# SANs and High Availability

# Key Trend in Data Storage

- Data is being use as a competitive weapon
- Global operations
- Explosive growth
- Internet/Internet (WEB)
- Centralization/consolidation of IT resources
- Low tolerance for data delays

- Centralized management
- High data accessibility
- High application availability
- Disaster protection
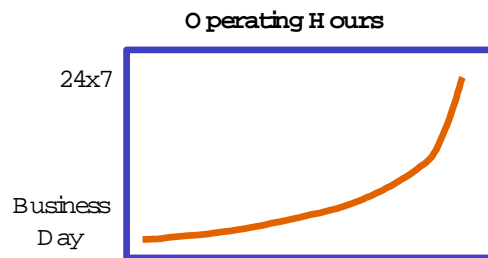- High performance and scalabilit
- Return on investment
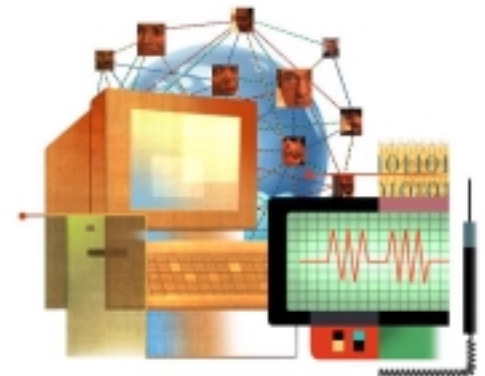
# What's Happening in IT Operations?

**$/MB**

$2/MB

Free
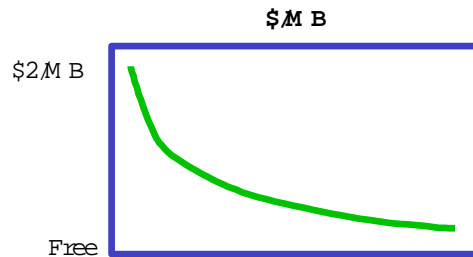
- Raw storage capacity (disk drives) is getting cheap

**On-line Data**

3 Years

1 Week

- Business want to keep more informat on-line

**Operating Hours**

24x7

Business Day

- Consumers need continuous access to information

**Administrator Mental State**

Insanity

Headache
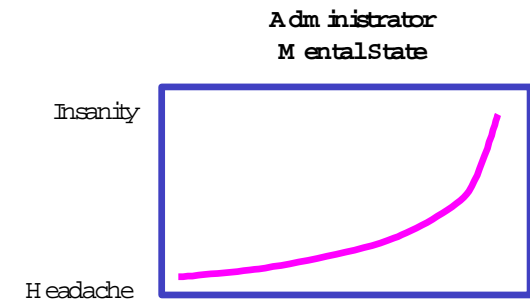
- System and management complexity out of control

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# What IT professionals say about storage:

- Most important qualities in a storage solution are High-availability and Reliability
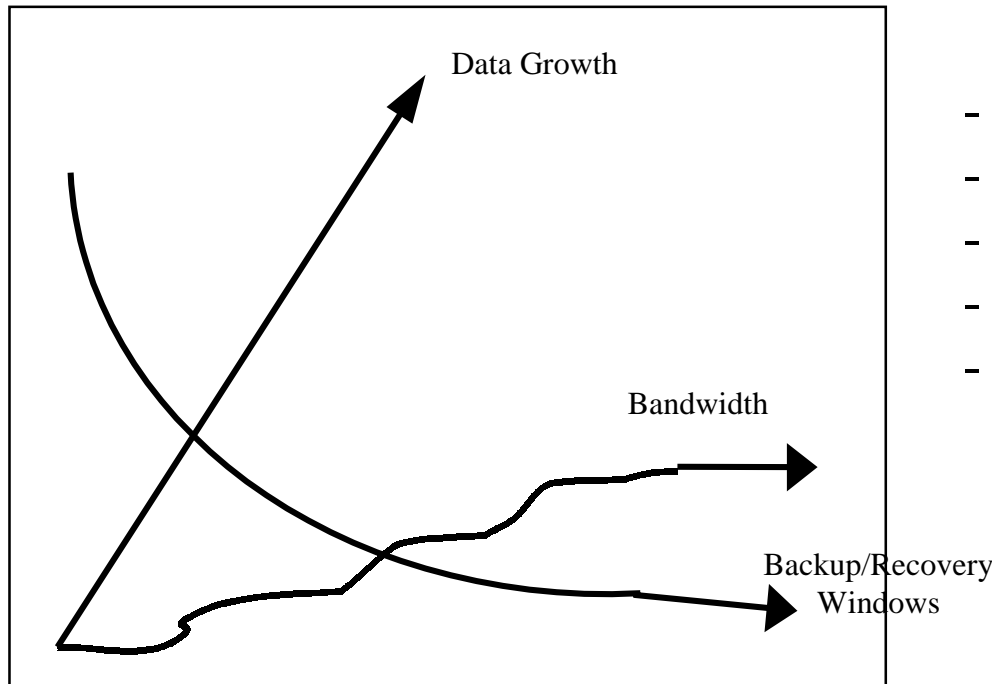  - "Reliability is the whole reason I have storage devices."
  - "Upper management's first question is, 'Is it reliable?' If you say 'yes' and it fails.. "
  - "If [my users] can't access information quickly, my phone starts ringing."

- Next, customers look for Operational Support

  *(business continuity through proactive management and reactive troubleshooting)*
  - "[Operational support] means I can focus on the business."
  - "I want to know there's someone I can call on with any questions."
  - "[I am looking for] storage that is easy to manage with the right tools."
  - "A single point of contact would reduce finger-pointing."

- And third, they want to buy from a Reliable Supplier
  - "[The vendor] must have credibility with all of us."
  - "I like [vendors] that have shown quality in other products as well."

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# What's driving SAN ?

