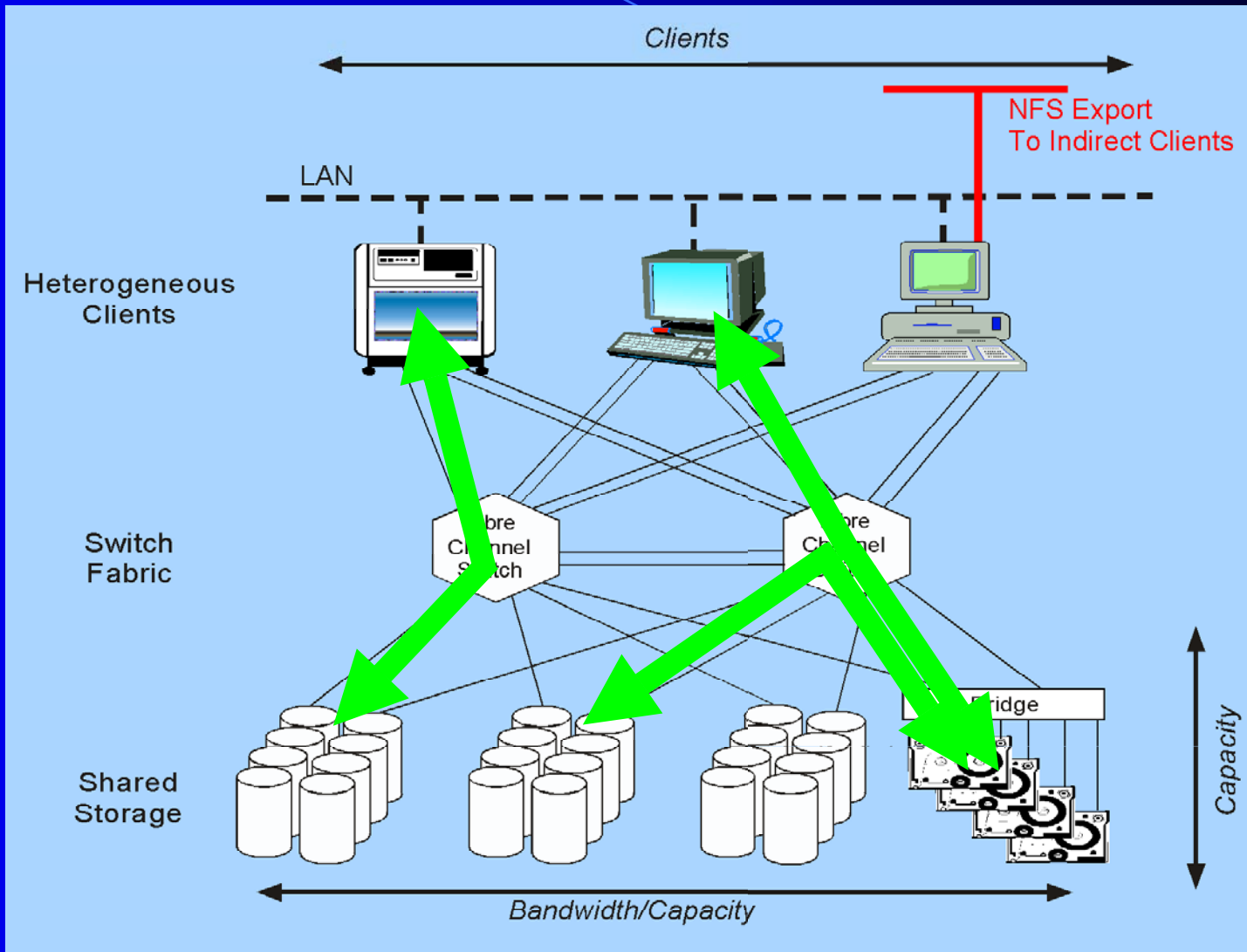
**Annapolis MD 21401-3094**

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# Traditional Infrastructure



# SAN Based Infrastructure



# SAN State of the Union

- Definition
  - Consolidated, sharable storage (disk and/or tape)
  - Accessible by heterogeneous clients at high bandwidth
- Acknowledged potential
  - Performance comparable to directly attached storage
- Technology is maturing rapidly
  - Shared file systems and back-up solutions
  - Management and administration tools
  - Fibre channel-based interconnect solutions dominate
  - InfiniBand and iSCSI based solutions emerging
- Experiencing broad industry participation
  - Computer manufacturers
  - Connectivity providers
  - System integrators
- Corporate consolidation

