T11

Introduction to Storage Networking

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IBM @server xSeries
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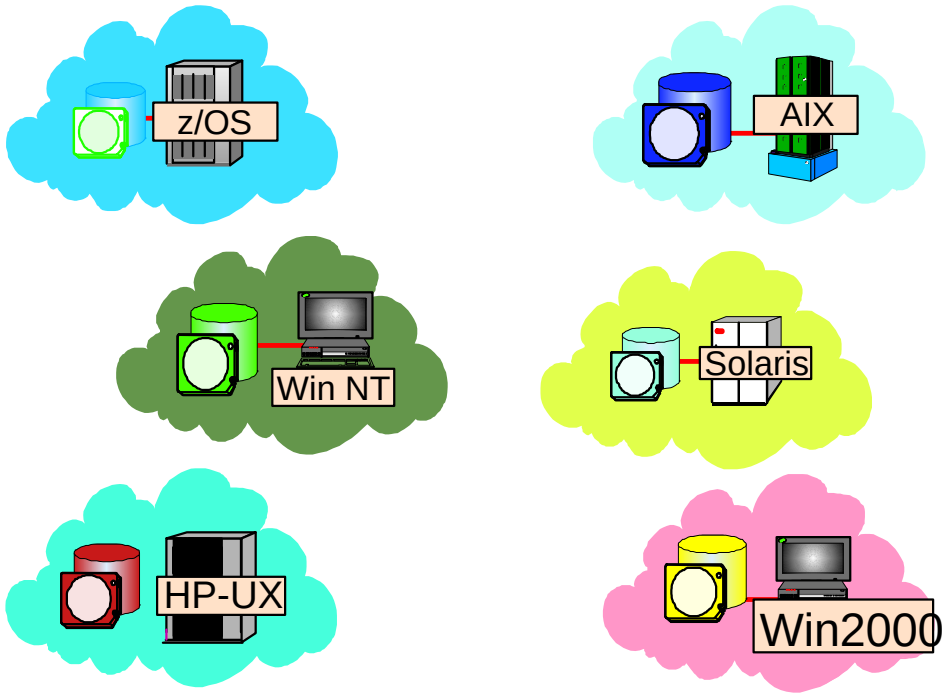
SAN - In a Nut Shell...

- SAN Infrastructure:
  1. Host Servers
  2. Storage Subsystems (Servers)
  3. SAN Networking Components (fabric)
  4. Resource Sharing (Zoning and LUN Masking)
- SAN Exploitation:
  - ★ SAN-Facilitated Applications (infrastructure exploitation)
  - ★ Network-based Intelligence (network exploitation)