The Backup Window Collapse

Data Growth

Bandwidth

Backup/Recovery
Windows

- Storage growth
- Storage consolidation
- Availability of data
- non-disruptive operations
- Performance for multi-terabyte backup

# SAN Infrastructure

Fibre Channel Point-to-point

Mass Storage

FC Arbitrated Loop

## Fibre Channel Fabric

HP-UX

Solaris

Low Cost

NT

FC Switch

Tape Libraries
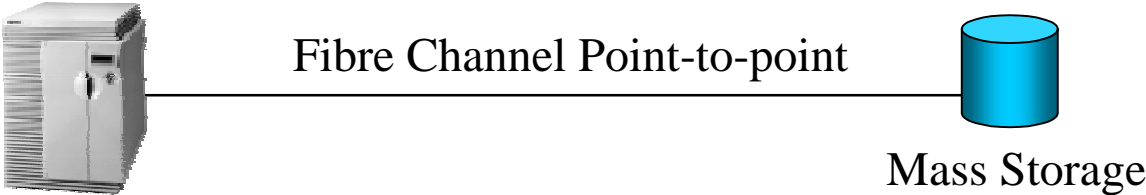
Fibre Channel-SCSI Mux
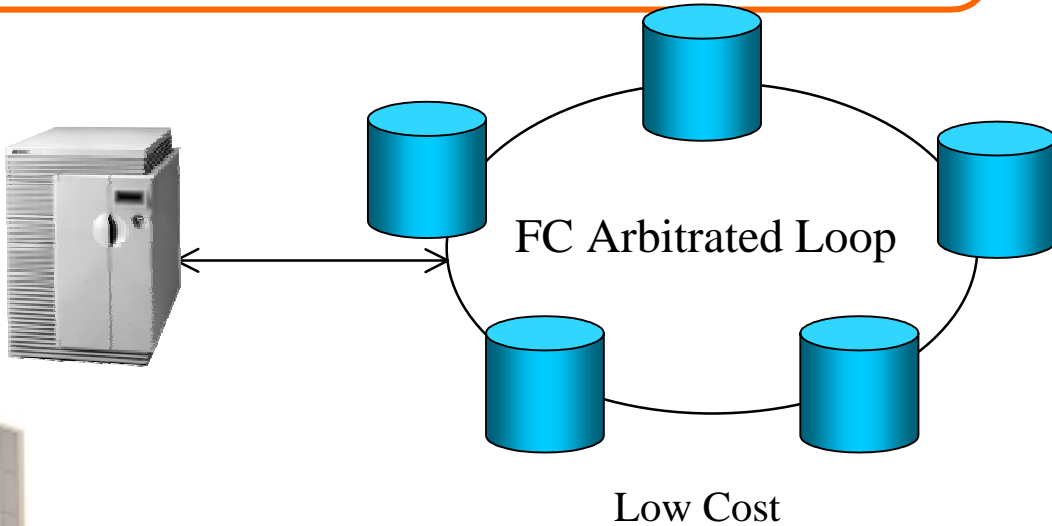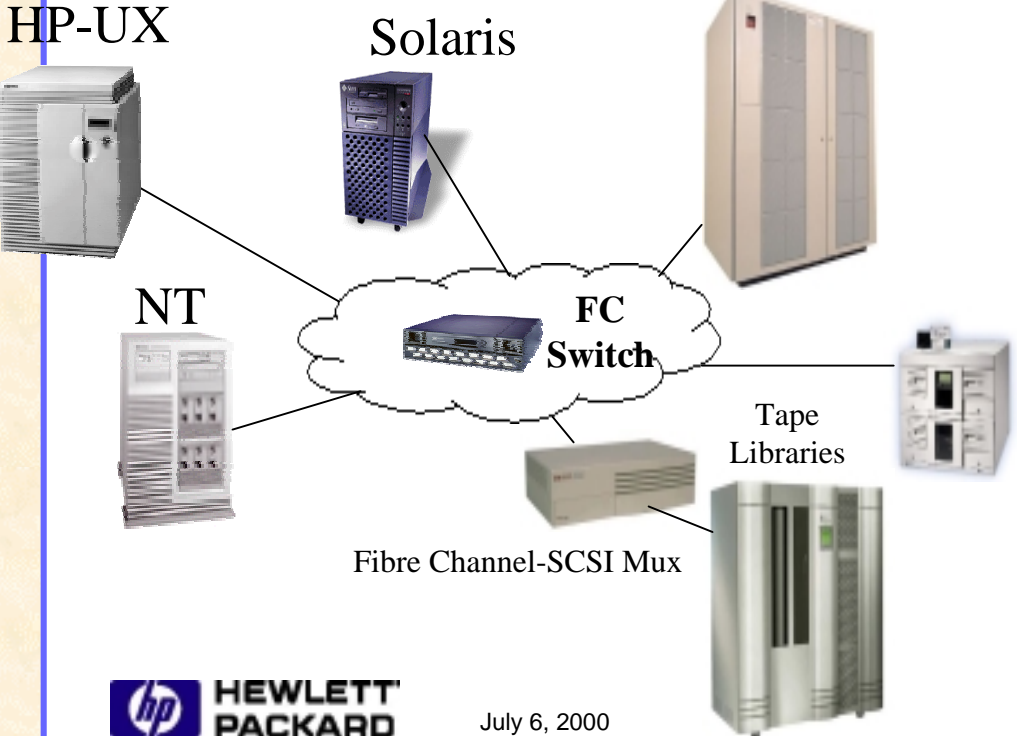
Supported Protocols:
- SCSI
- IPI (Intelligent Peripheral Interface
- HIPPI (High Performance Parallel Interface)
- ATM
- IP (Internet Protocol)

