SANs: Real World Solutions

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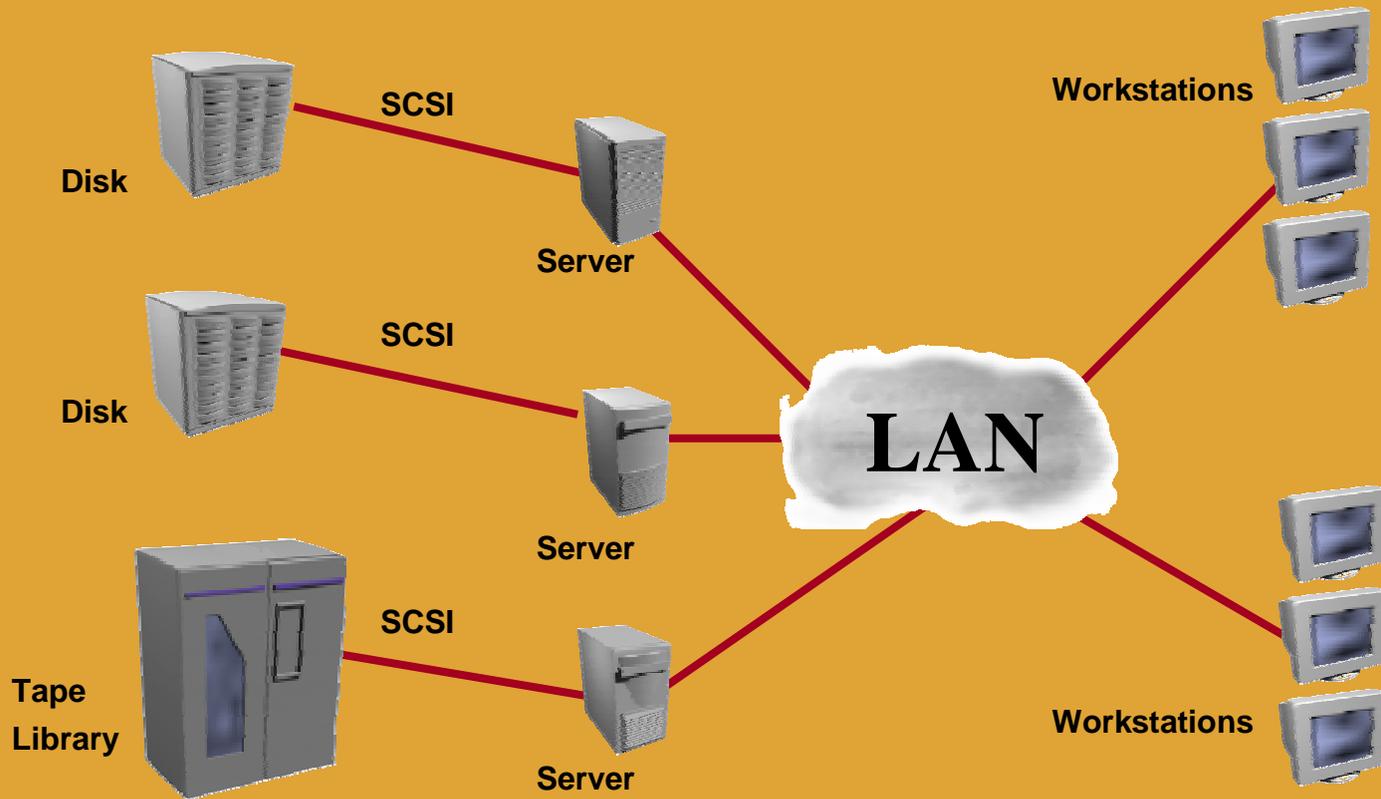1-800-448-6314
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Agenda

- **SAN Background Information**

- **Real World SAN Solutions**

- **SAN Deployment Case Study**

- **Summary**

- **Questions**

SAN Background Information

The Traditional Approach

Limitations to Traditional Approach

- Storage is isolated on individual servers (storage islands)
- Point-to-point SCSI connections only
- Backup, disaster recovery, and file sharing over LAN
- Storage islands scale poorly
- Storage islands are difficult to centrally manage

Mounting Challenges

- Applications outpace storage system capabilities
- Applications are business critical
- Open Systems capacity is exploding
- Heterogeneous environments have varying storage needs

Mounting Challenges

- Existing networks provide limited bandwidth for data intensive applications
- Current interconnects are not scaling to meet this challenge
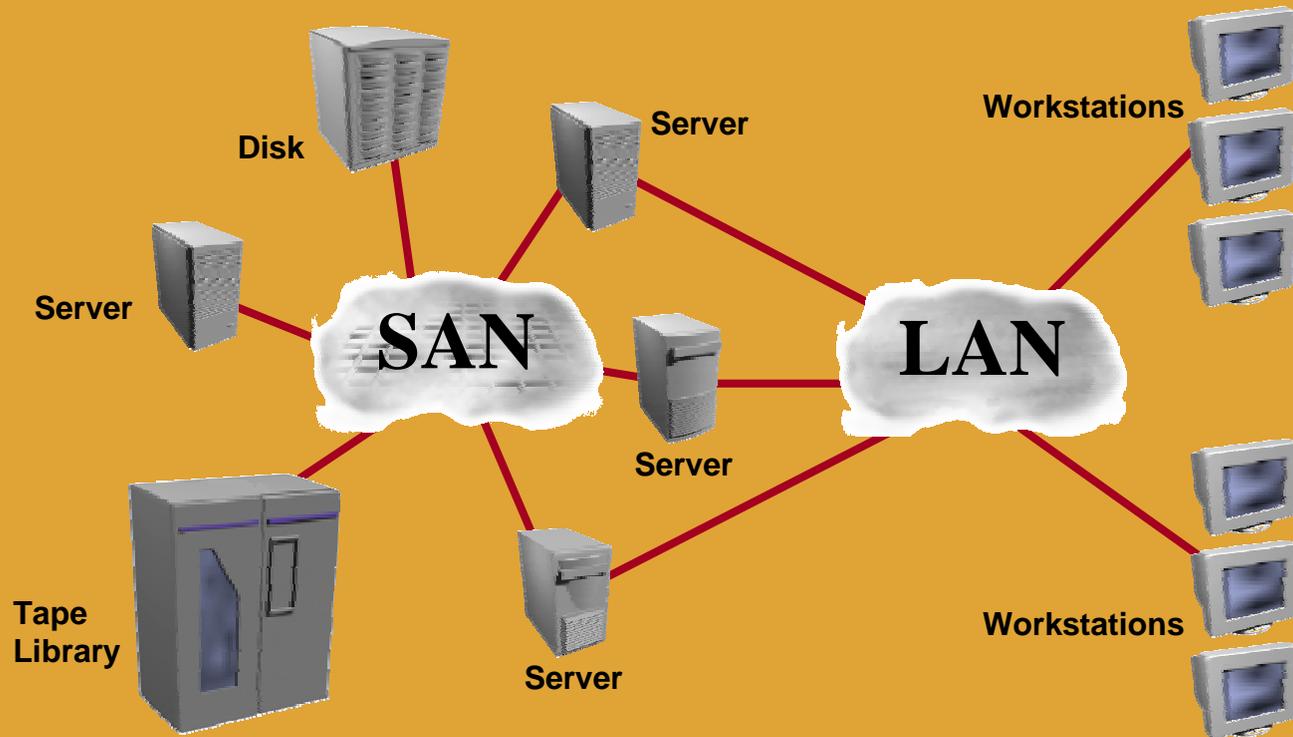- MIS staffs at capacity/shortage of qualified talent