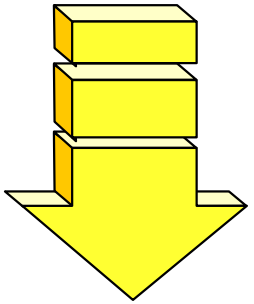
LUN - Logical Unit Number

Today's Distributed Environment

Multiple Isolated Islands of Storage



Distance and Connectivity Limitations

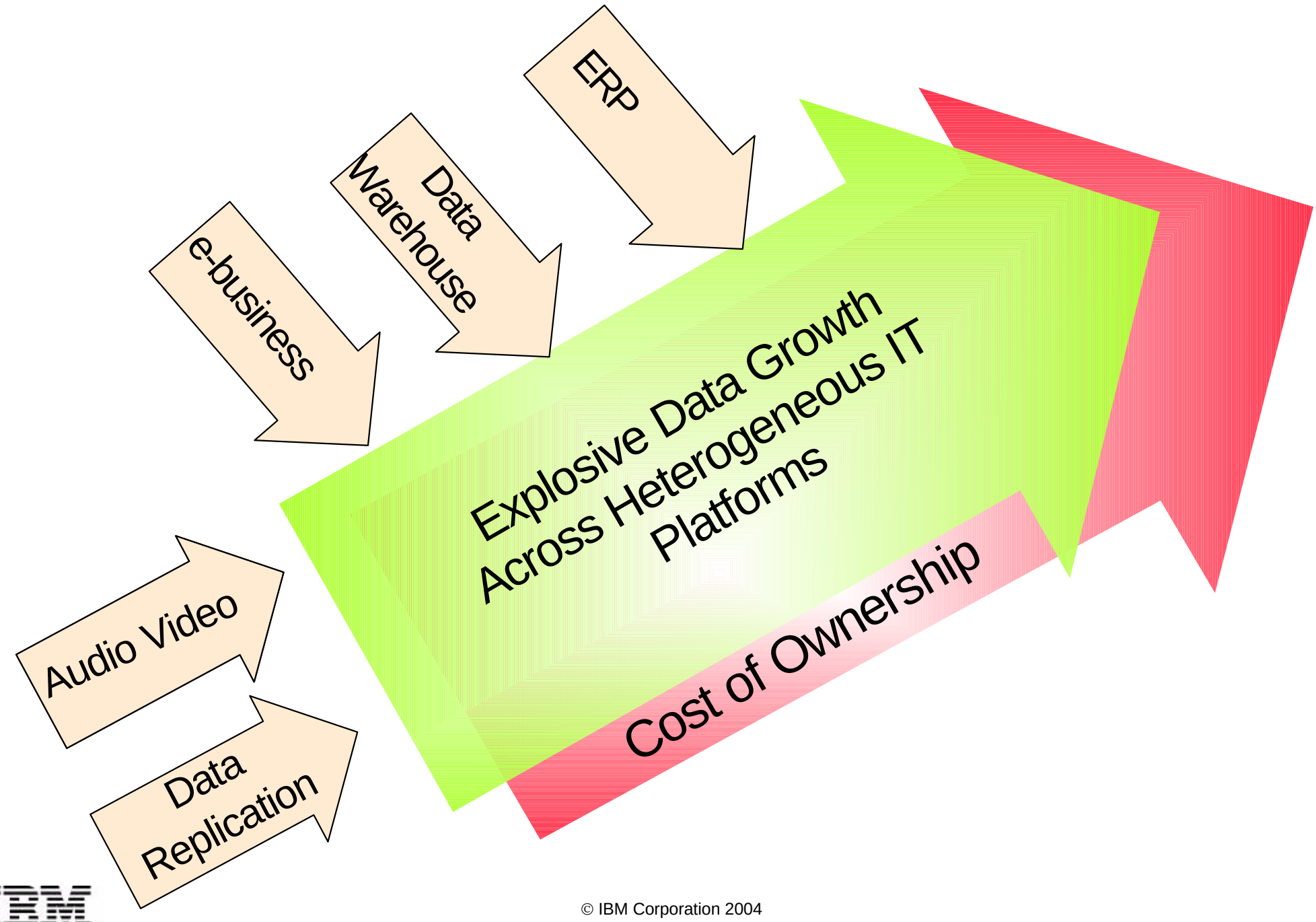


Storage Coupled to Single Host

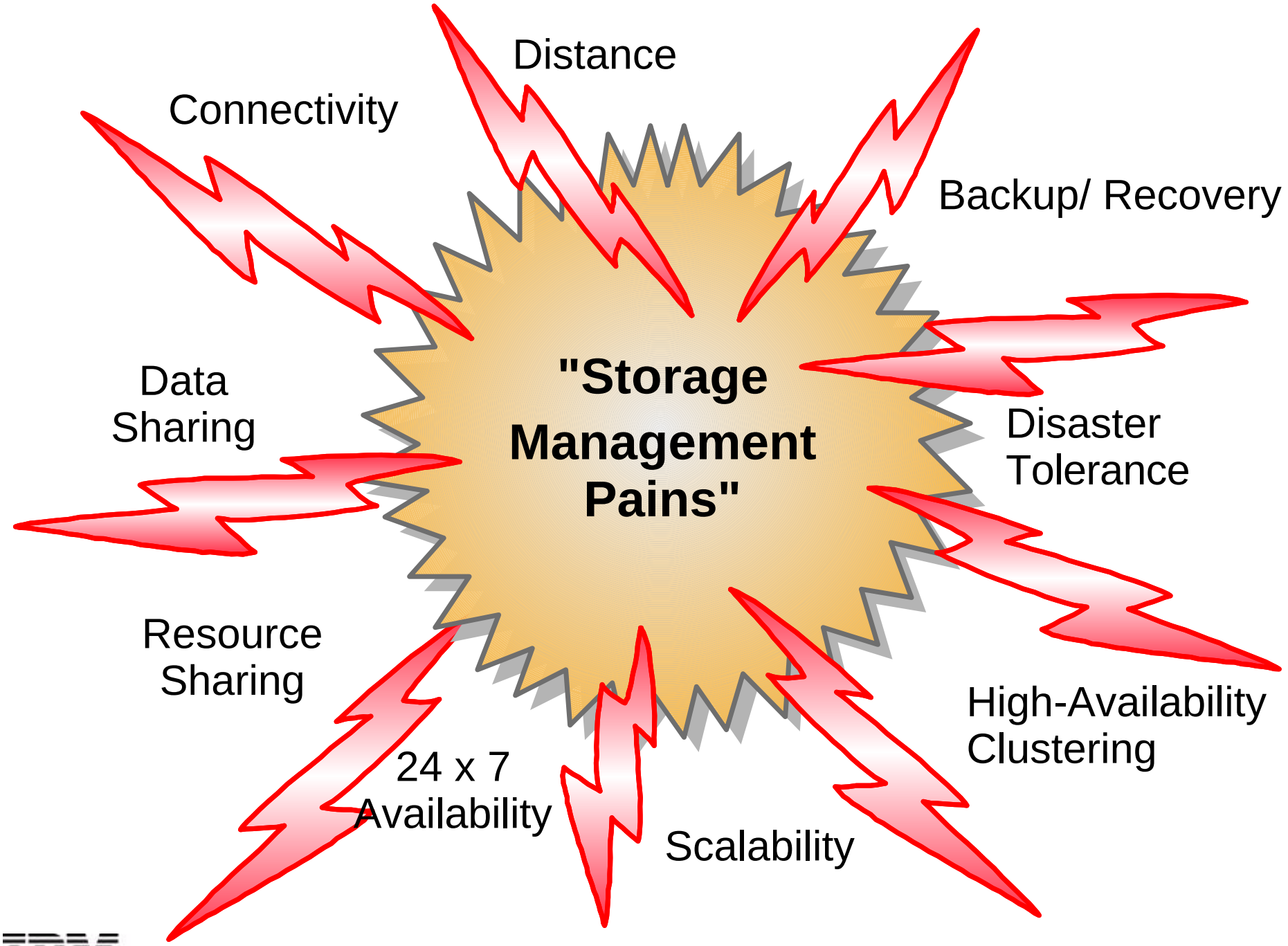
Storage Utilization

Management Complexity