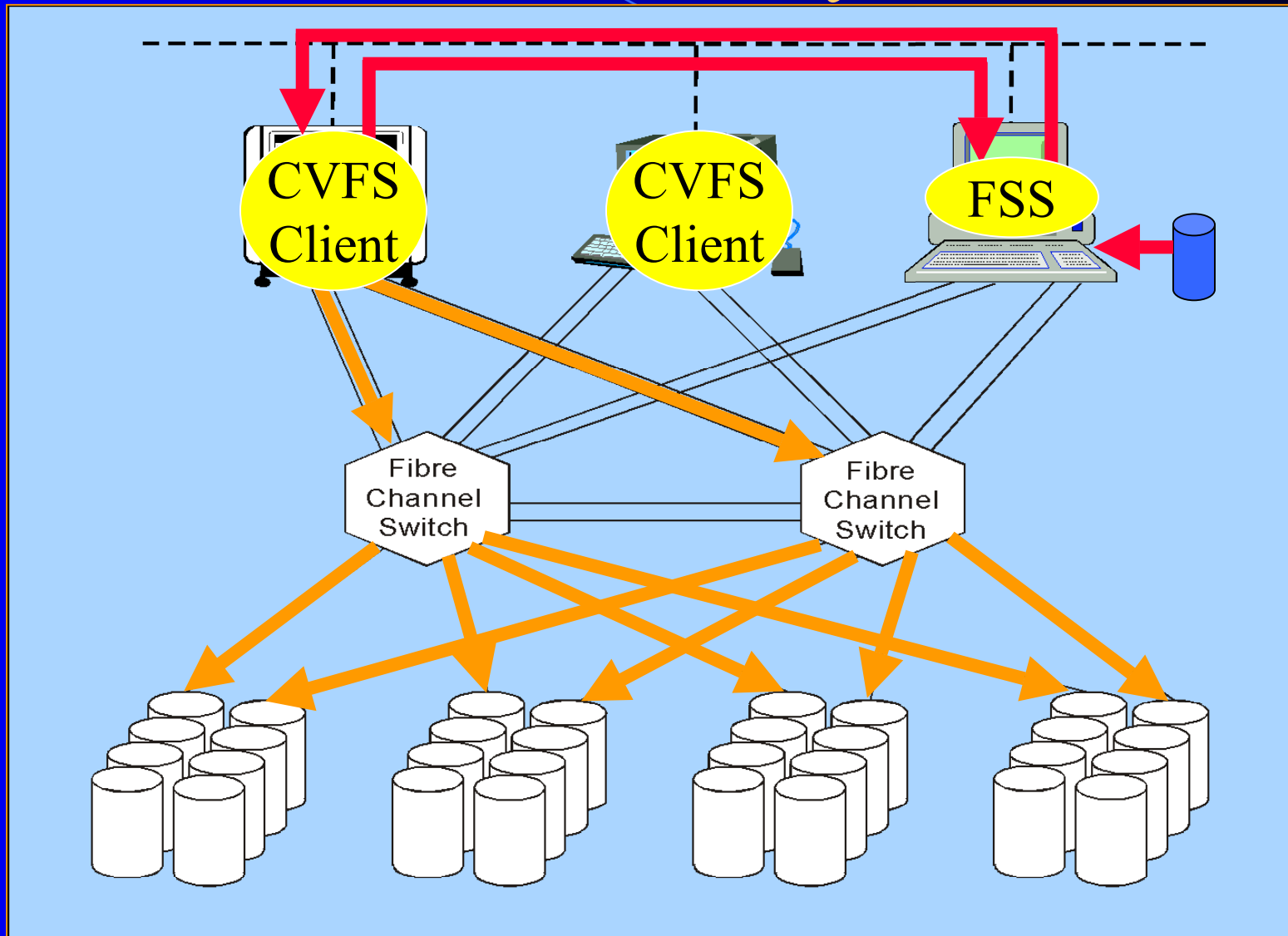
# Six Degrees of SAN

- Variable number of connections per client
  - Driven by required client bandwidth
  - Allows connection striping
- Flexible switch fabric
  - Increase client and storage connectivity
  - Increase system bandwidth
  - Improve availability
  - Connect both disk and tape
- Expandable shared storage
  - Increase capacity by adding more spindles/tapes
  - Increase bandwidth by adding more controllers/drives