Storage Changing from Tactical to Strategic

- Storage used to be tactical (add-on to servers)

- The importance and growth of storage has elevated storage/storage management to a strategic position

Storage Architecture Wish List

- Bandwidth Intensive Media and Protocols
  - High throughput
  - High I/O

- High Availability

- Simplified Scalability

- Enhanced Functionality
  - Simplified configuration/tuning
  - High performance backup
  - Disaster avoidance/recovery
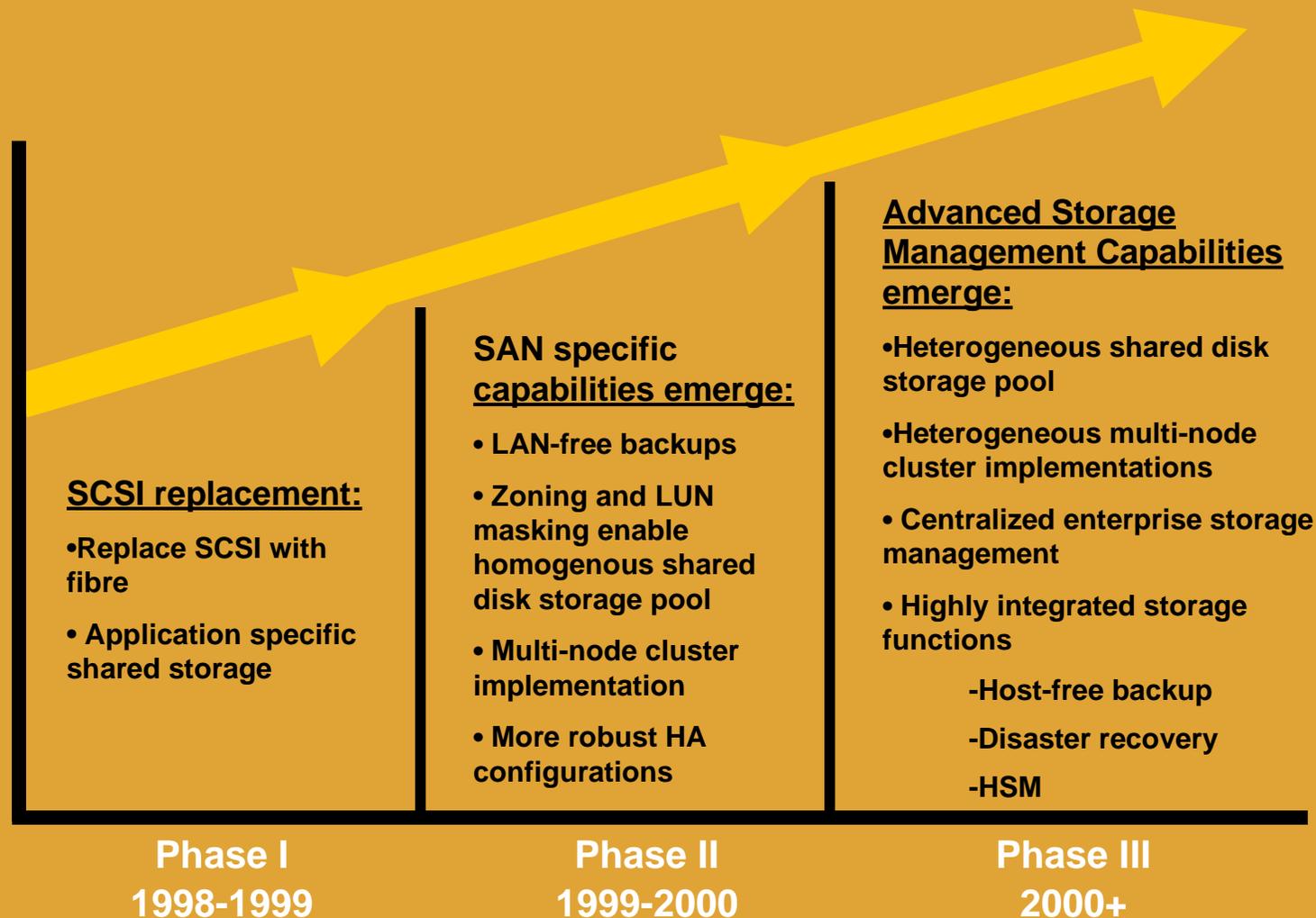 - Data sharing
  - Server and storage consolidation

SAN Addresses Limitations

SAN Evolution

- Education

- Planning

- Acceptance

- Implementation

SAN Deployment Road Map

SCSI replacement:

- Replace SCSI with fibre
- Application specific shared storage

SAN specific capabilities emerge:

- LAN-free backups
- Zoning and LUN masking enable homogenous shared disk storage pool
- Multi-node cluster implementation
- More robust HA configurations

Advanced Storage Management Capabilities emerge:

- Heterogeneous shared disk storage pool
- Heterogeneous multi-node cluster implementations
- Centralized enterprise storage management
- Highly integrated storage functions
    - Host-free backup
    - Disaster recovery
    - HSM

Phase I
1998-1999

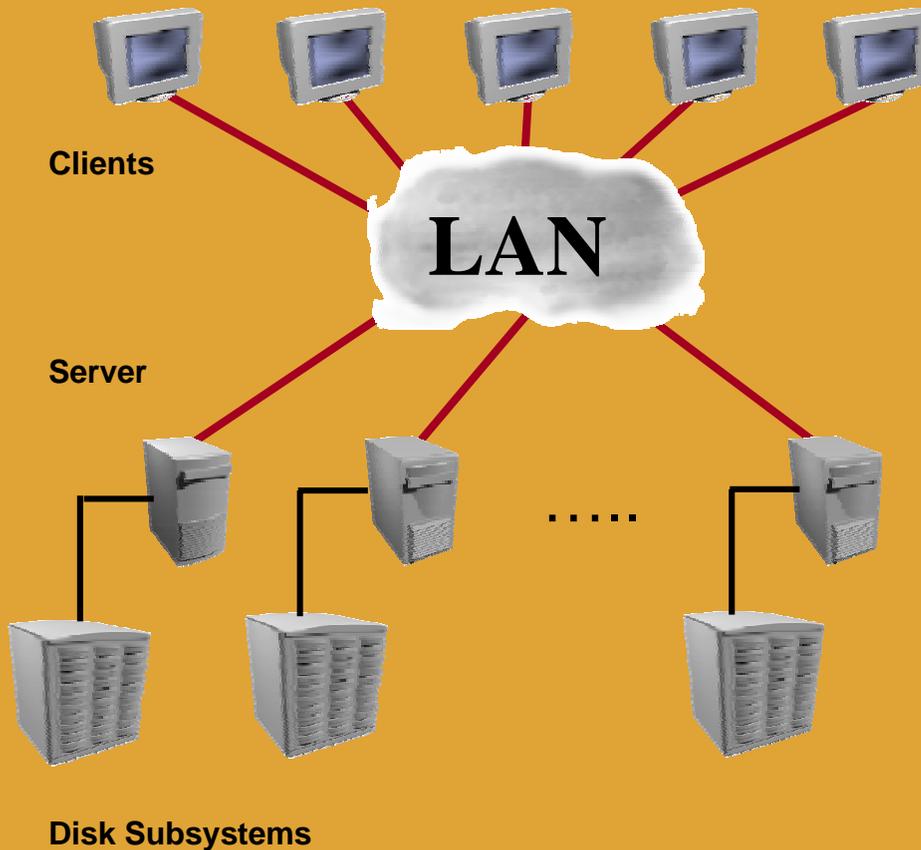**Phase II**
1999-2000

Phase III
2000+

Fibre Channel Building Blocks

- Fibre Channel Host Bus Adapters (HBA)
- Bridges (Fibre to SCSI)
- Hubs
- Switching Hubs
- Switches
- Directors

Real World SAN Solutions

Traditional Network Configuration

Clients

LAN

Server

. . . . .