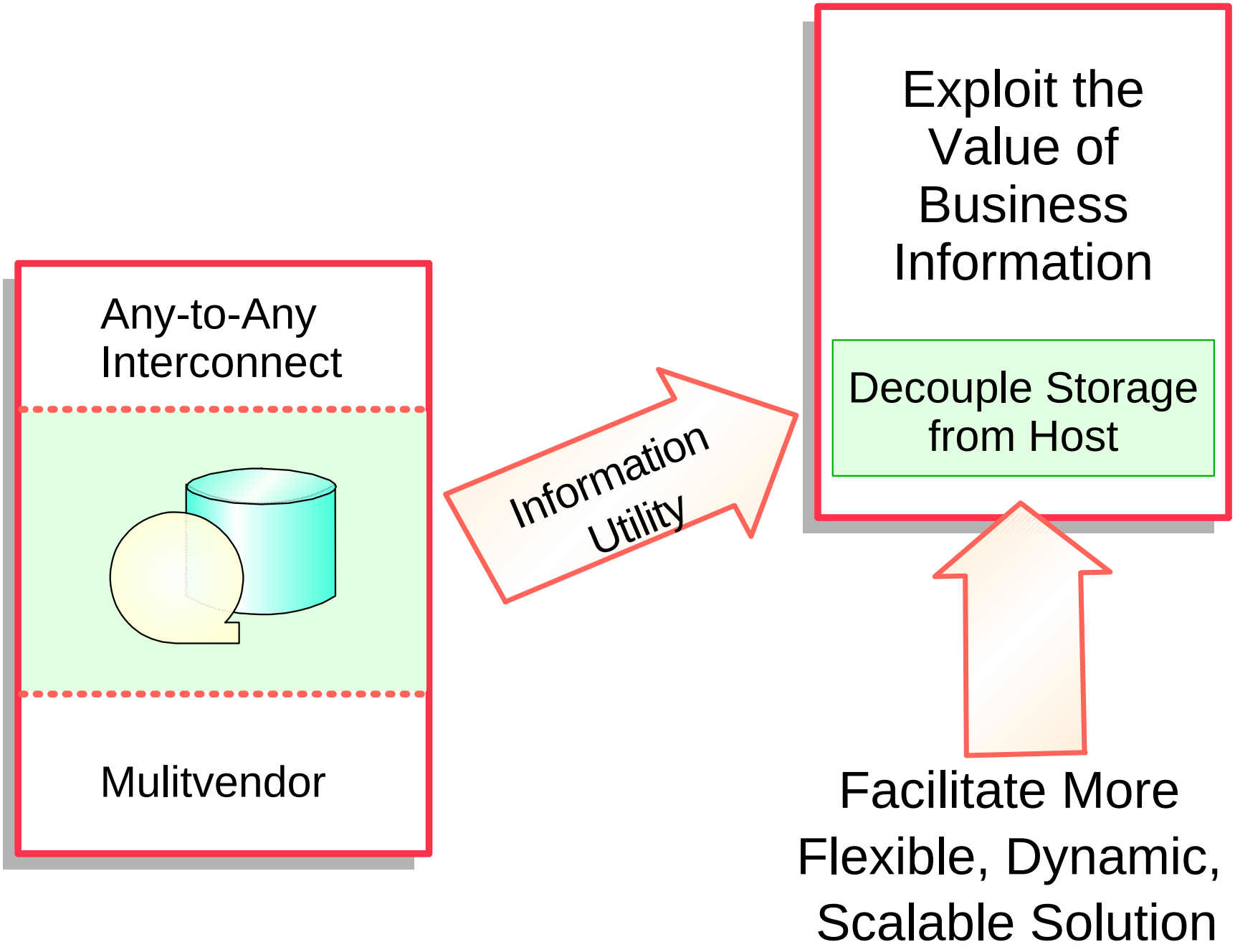
Explosive Growth of Business Data



Information Management Complexities and Pains

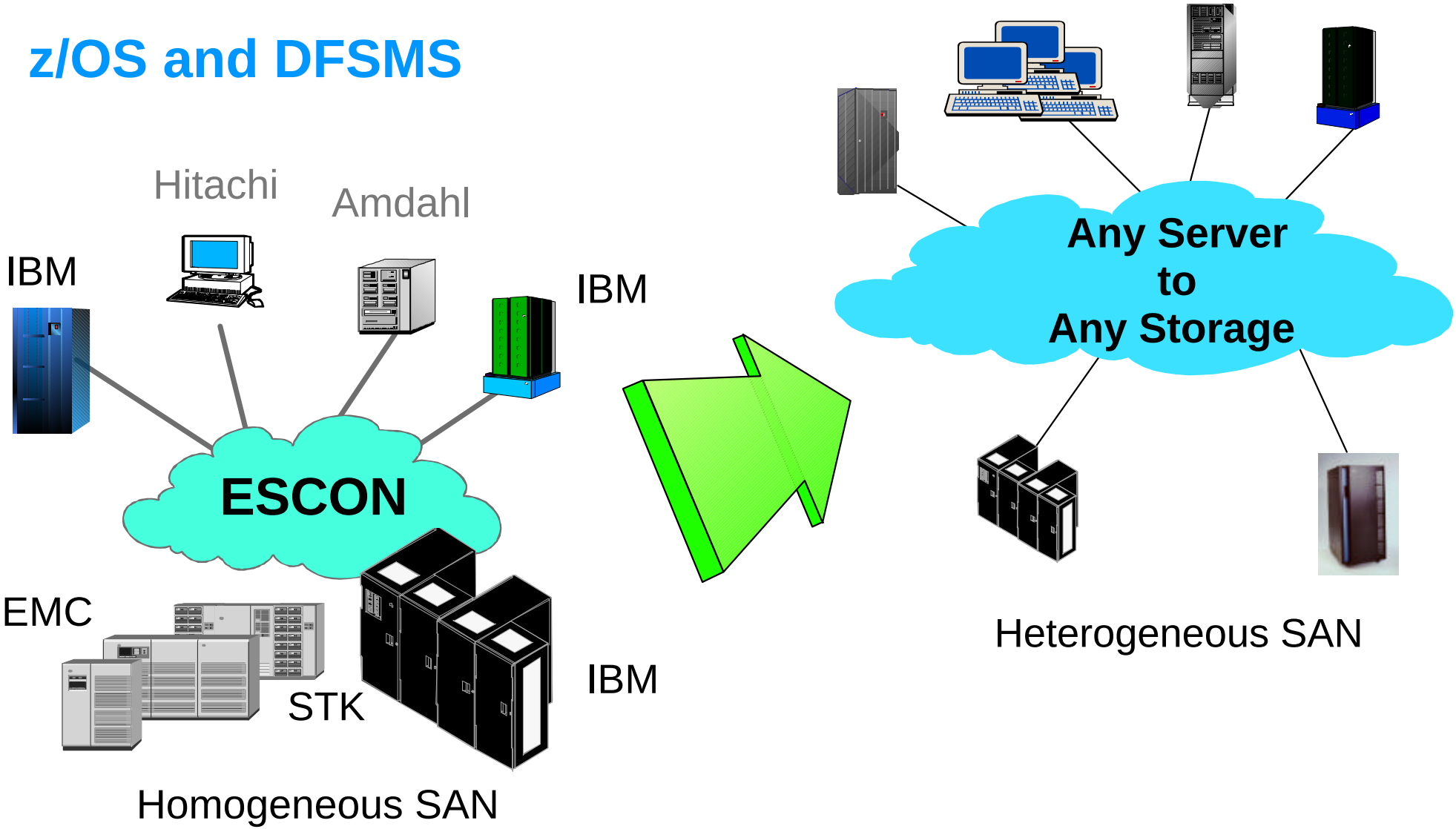