# SAN File System Options

- ADIC CentraVision™ File System (CVFS)
  - Formerly MountainGate Imaging Systems Corp., Inc.
- IBM/Tivoli Systems SANergy™
  - Formerly Mercury Computer Systems, Inc.
- DataPlow, Inc. DataPlow™ SAN File System (SFS)
- Global File System (GFS)
  - University of Minnesota with NASA/DoD funding
  - Now supported by Sistina Software
- Veritas SANPoint™ Direct
  - Windows 2000 only
- DOE ASCI PathForward GFS/DFS File System

# CentraVision™ File System Flow



# SAN Management Options

- Veritas SANPoint Control
- SANavigator™
- HP Openview Storage Area Manager
- Vixel SAN InSite 2000
- Prisa VisualSAN™
- StoreAge SAN Volume Manager
- Datacore SANsymphony

# SANavigator

The screenshot displays the SANavigator application window. The main area shows a 'Physical Map' of a Storage Area Network (SAN) topology. The map is divided into several groups: a yellow 'Host Group' containing two 'Glogic Corp.' servers; a grey 'Storage' group with a server icon; a central 'SANbox 8\_c' switch; and a grey 'Seagate Technology' group with a server icon. Two 'Loop' nodes are also shown, connected to the central switch. The interface includes a menu bar (SAN, Edit, View, Plan, Discover, Monitor, Tools, Help, Debug) and a toolbar with various icons. Below the map is an 'Event Log' table with columns for Level, Source, Type, Description, Time, and IP. The log shows several 'DeviceOnline' events from 'JNI' and 'IBM' sources. At the bottom, there are buttons for 'Admin', 'Discovery', and 'Delay'.

Level	Source	Type	Description	Time	IP
Info	JNI	AppDevComm	DeviceOnline	2001/04/25 15:02:13	
Info	JNI	AppDevComm	DeviceOnline	2001/04/25 15:02:13	
Info	IBM	DRVL	AppDevComm	DeviceOnline	2001/04/25 15:02:13
Info	IBM	DRVL	AppDevComm	DeviceOnline	2001/04/25 15:02:13

# Integration Intensive

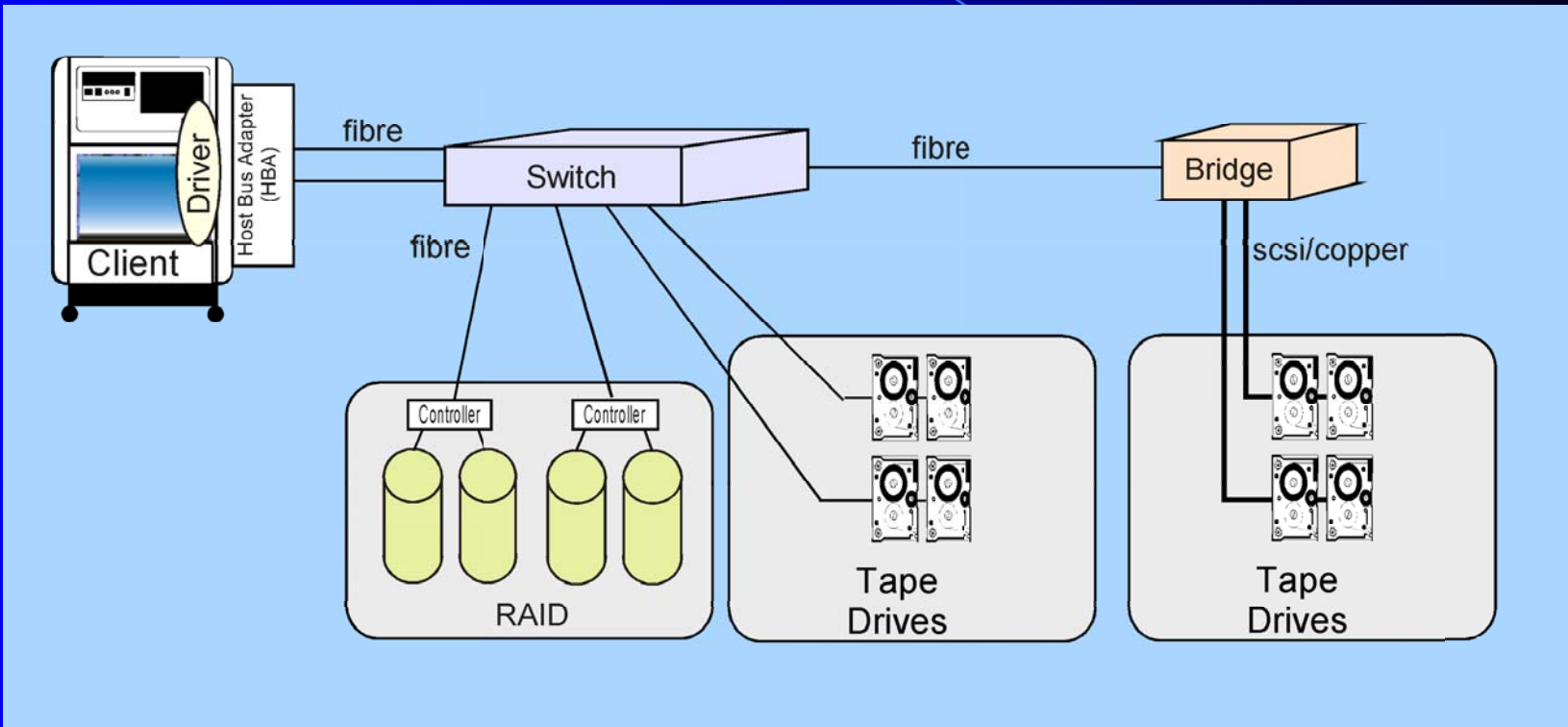
- Software installation/tuning
  - File system
  - Management
- RAID
  - Tuning, optimizing, etc.
  - LUN Configurations
- Connectivity
  - Host bus adapters (HBA)
  - Fabric login/drivers
  - “Seeing” the RAID
  - Setting preferred paths/zoning
- Supported versus works