Disk Subsystems

Limitations:

- Difficult to manage
- Does not scale well
- Percent utilization is not good
- If server fails, lose access to all data
- Difficult to reassign capacity

Example 1: Storage Consolidation

Clients

LAN

NT   NT   NT

Servers

. . . . .

Switch

Benefits:

+ Consolidate storage
+ Easier to manage
+ Reduce administration costs
+ Higher end storage system
+ More fault tolerant solution
+ Storage investment spread across multiple servers
+ More efficient use of total capacity

Disk Subsystem

Example 2: Scaling Capacity and Servers

Clients

LAN
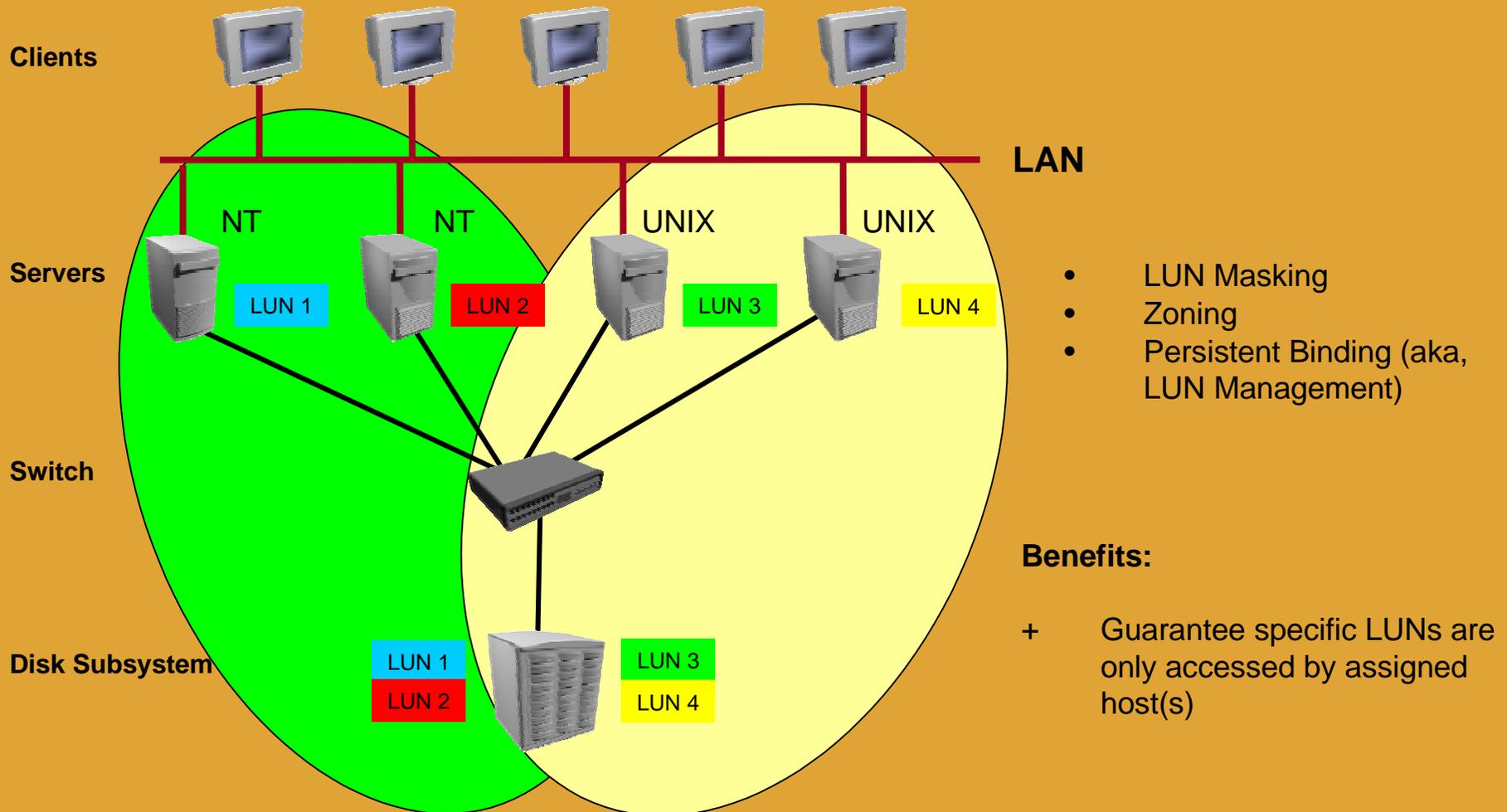
NT   NT   UNIX   UNIX   UNIX

. . . .