Business Requirements: Information Utility

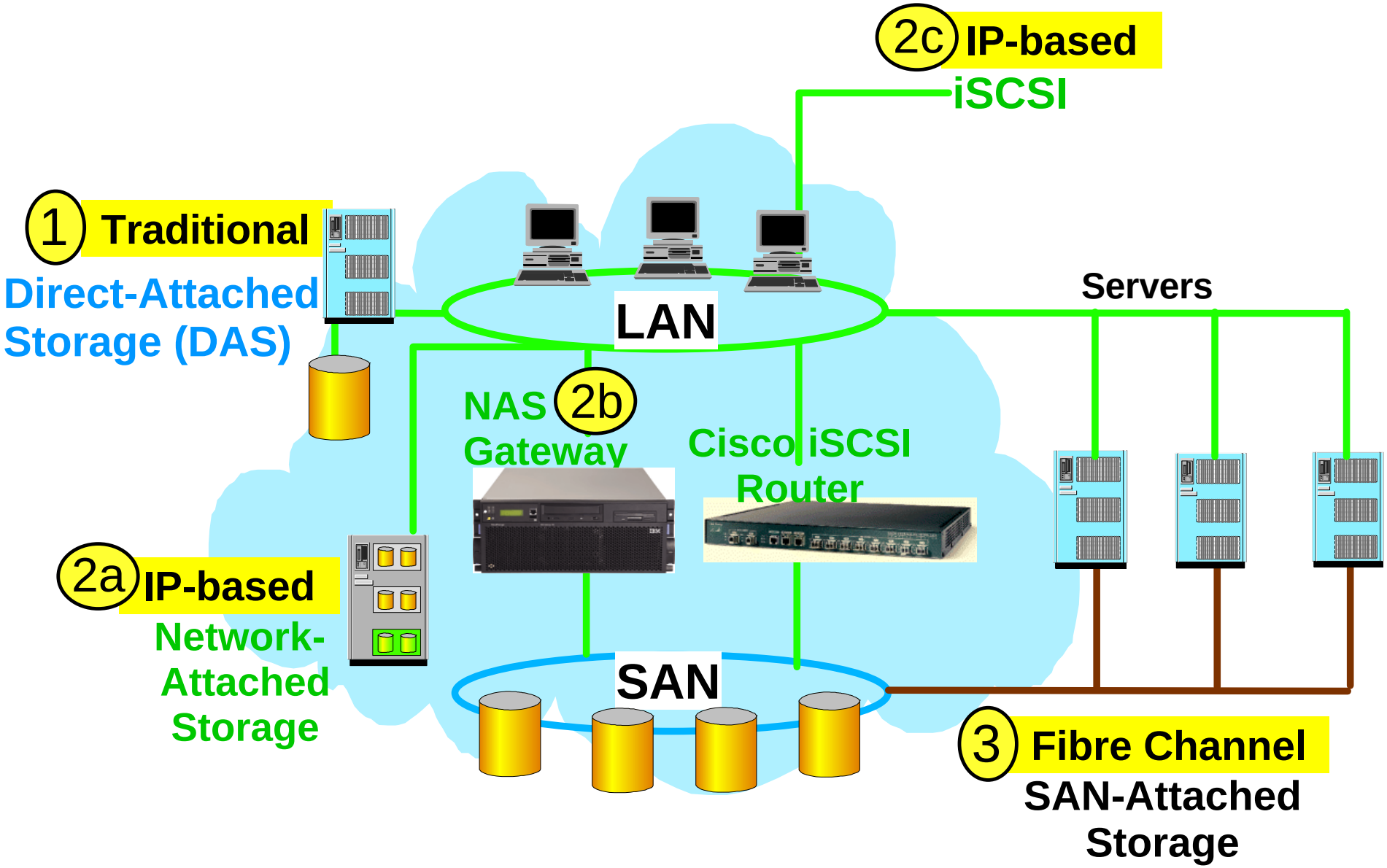


z/OS ==> Open Systems ==> Recentralization

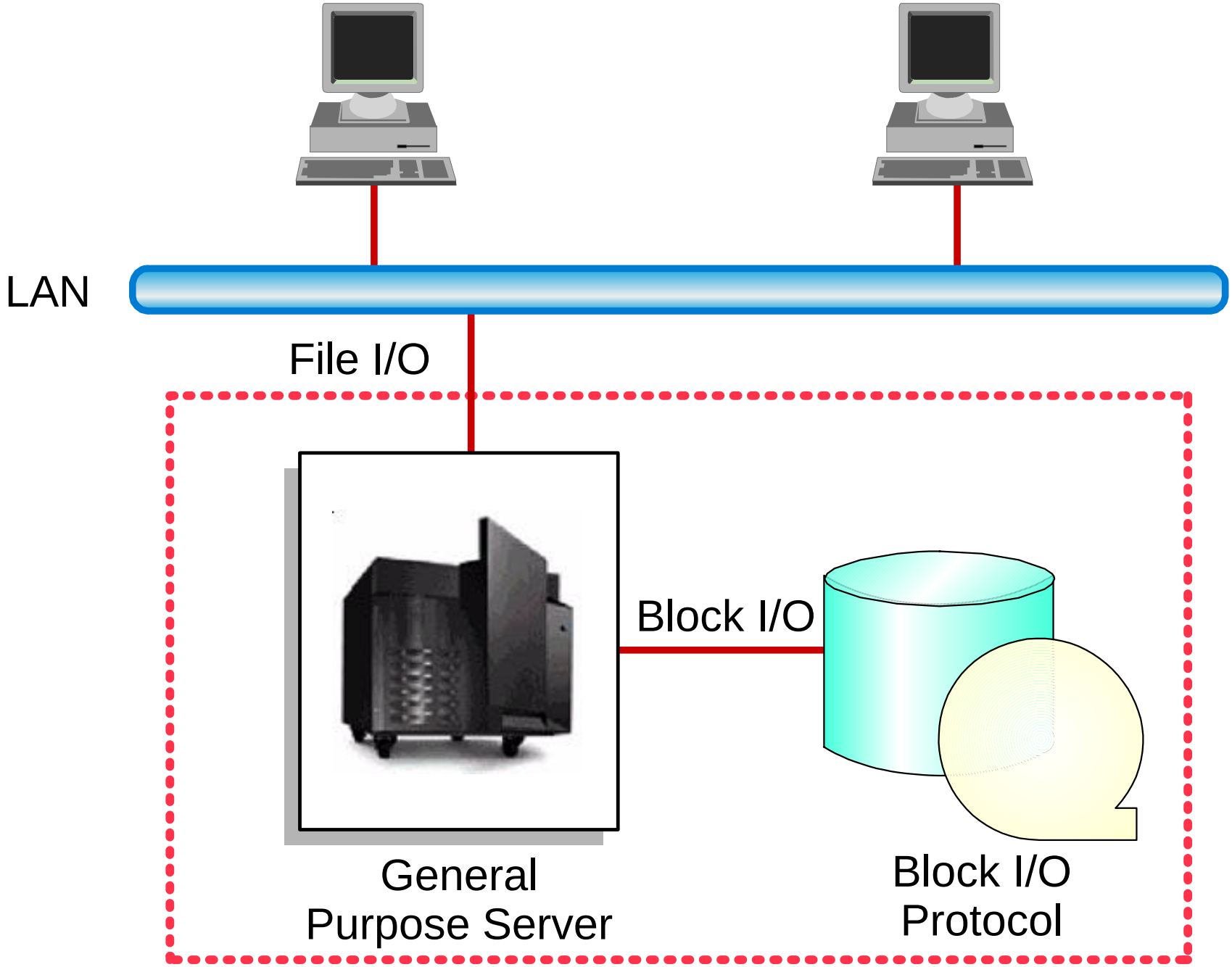