*Establishing and maintaining a working fabric is key!*



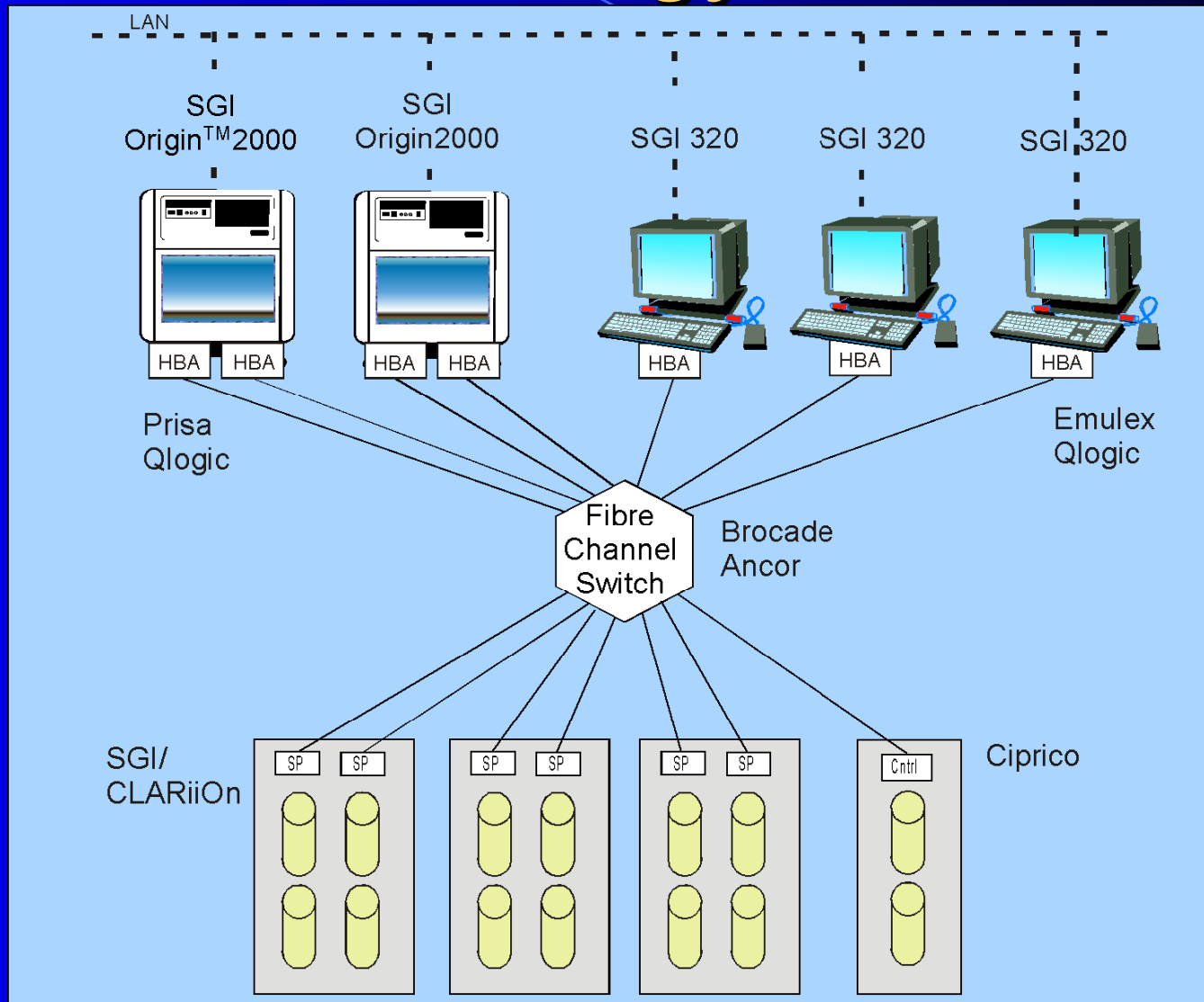
# SAN Data Path



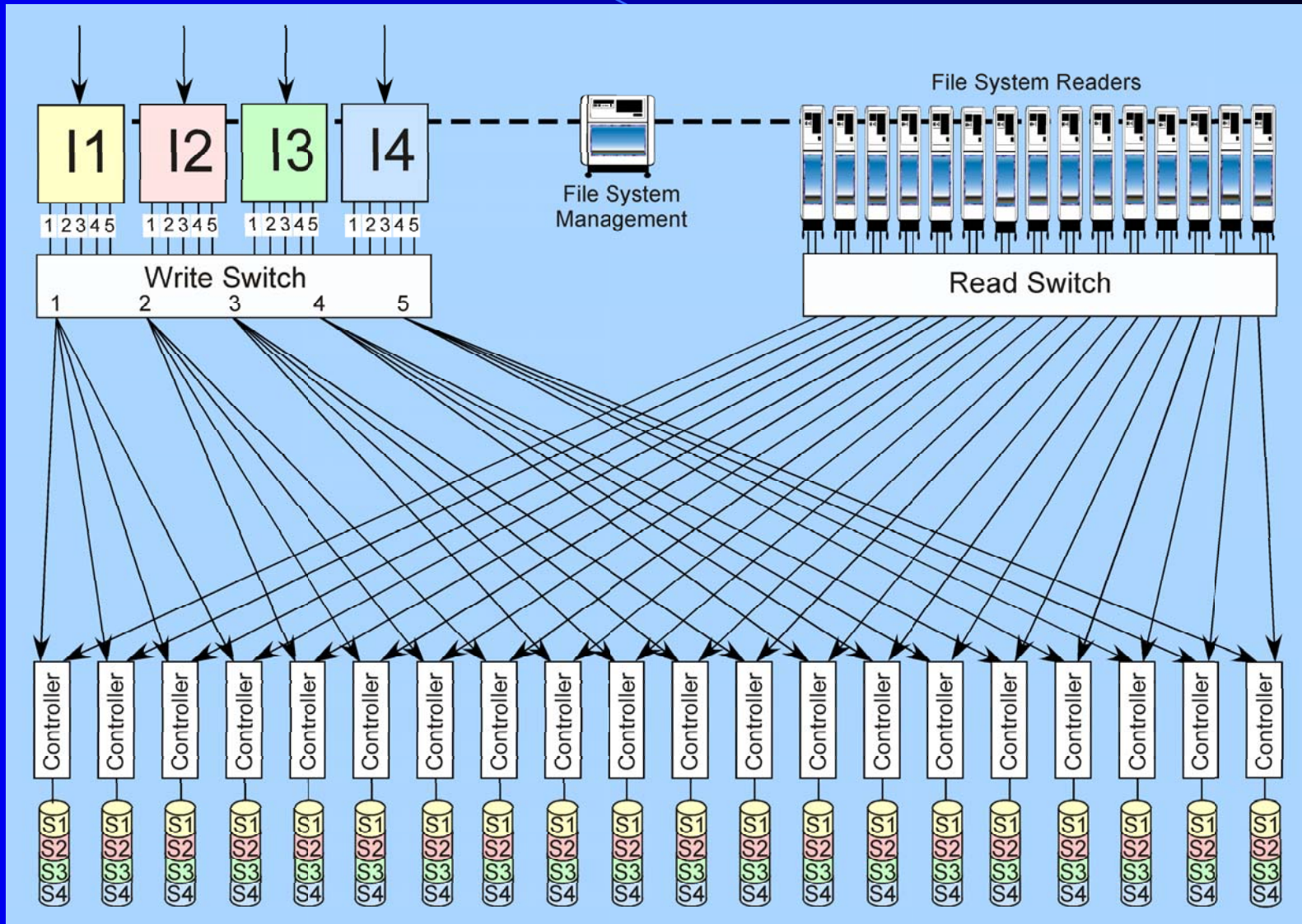
# Typical Deployment Questions

- Number of SAN clients
- Client operating systems requiring support
- Sustained bandwidth required per client
- Total system bandwidth
- File size range
- Total system storage capacity
- User access patterns/concurrency of accesses
- Access to first byte timing
- On-line vs. near-line mix
- Archive vs. back-up vs. HSM
- Availability requirements
- Growth expectations