Servers

Switch

Disk Subsystem

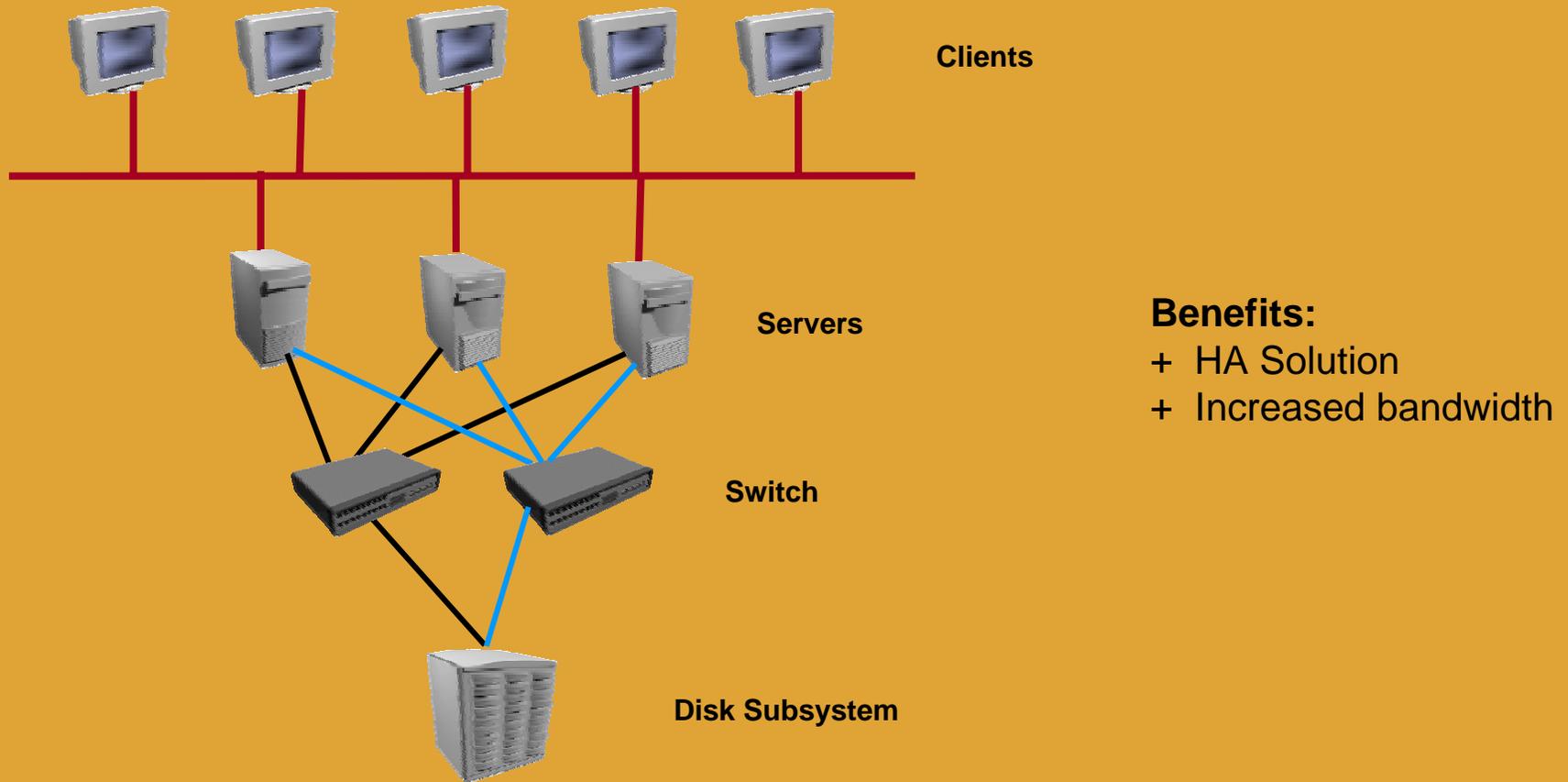**Benefits:**

+ Scales easily
+ Decouple servers and storage
+ Add servers as application needs increase
+ Add storage as capacity needs increase
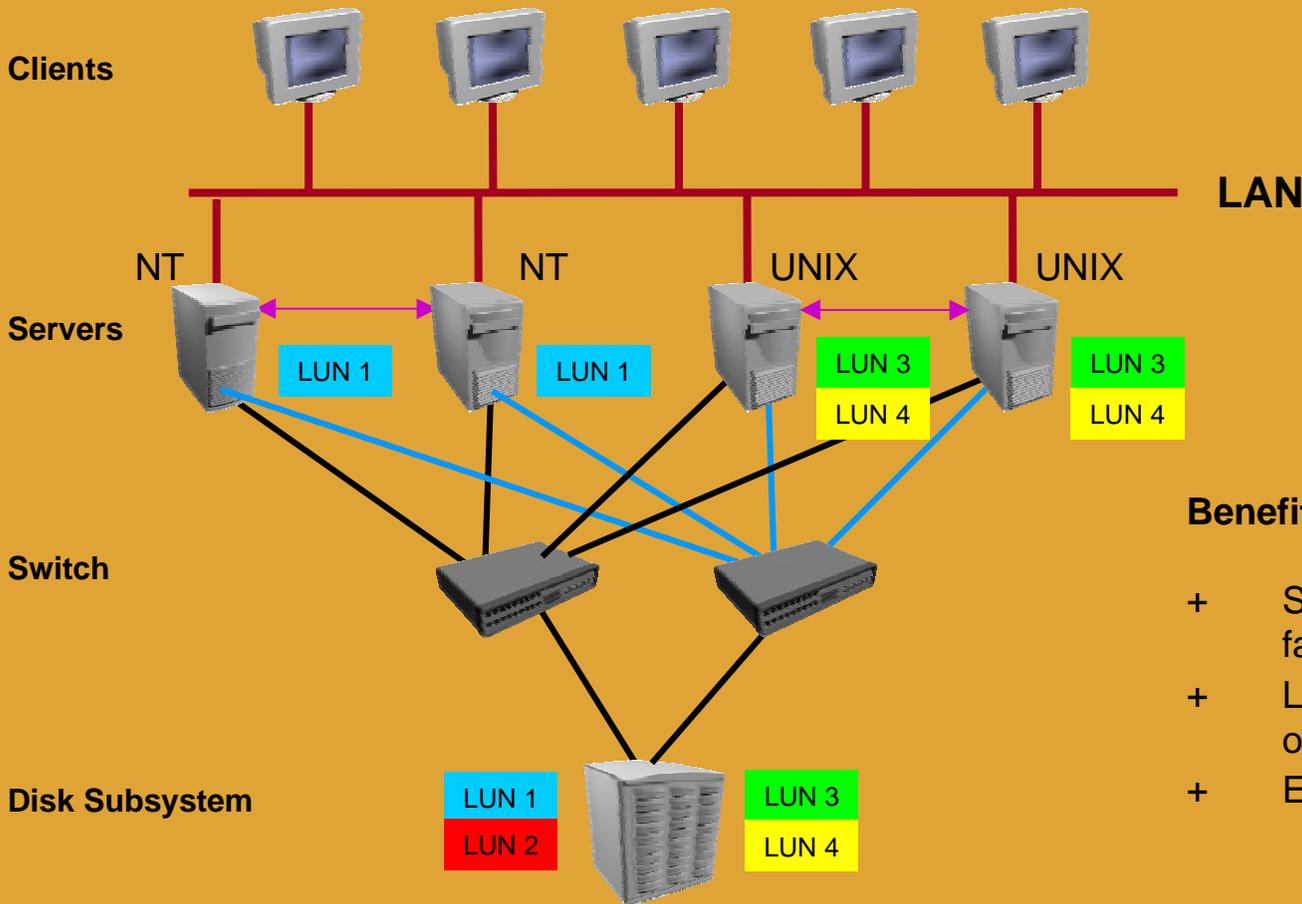+ Add switches as connectivity needs increase

Example 3: Managing "Any-to-Any" Connectivity

Clients

LAN

Servers

NT   NT   UNIX   UNIX

LUN 1   LUN 2   LUN 3   LUN 4

- LUN Masking
- Zoning
- Persistent Binding (aka, LUN Management)

Switch

Disk Subsystem

LUN 1   LUN 3
LUN 2   LUN 4

Benefits:

+   Guarantee specific LUNs are only accessed by assigned host(s)

Example 4: Add I/O Path Failover

Clients

Servers

Switch

Disk Subsystem

Benefits:
+ HA Solution
+ Increased bandwidth

Example 5: Clustered Environments

Clients

LAN

NT   NT   UNIX   UNIX

Servers

| LUN 1 | | LUN 1 | | LUN 3 | | LUN 3 |
| | | | | LUN 4 | | LUN 4 |

Switch

Benefits:

+ Server removed as single point of failure

+ Leverage scaling capabilities of SAN

+ Enhances HA solution

Disk Subsystem

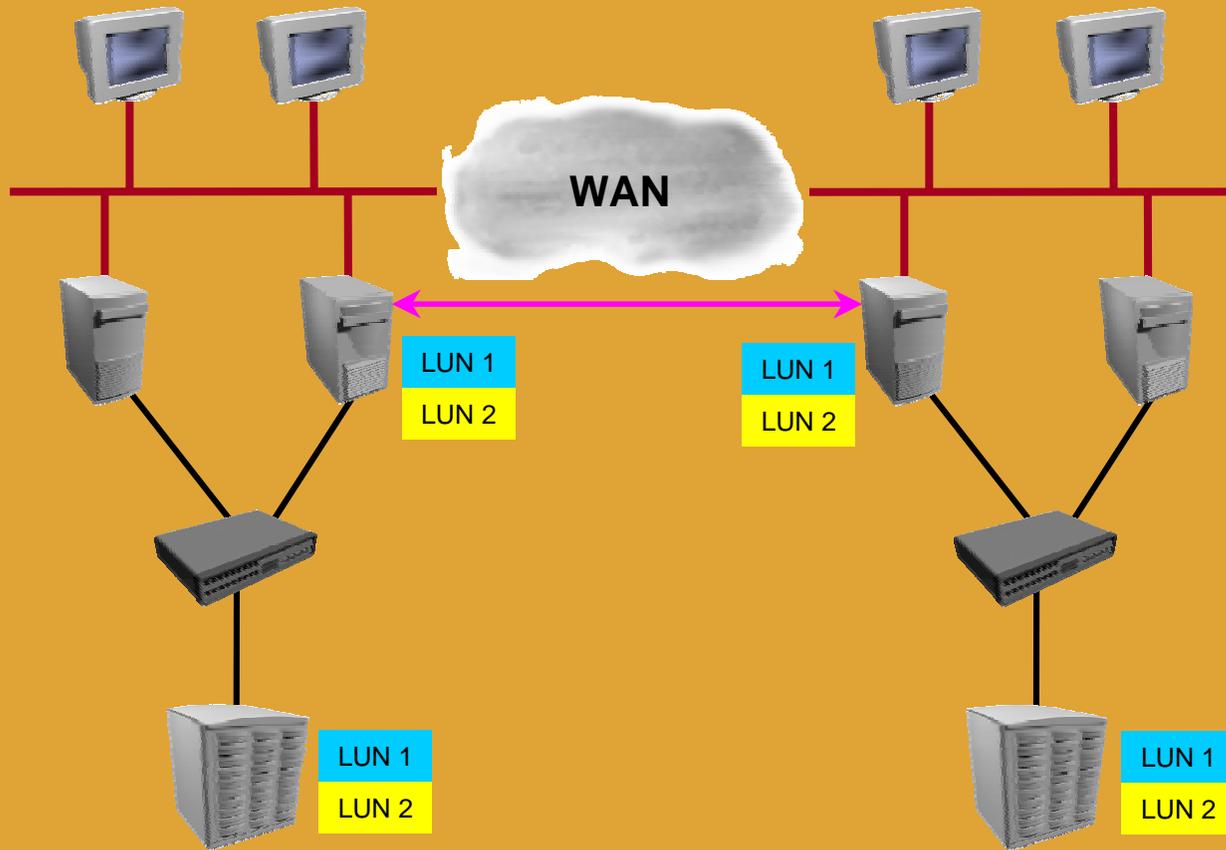| LUN 1 | | LUN 3 |
| LUN 2 | | LUN 4 |

Example 6: Remote Mirroring Across a Campus

Building #1

Building #2

LAN

NT
NT
NT

LUN 1
LUN 2
LUN 2

LUN 1
LUN 2

LUN 1
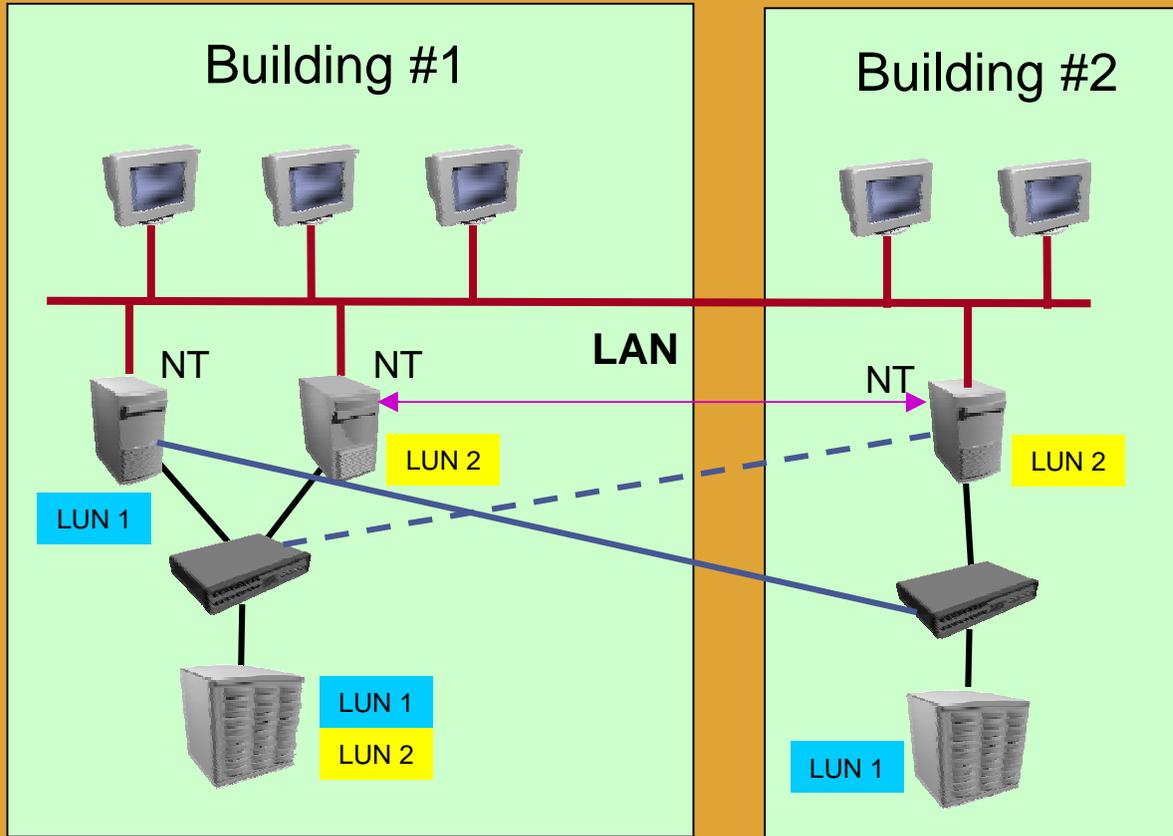
Benefits:

+   Highest Availability
+   Disaster Recover solution

Example 7: Remote Mirroring across a WAN

WAN

LUN 1
LUN 2

LUN 1
LUN 2

LUN 1
LUN 2

LUN 1
LUN 2

Benefits:

+ Co-location of data
+ Disaster Recover strategy

Traditional Network Backup Configuration

Clients

LAN

Server

Novell

UNIX
.....