z/OS and DFSMS



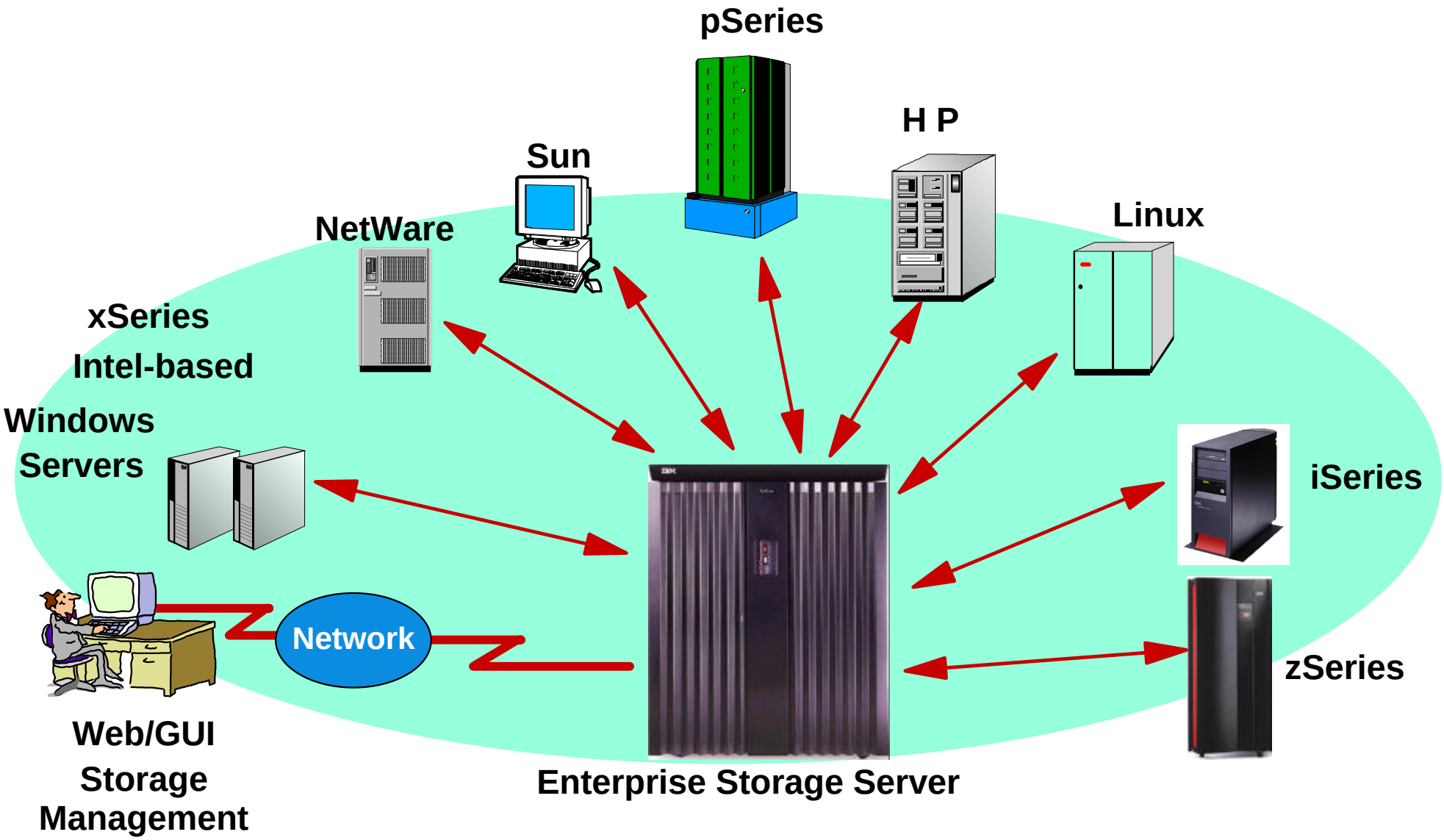
Storage Attachment Options



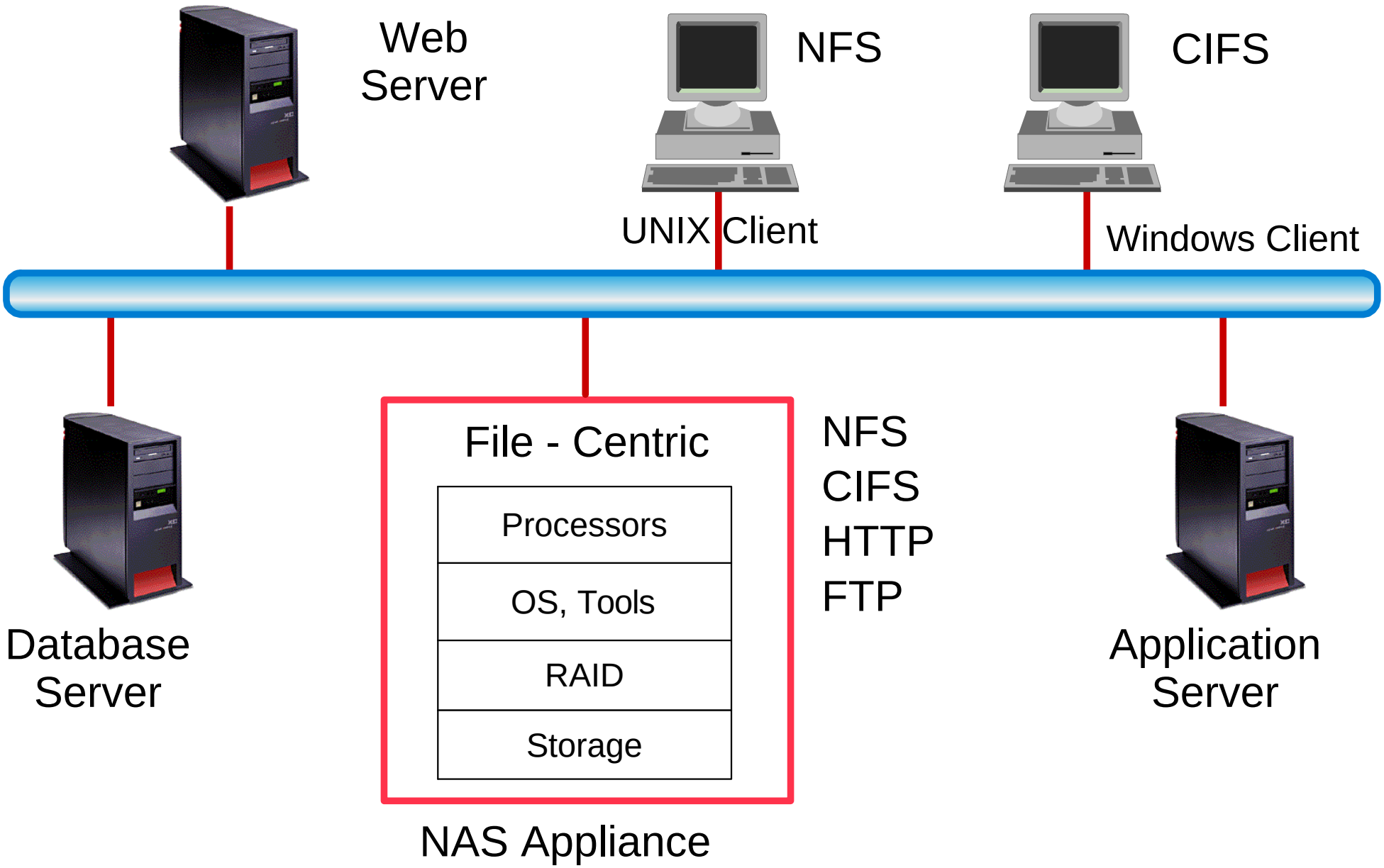
Direct-Attached Storage (DAS)