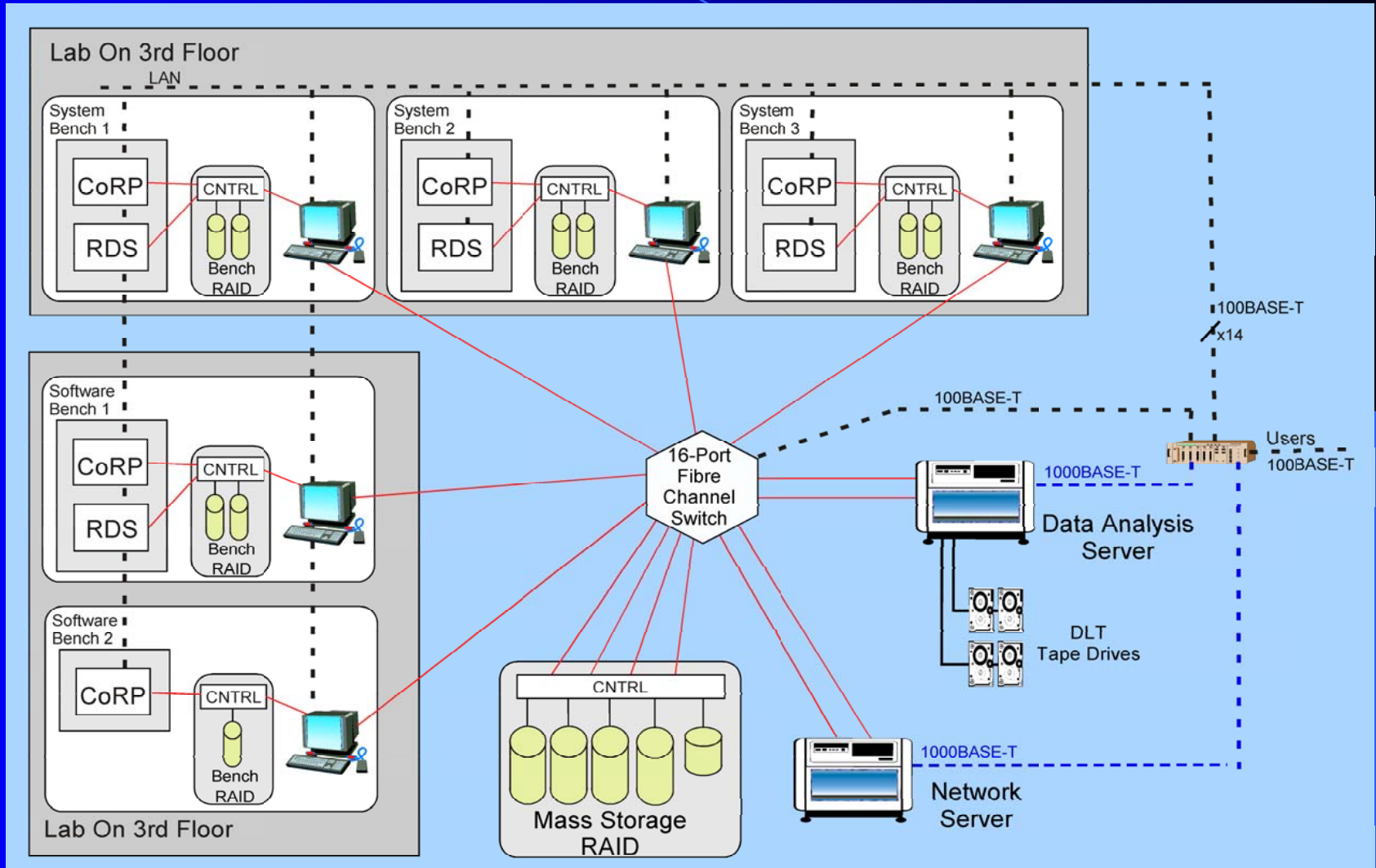
# SAN Technology Evaluation



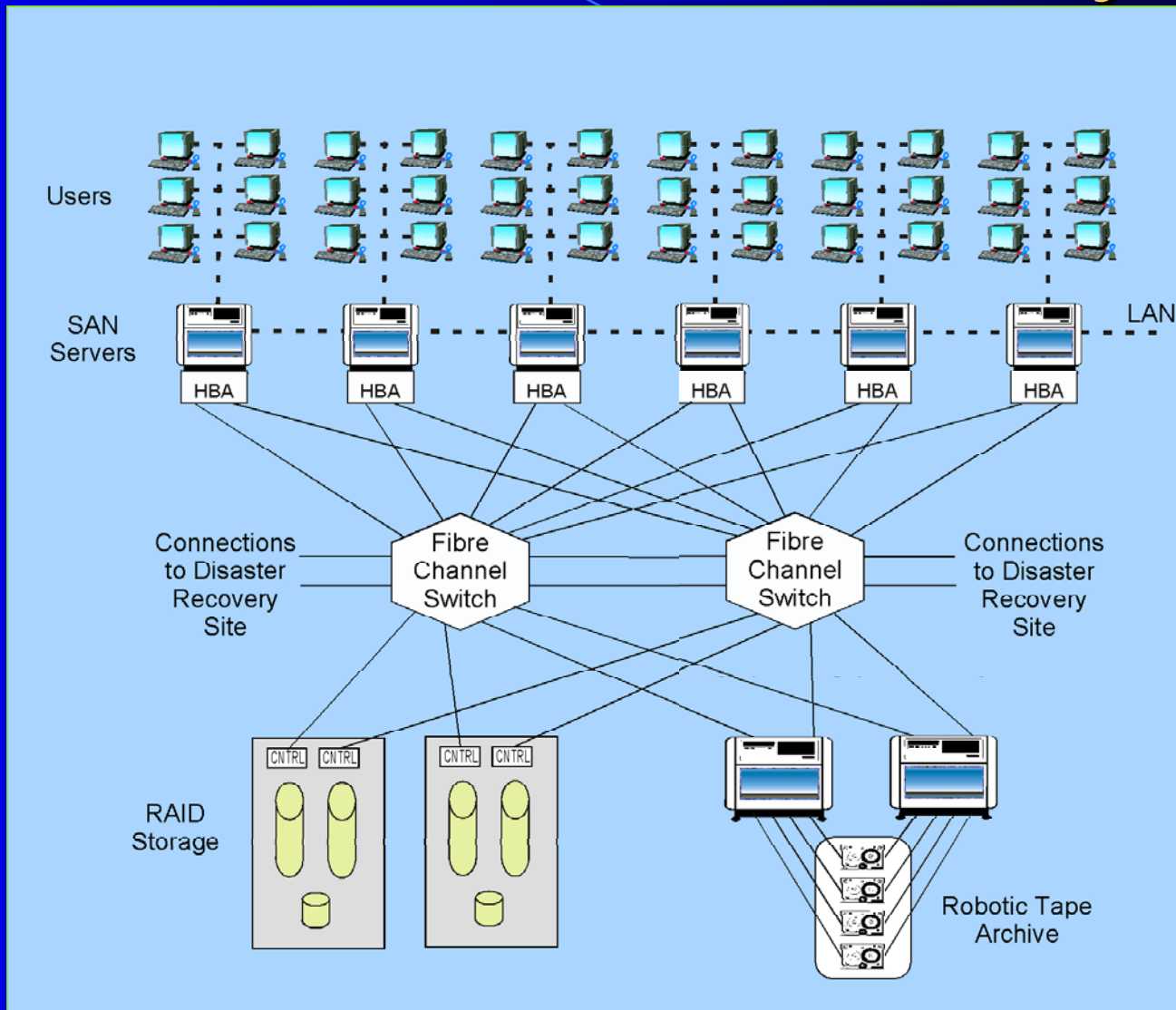