NT

DDS
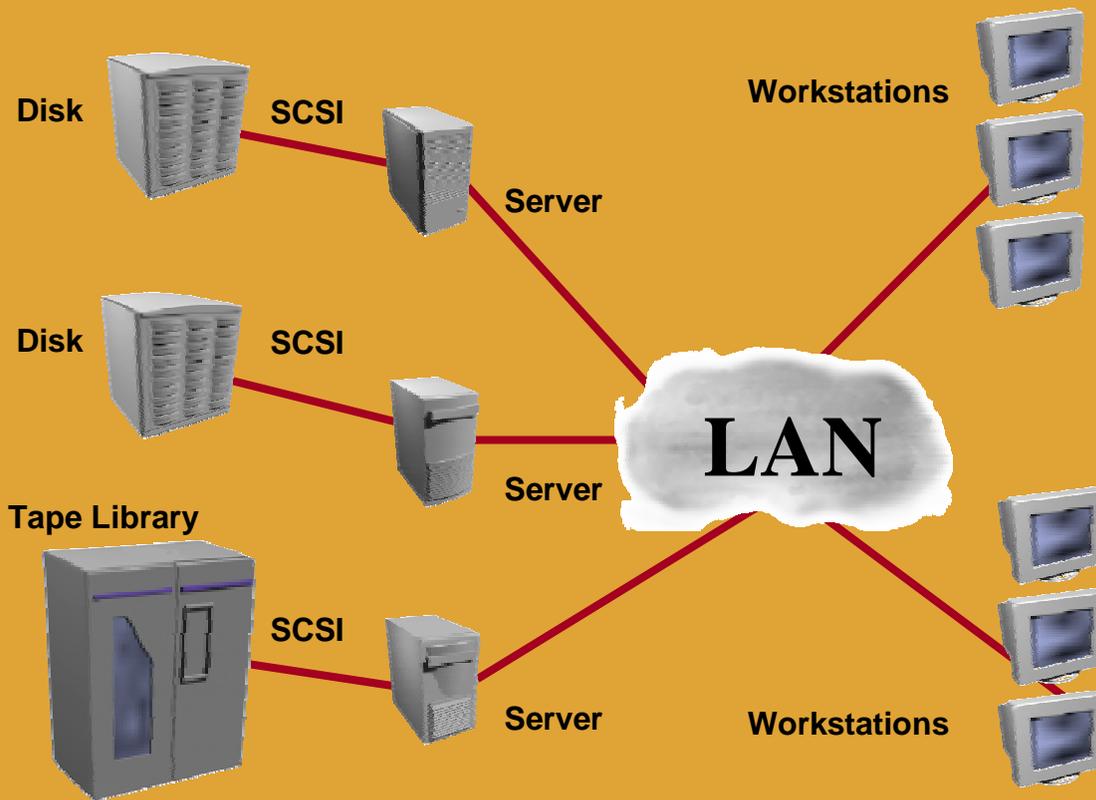
DLT

AIT
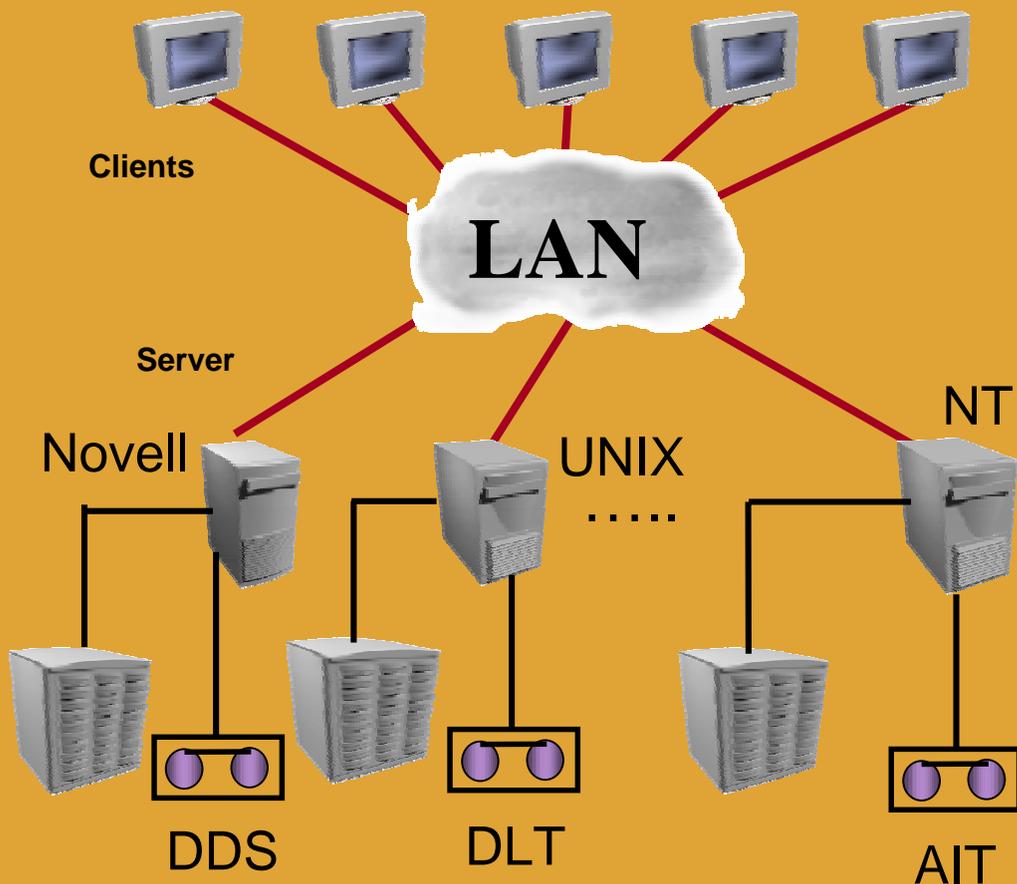
Limitations:

- No centralized management
- Multiple backup software
- No standardized tape technology
- Manual tape media management
- Does not scale well
- If server fails, loose access to all data

Dedicated Backup Server Over LAN

Disk — **SCSI** — **Server**

Disk — **SCSI** — **Server**

Tape Library — **SCSI** — **Server**

LAN

Workstations

Workstations

Advantages:

+ Centralized administration
+ Standardized backup software
+ Standardized tape technology
+ Automated library
    + Robotic media handling
    + Bar-coded inventory

Limitations:

- Increased LAN traffic
- Bottlenecks
    - Individual servers
    - Network
- Does not scale well
- If server fails, loose access to all data