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# HP Fibre Channel Strategy

Storage Consolidation

Availability and Reliability

System Consolidation

Worry Free Storage

Storage Management

Reliable Supplier

Operational Support

Storage Area Networks

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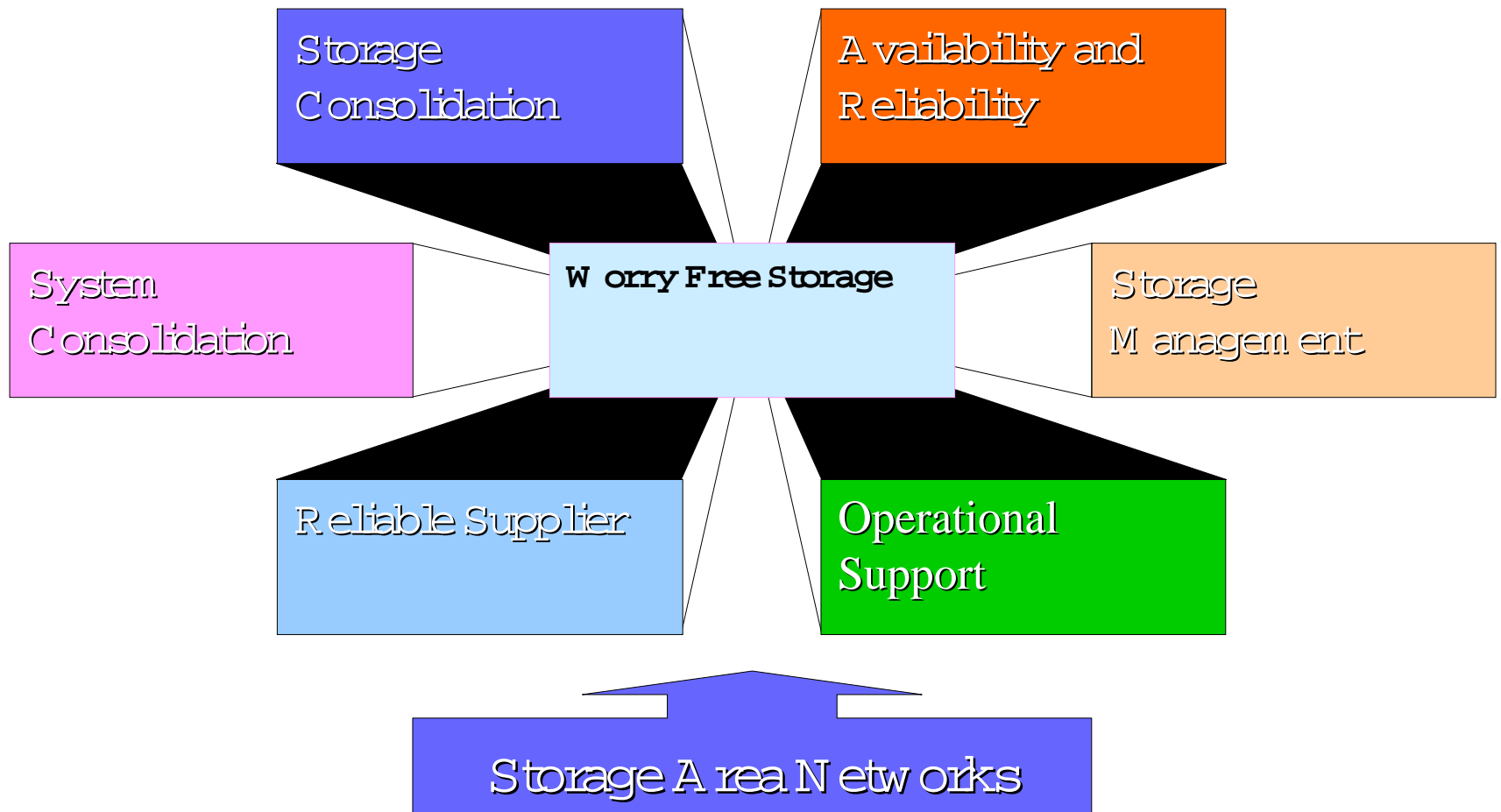
# An Integrated Approach to SAN Solutions

**Solaris**

**MPE/iX**

**NT**

**HP-UX**

Application & Database Servers
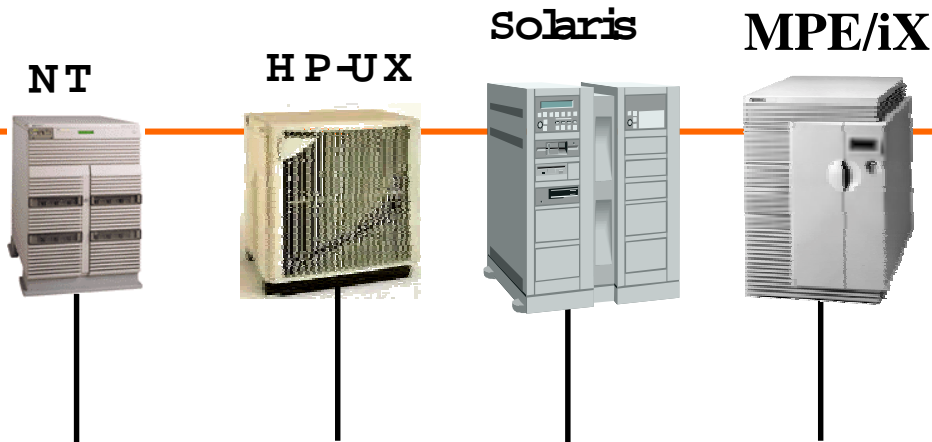
**FibreChannel Infrastructure**

**Storage Management**

**Storage Hardware Devices**

**Consulting & Service**

## Storage Area Network

Storage/ Back-up Server

**Storage Solutions**
Backup
Recovery
Archiving
Fail-Over
DSS
Consolidation

### Storage Management
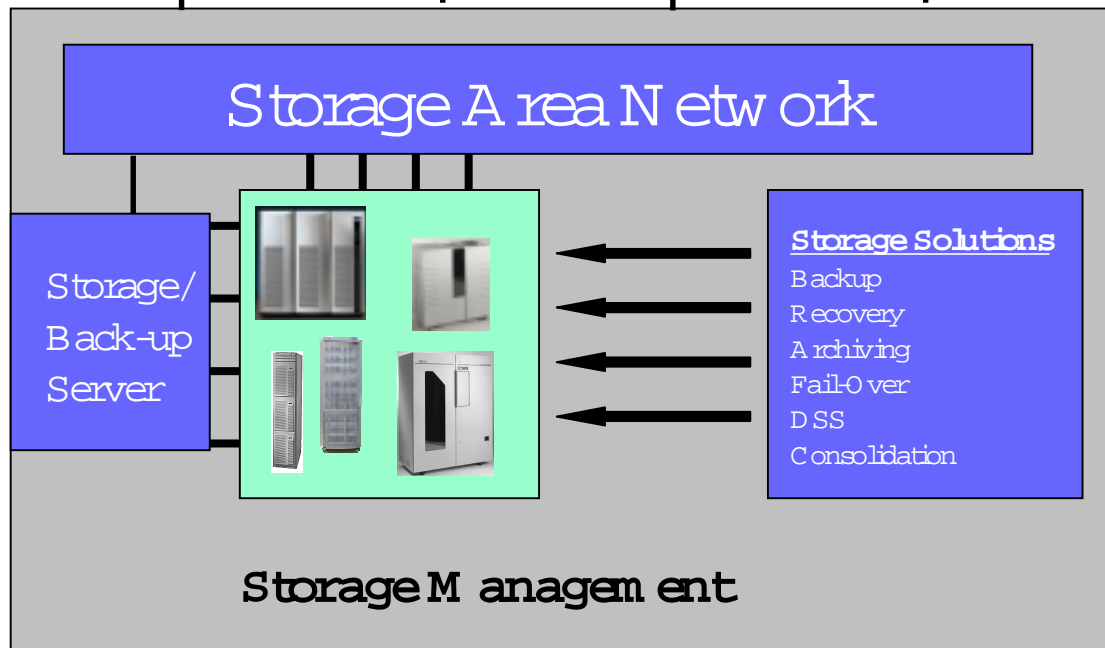
### SAN Difference
An integrated and complete approach that offers improvement in availability, reliability and manageability needed to provide customers with a stress-free storage environment