Direct-Attach: Storage Consolidation

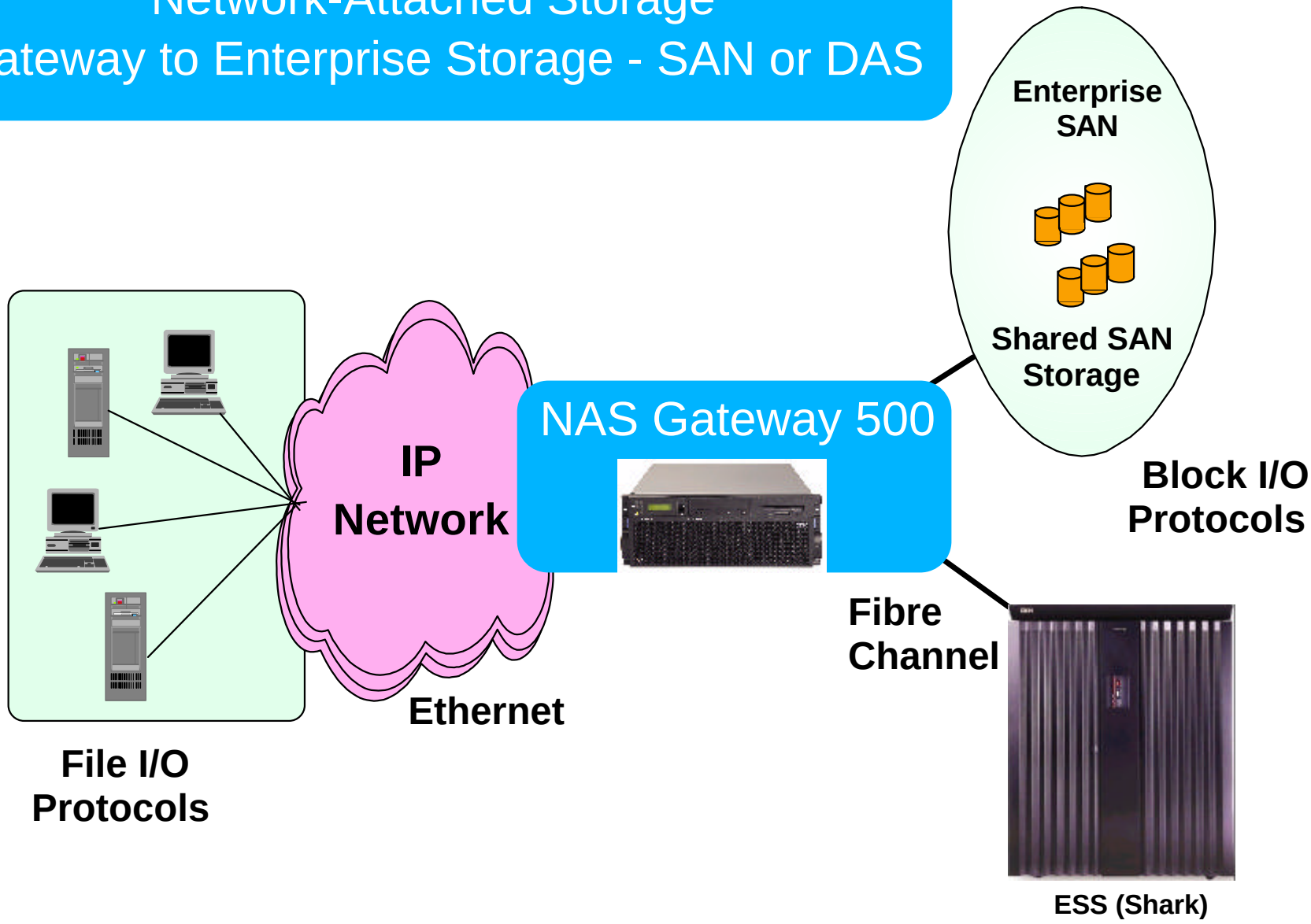


NAS: Network-Attached Storage

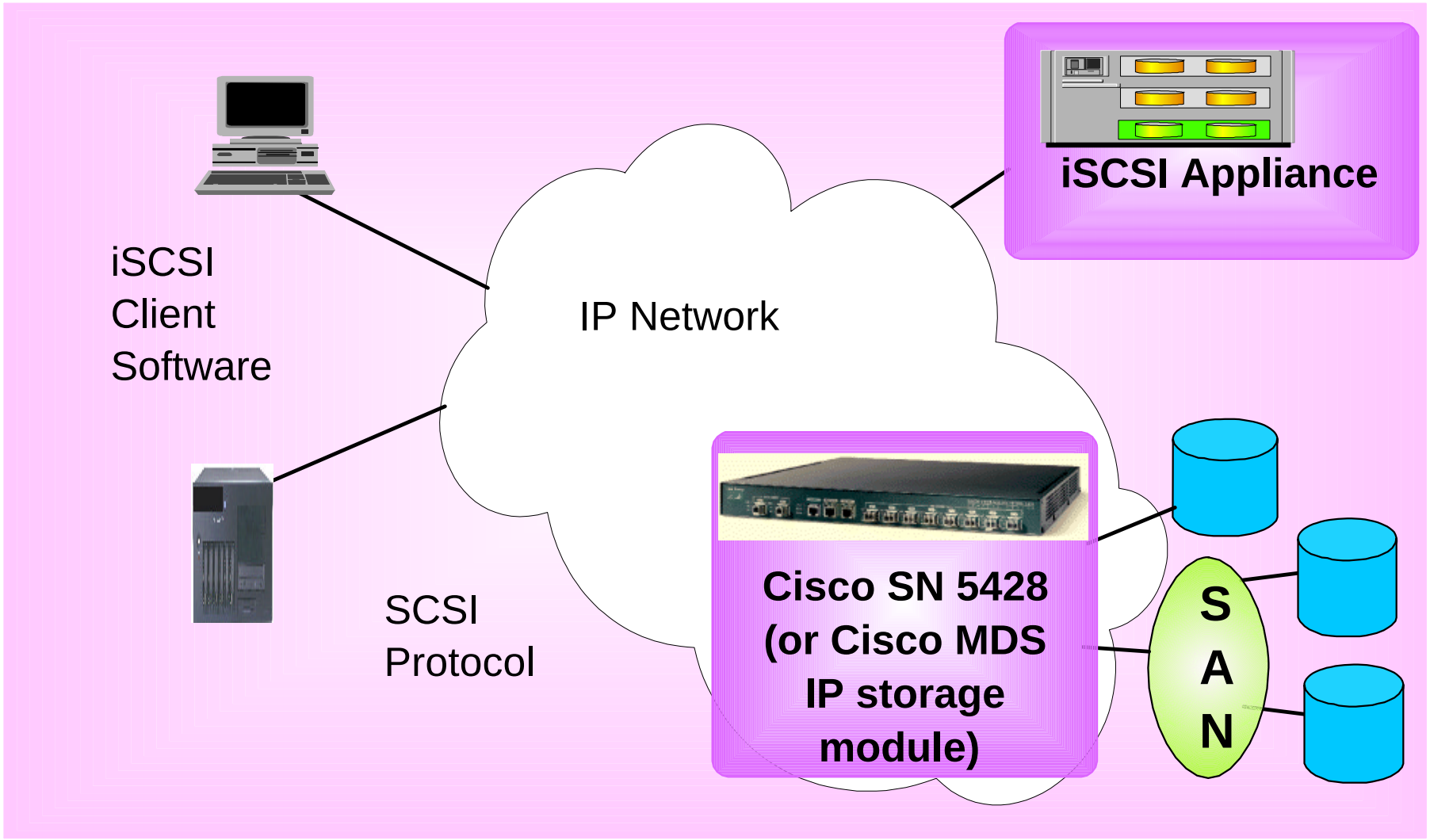


IBM TotalStorage NAS Gateway 500