Sharing Tape Library via SCSI
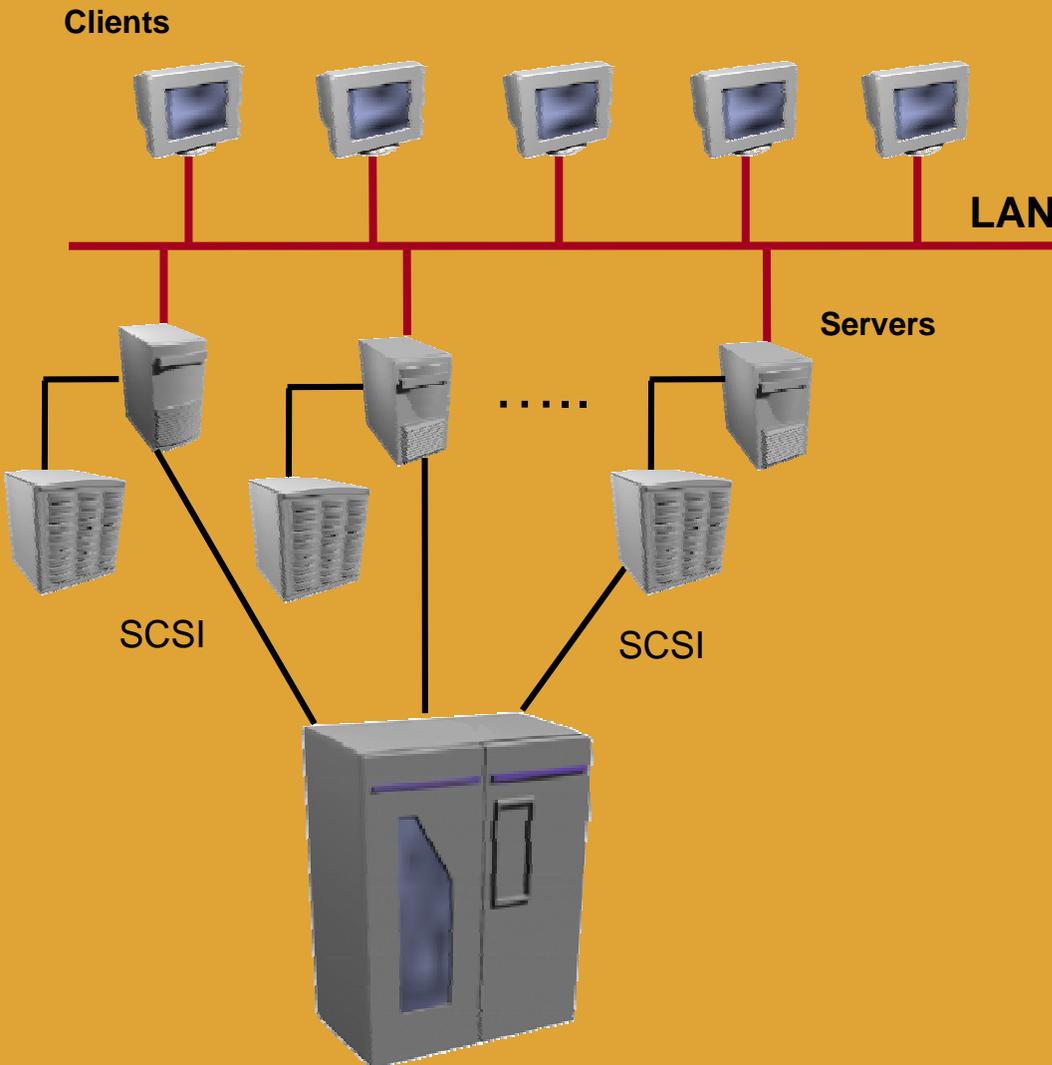
Clients

LAN

Servers

SCSI

SCSI

Advantages:

+   Centralized administration
+   Standardized backup software
+   Standardized tape technology
+   Automated library
  +   Robotic media handling
  +   Bar-coded inventory
+   Minimal LAN traffic (LAN-Free)

Limitations:

-    SCSI distance limit
-    Not able to share tape drives
-    Tape drives become very $$
-    Does not scale well

Sharing Tape Library via Fibre Channel

Clients

Servers

Fibre Channel

Switch

Fibre Channel

Tape Library
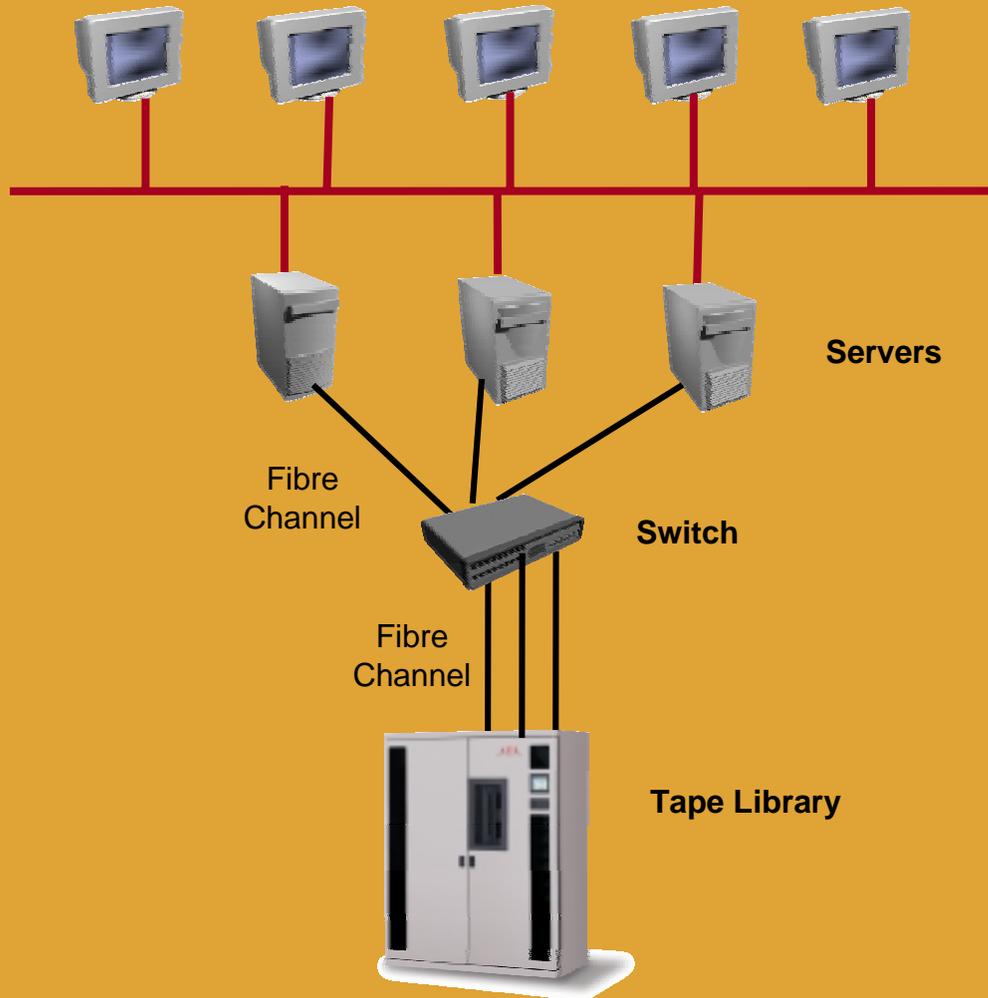
Benefits:

+ LAN-Free backup
+ Dynamic Tape Allocation
  + Best use of tape resources
+ Easily centralized
  + Fibre distances
+ Scales well