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# LAN Backup

PC/Workstations

**Local Area Network**

Oracle
Server

SAP
Server

Backup
Recovery
Server

SCSI

SCSI

SCSI

Data

Data

Tape
Optical
Library

# LAN –Free Backup

Retail   Airline   Stocks   Supplier   Insurance

Business Network

Backup Server

FC Switch

FC Hub or
Switch

Router or
Bridge
SCSI
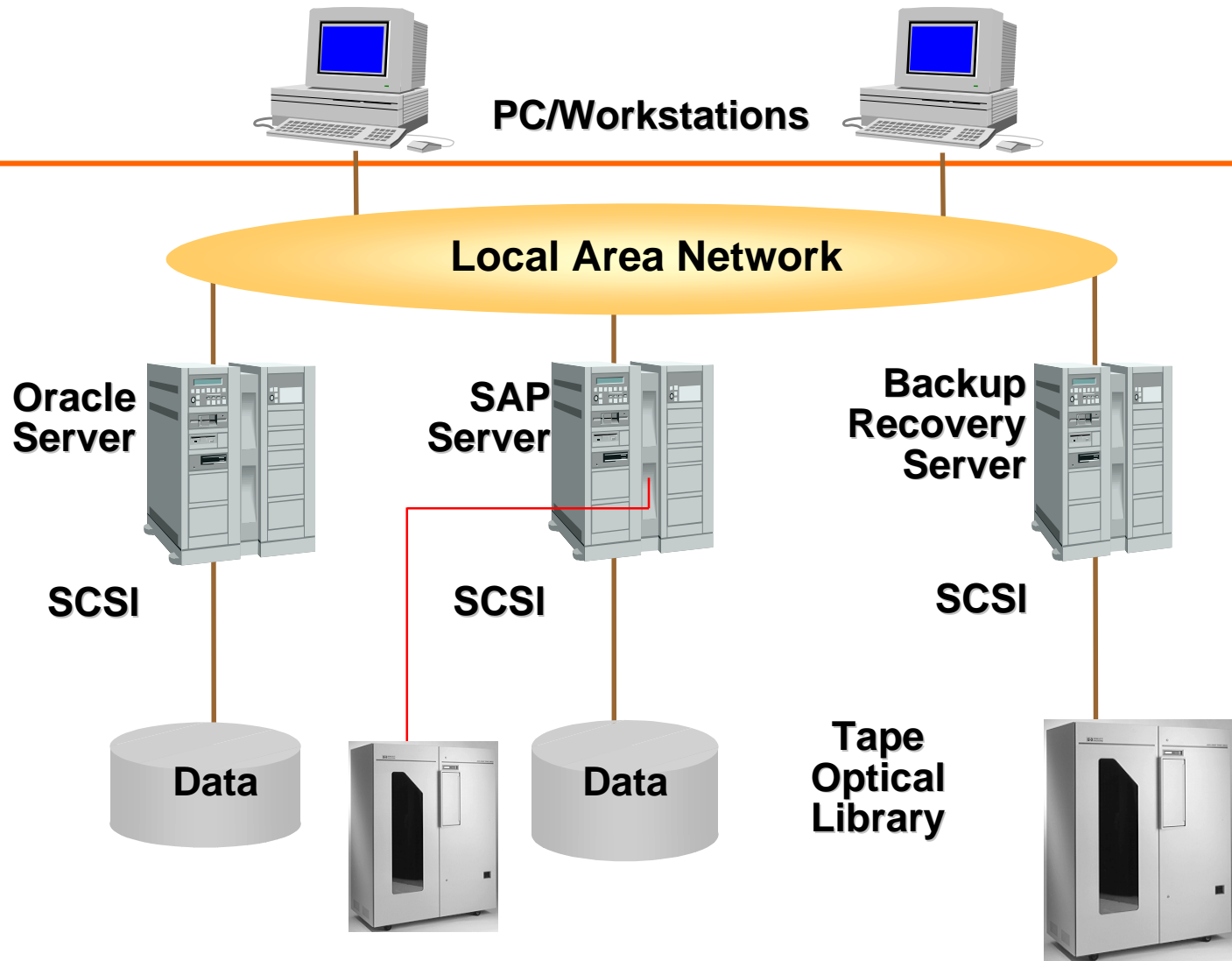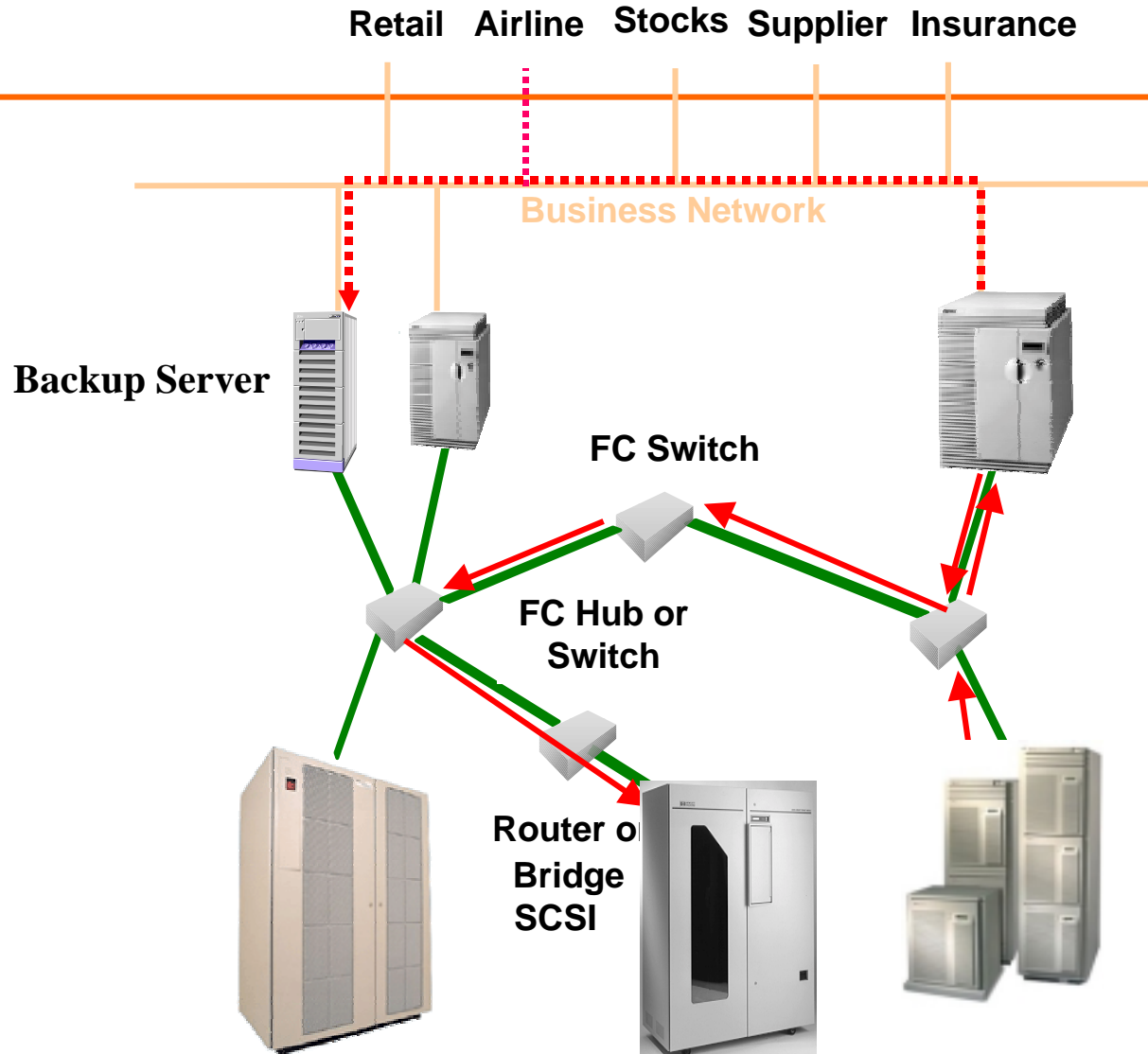
# Why Should Customers Deploy SANs?