# Write/Read SAN



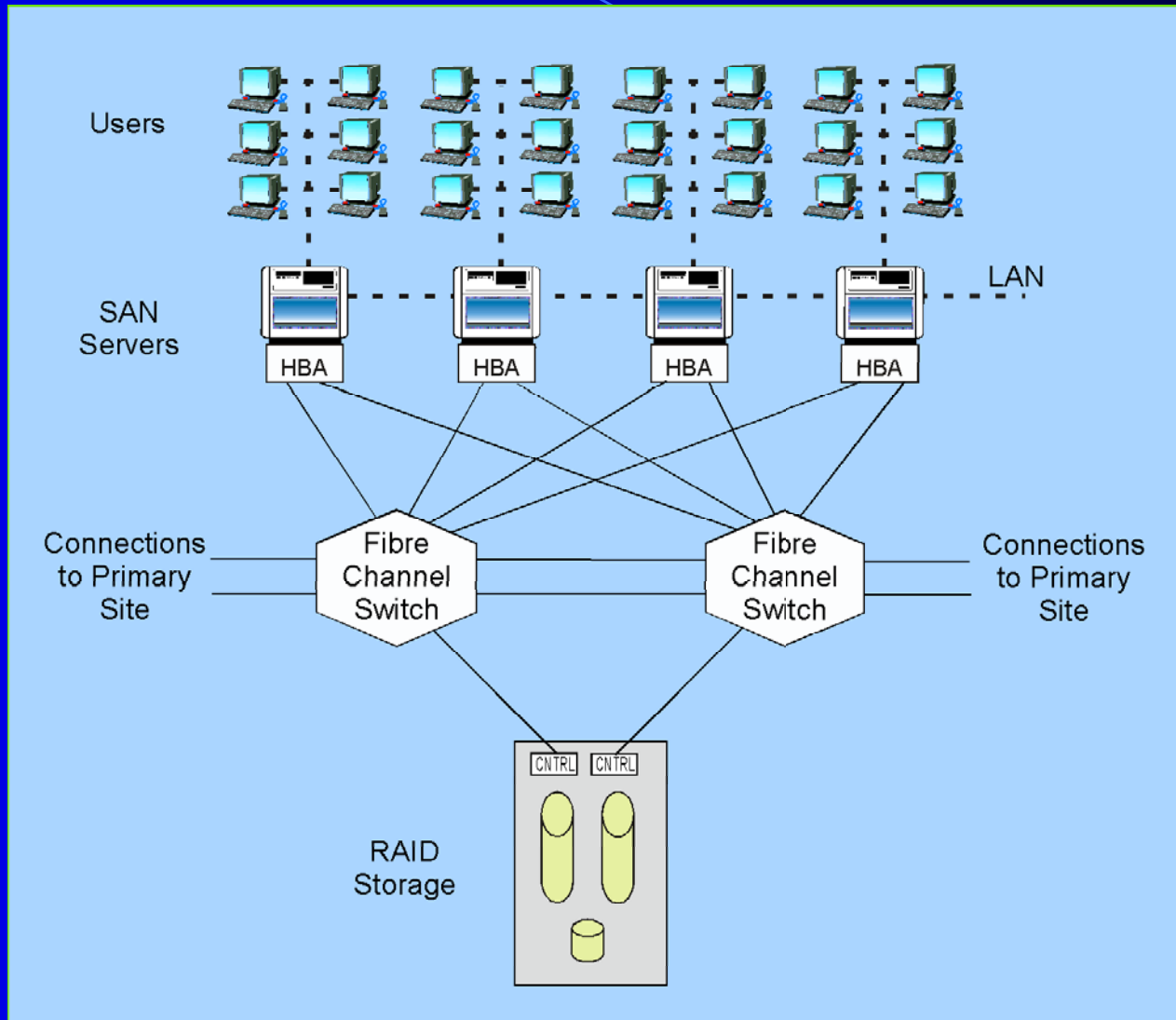
# Data Sharing Environment



# Server Schema - Primary



# Server Schema – DR Site



# And In Conclusion.....