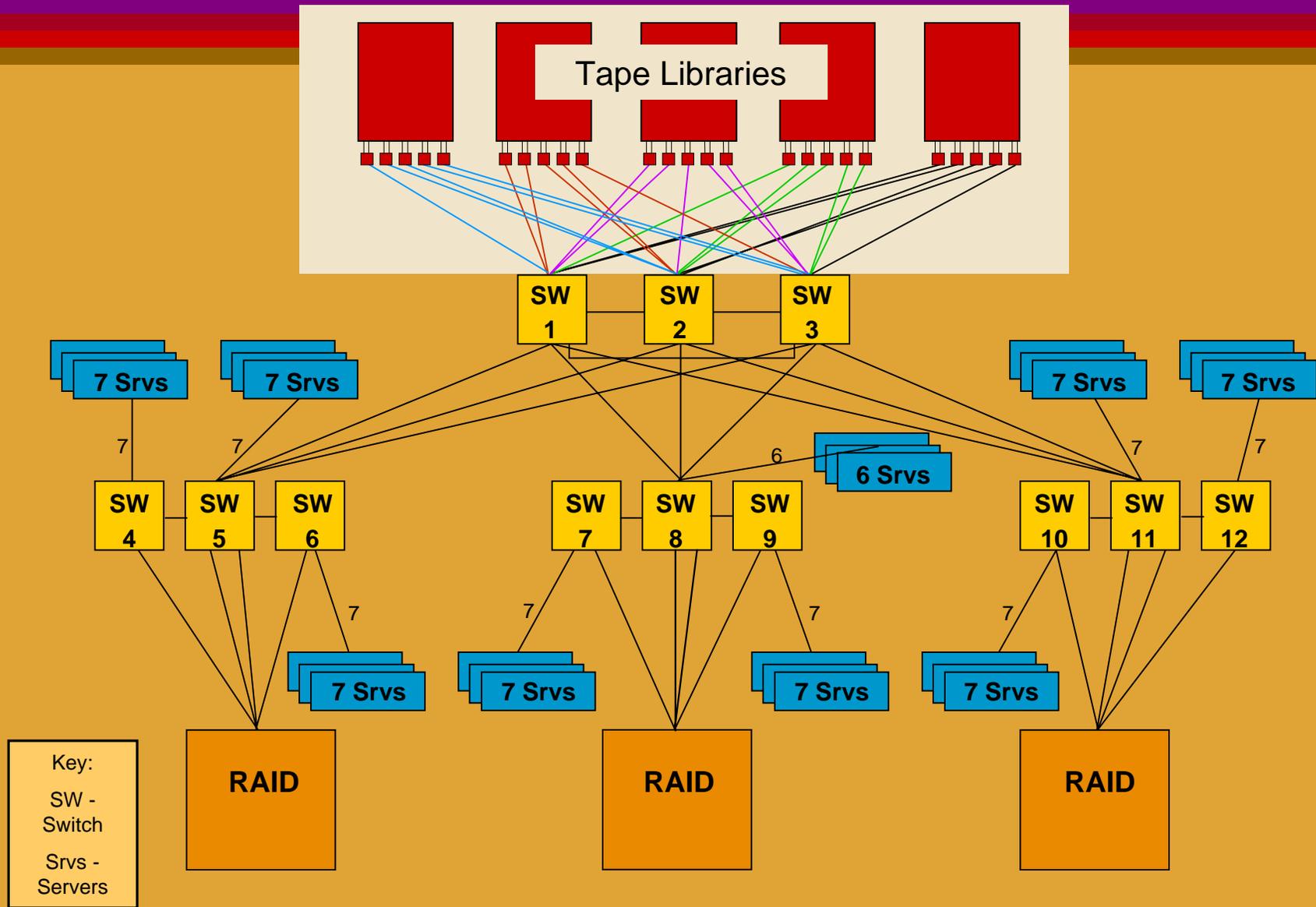# SAN Deployment Case Study

SAN Deployment Case Study

- Customer:
  - $7.5 billion, Fortune 250 manufacturer
- Original Environment:
  - Disk attached directly to servers
  - Disk storage difficult to scale
  - Direct-attached storage difficult to manage
  - All backup accomplished over the LAN

Phase 1 Implementation: Storage Consolidation

Key:

SW - Switch

Srvs - Servers

- 12 switches
- 62 NT servers
- 3 enterprise class RAID systems
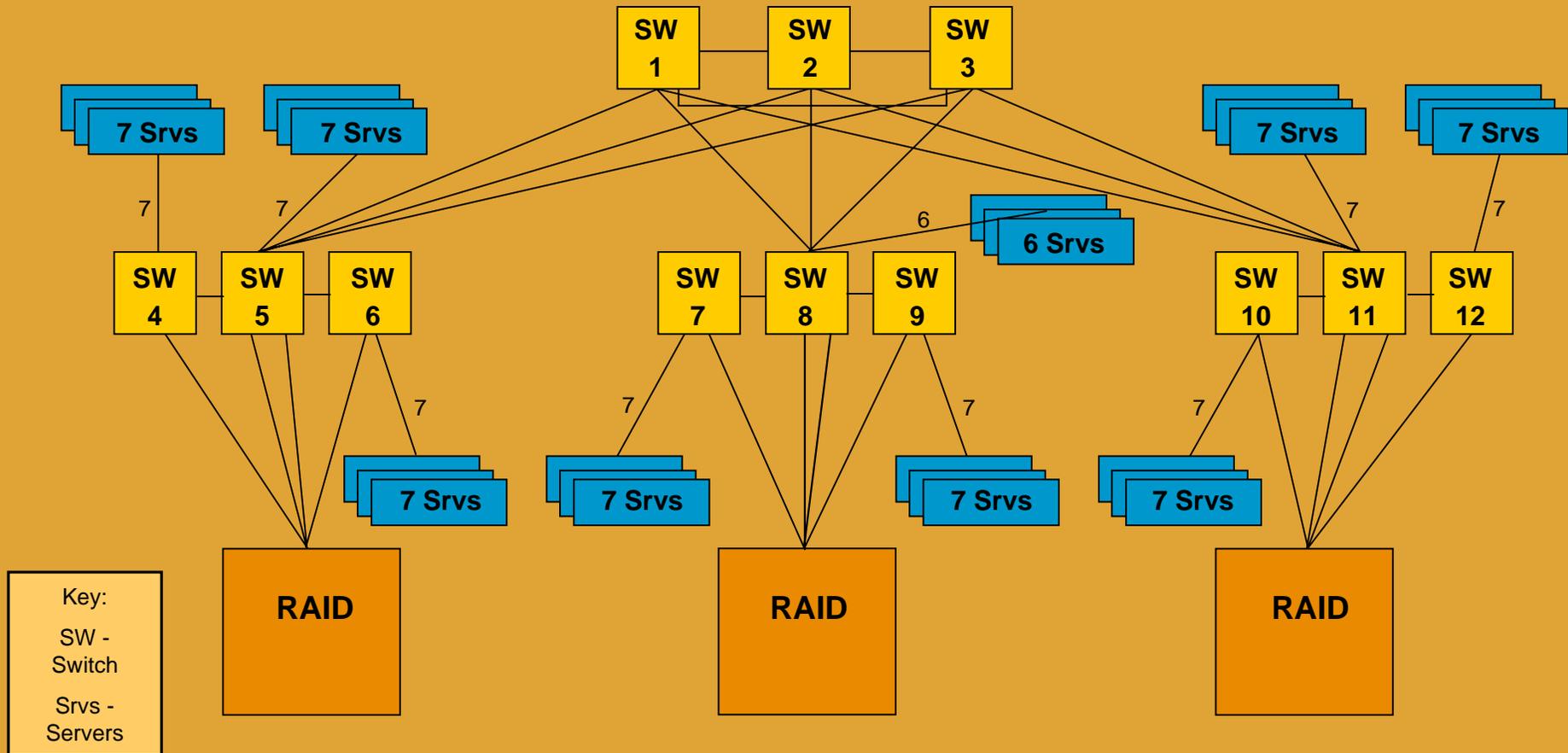
Phase 2 Implementation: LAN-free Backup

Customer Benefits

- Fully redundant storage infrastructure

- Highly scalable performance and capacity

- Simplified management through storage consolidation

- Infrastructure built for LAN-free backup

Summary

- Real production SANs are being delivered today

    - Scalable performance and capacity

    - Improved high availability configurations

    - Advantages over SCSI

    - Centralized storage administration

    - Shared storage configurations

    - LAN Free backup

Questions?

Thank You