POWERED BY HP...
HP **e3000**

## Serverless Backup

PC/Workstations

**Messaging Network**

Application Servers

Storage Server

**Storage Area Network**
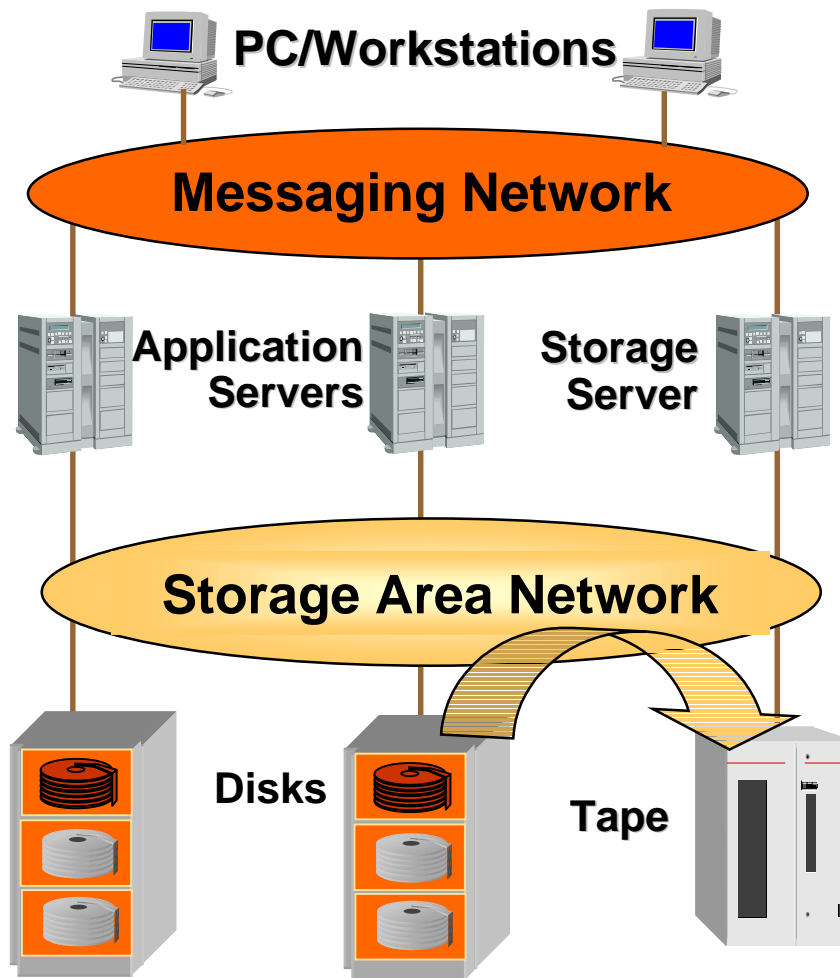
Disks

Tape

• Direct disk-to-tape and disk-to-disk storage

• No impact to LAN or application servers

• Enables continuous
  - Backup
  - Replication
  - Restore

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# High Availability Cluster

- **De-couples applications from physical server to disk connection**

- **Up to 100 collaborative servers**

- **Enables dynamic responses to changing processing conditions**

- **Clusters foster key SAN attributes**
  - **Resource sharing**
  - **Any-to-any connectivity**
  - **Fault resistant**
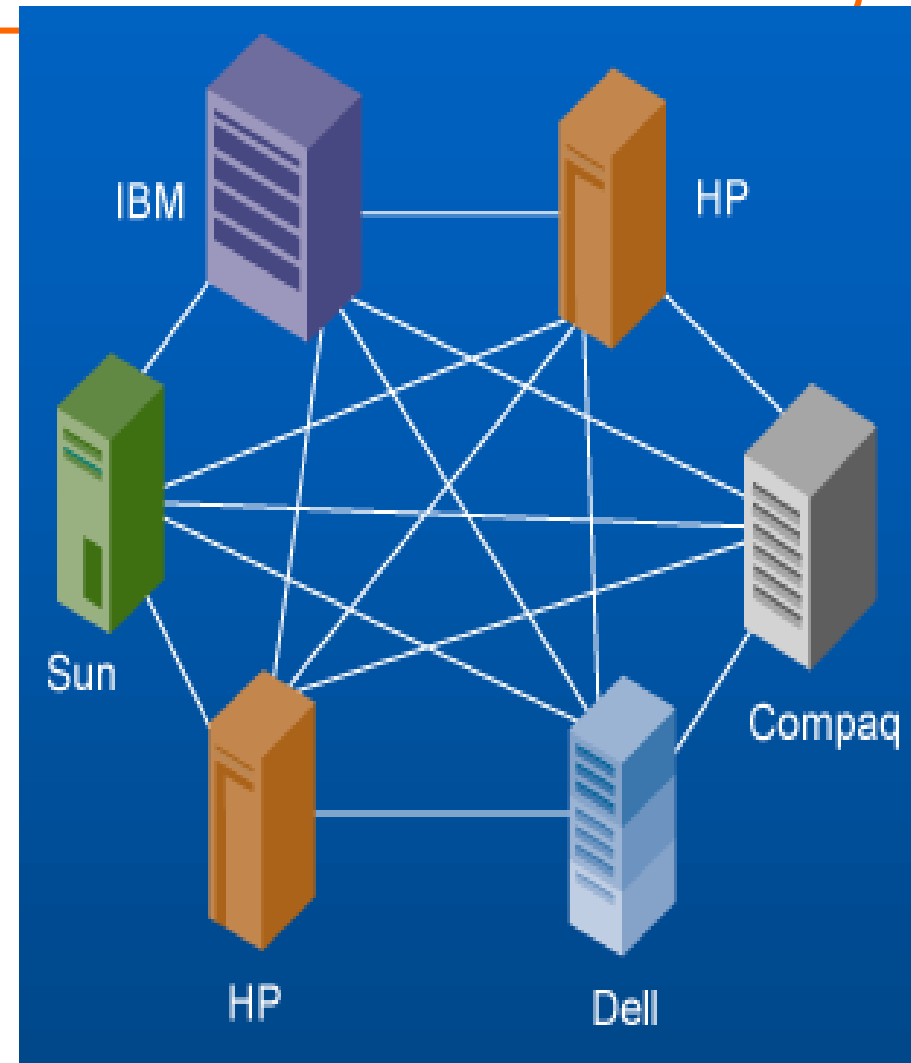
# High Availability

- Highly redundant systems
- No single point of failure
- Supports of multiple paths to the data
- Resource sharing
- Fault resistant

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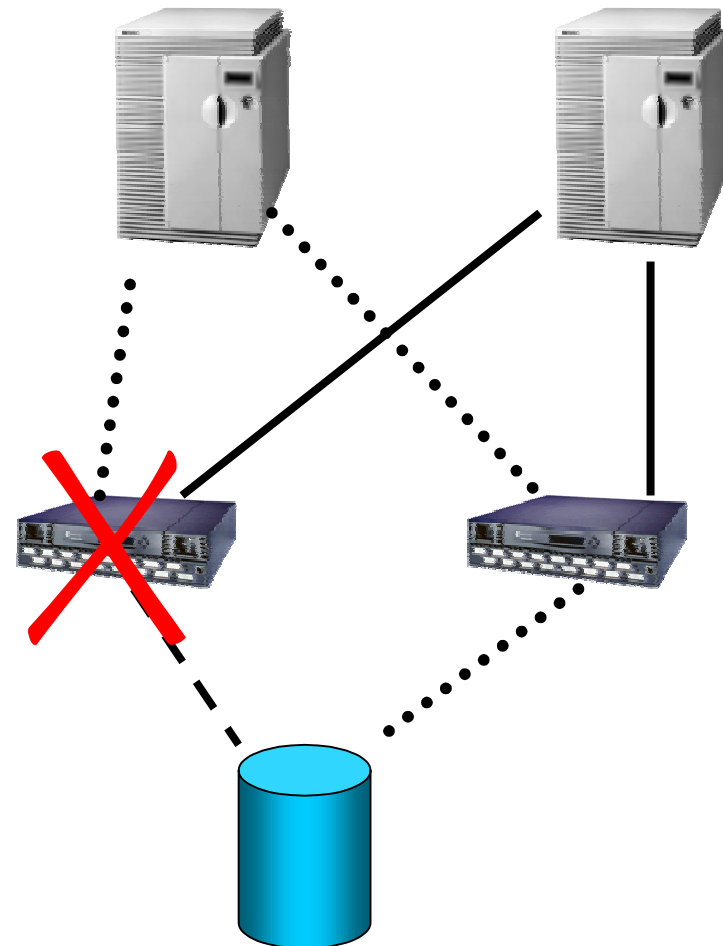
# **High Availability**

## How Highly Available will it be?
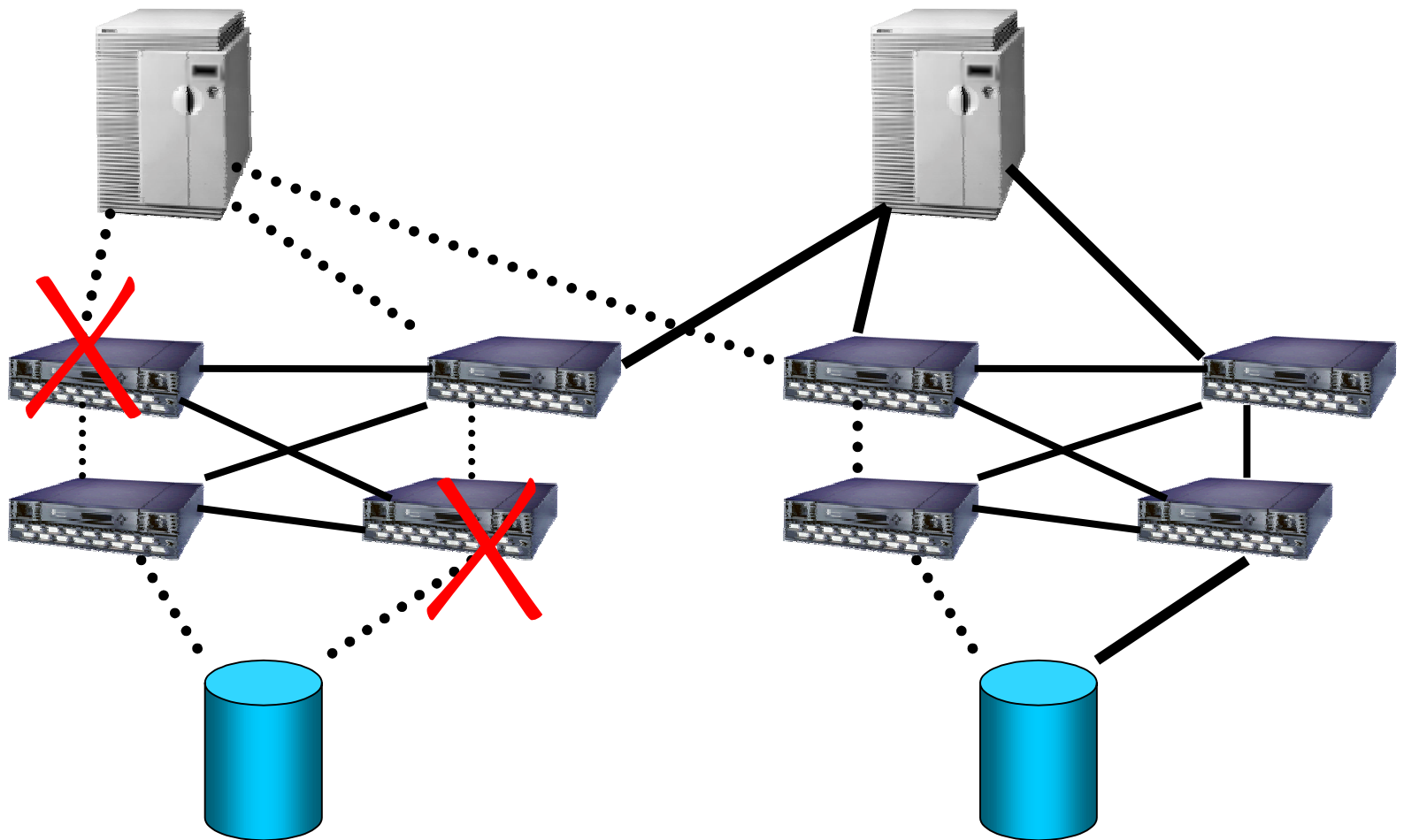


Highly redundant Fibre Channel network

To Hosts

**FC HBAs**

**FC HBAs**

**FC HBAs**

**FC HBAs**

*Resource Management Server*

Management FC Hub

Management FC Hub

Management FC Hub

Management FC Hub

Management FC Hub

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Management FC Hub
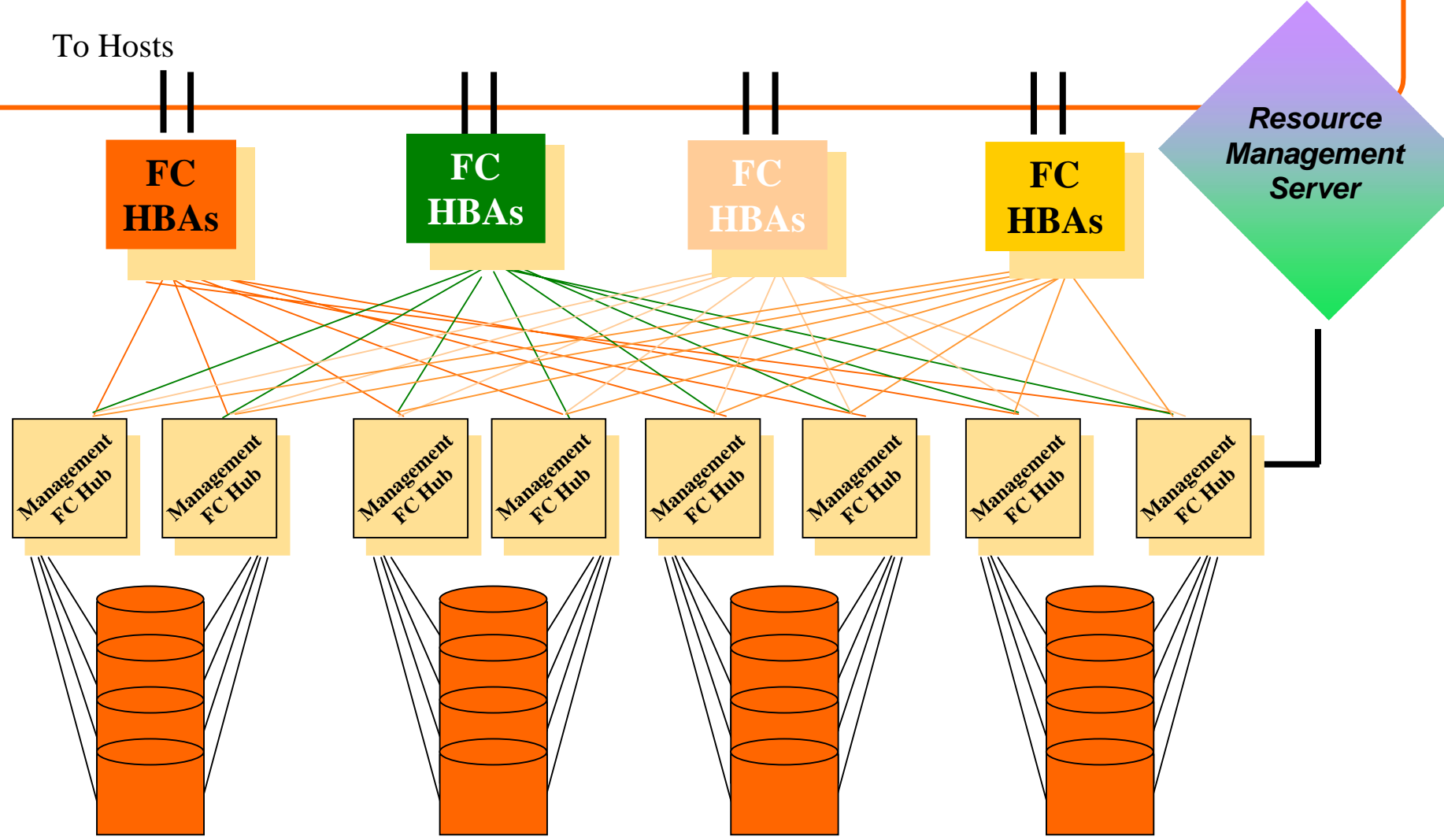
# SANs WILL EVOLVE as LANs DID

POWERED BY HP...
HP *e*3000

**1**   **2**   **3**

1980

**LAN**

- Islands of networking
- Mainly homogeneous
- Few standards

- Networks managed as separate entities
- Standards emerge (e.g. SNMP MIBs)
- Rise of network admin

- Self-healing networks
- Policy-managed
- Rise of network architect

1990

**SAN**

- Islands of storage
- Mainly homogeneous
- Few standards

- Storage managed as a separate
- and distinct entity
- Standards emerge (e.g. SNMP MIBs)
- Rise of storage admin

- Self-healing storage
- Policy-managed
- Rise of storage architect

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# Campus and Metropolitan Storage Networks Now Possible

Multi-site disaster recovery at gigabit speed
Uninterrupted business operation in the event of a
    single-site emergency
More servers, accessing more data, simultaneously,
    than ever
Deployment flexibility when floor space is at a
    premium

**Data Center B**

10 kilometers

True disaster recovery at Gigabit FC-AL
    speeds
10 ports per Fibber-channel-arbitrated-loop
    (FC-AL) hub
Cabling options ranging from .5 to 10
    kilometers
More than 4x the storage density of SCSI I/O
    cards
    Servers connected across campus or across town

**Data Center A**

**POWERED BY HP...**
**HP e3000**

Storage as a 'network service'

Ubiquitous, transparent and highly available

Transparent management of data and network operations

Applications    Storage    CPU

Information

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# Supporting Slides
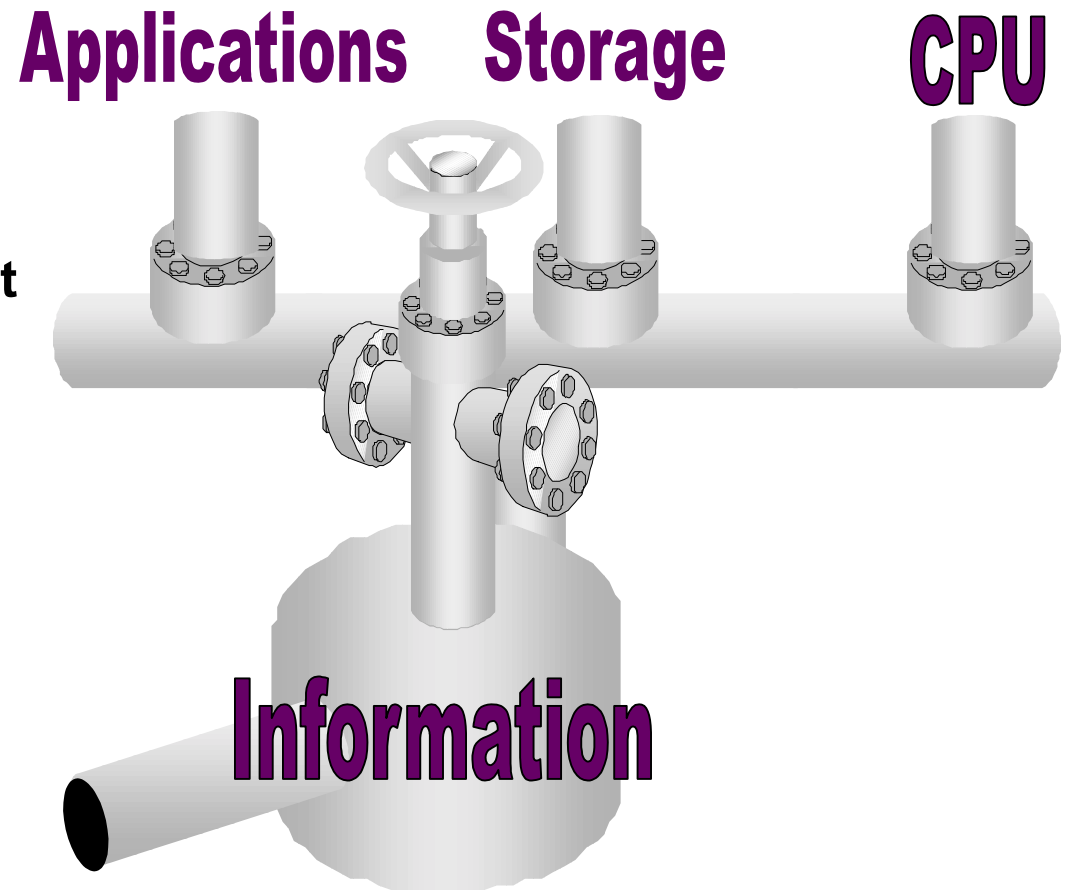
# HP Dominates Fiber Channel

## *HP Tachyon FC chip family*

- **The dominant supplier of FC protocol integrated-circuits and modules in the industry**
- **HP owns 80% of the FC chip market**

**STK**          **EMC**                                **CLARiiON**

*Prisa Systems*

                              *Ciprico*                          *Unisys*

*Genroco*

        **Fujitsu**                    **NEC**

                                                        Symbios Logic
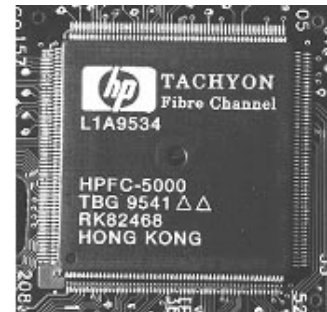
# Fibre Channel Connectivity

- Point to Point
  - **SCSI replacement**
  - **Distance Extension**
- FC-AL
  - **Optimize cabling infrastructure**
  - **Managed elements**
  - **OLTP device focus**

- Fibre Channel Fabrics
  - **Combination of point to point, FC-AL, and FL or switched connections**
  - **Optimizes multiple aspects of the SAN**
    - **Number of connections**
    - **Sequential Bandwidth**
    - **IO/s for OLTP**
    - **Cost**
  - **Offers superior SAN management**

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# Offline Support

- DLT tapes drives and libraries with FC Multiplexer
- Multiplexer with FC-AL Hubs
  - **Distance extension up to 10 km**
  - **Disaster recovery at gigabit speeds**
- STK and HP DLT Library tape , Wolfcreek and Powderhorn with FC Multiplexer
- Switch and fabric support planned for second half on 1999 for HP UINX. HP 3000 support planned for Late 2001/2002

# Reference Data Center Design
## (Storage Viewpoint)

**POWERED BY HP...**
**HP e3000**

**Client**  **Client**

**Internet -- Anyone in the World can access**

**Client**  **Client**

**Encrypted & Secured Management Traffic**

**Firewall(s)**

**Operations Management**
- OpenView NNM or IT/O
- Tivoli, CA Unicenter, etc
- Can launch X-window or web browser window

**Remote Access (Dial-in)**

**WAN Intranet**

**Intranet -- Logically secure behind firewall(s), all employees access**

**Servers in a Data Center**

**System Attached Storage ("SAS")**

**MPE/iX**

**Management Depends on Physical Security**

SCSI or FC

**SCSI or FC**

SCSI    Tape, DVD, etc

**System Manage-ment Server**

**SAS behind systems**

**Arrays behind systems**

**Network Attached Storage (NAS)**

**Management Network -- Physically secure (10/100 BaseT)**

**Cluster Network(s) -- Optional**

**Storage Network(s) (FibreChannel)**    **Usually multiple smaller storage networks; optical patch panels?**

**Midrange Arrays**

**Storage Node Manager Server**

*Storage is managed in-band via agent software in system(s) on its storage network*

**SAN Storage**

**Enterprise Arrays**

**Tape Libraries**

**Backup Server(s) and/or SAN Agents**

**Centralized Backup Service**

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