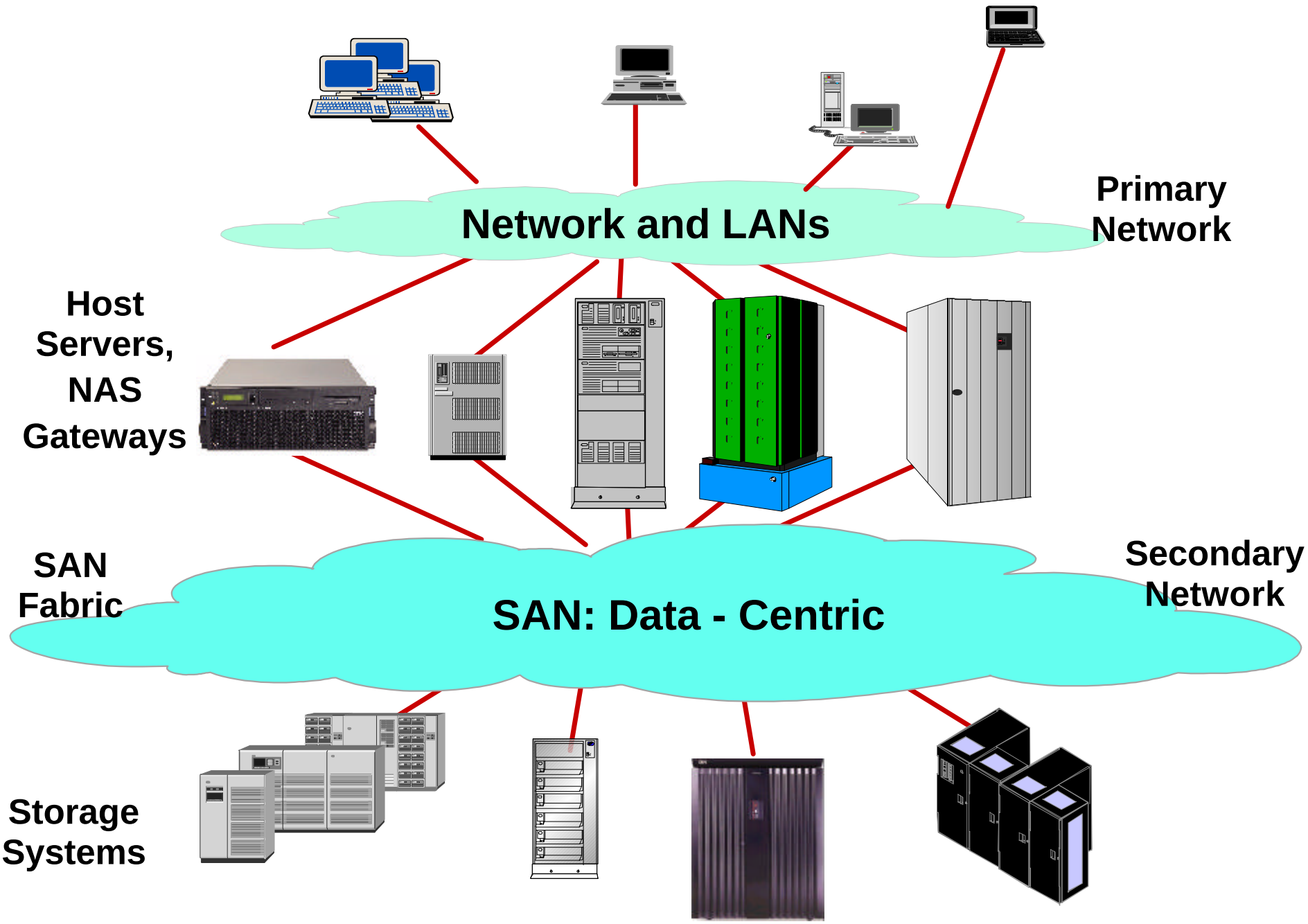
Network-Attached Storage
Gateway to Enterprise Storage - SAN or DAS



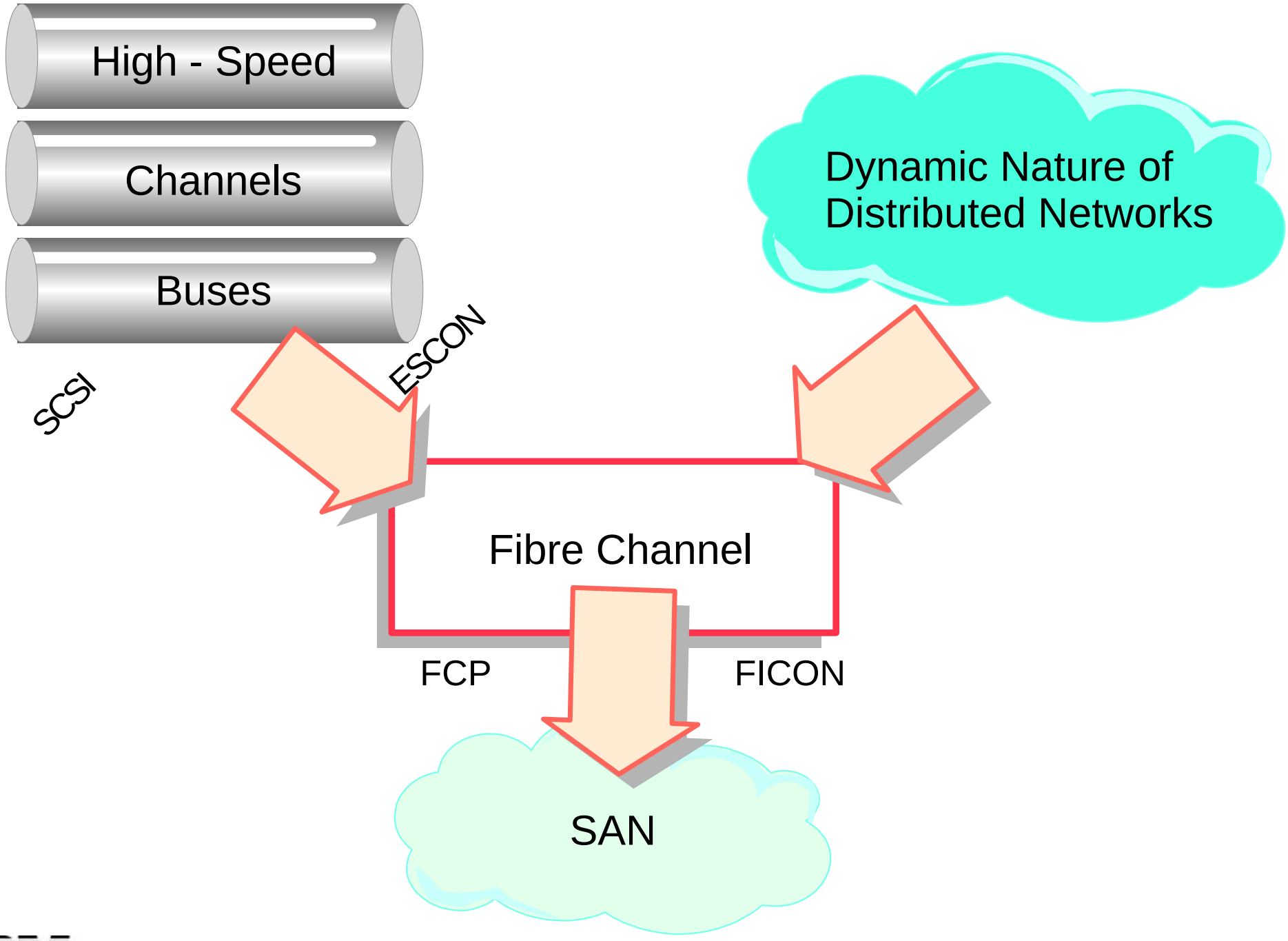
iSCSI (Internet SCSI): SCSI over IP



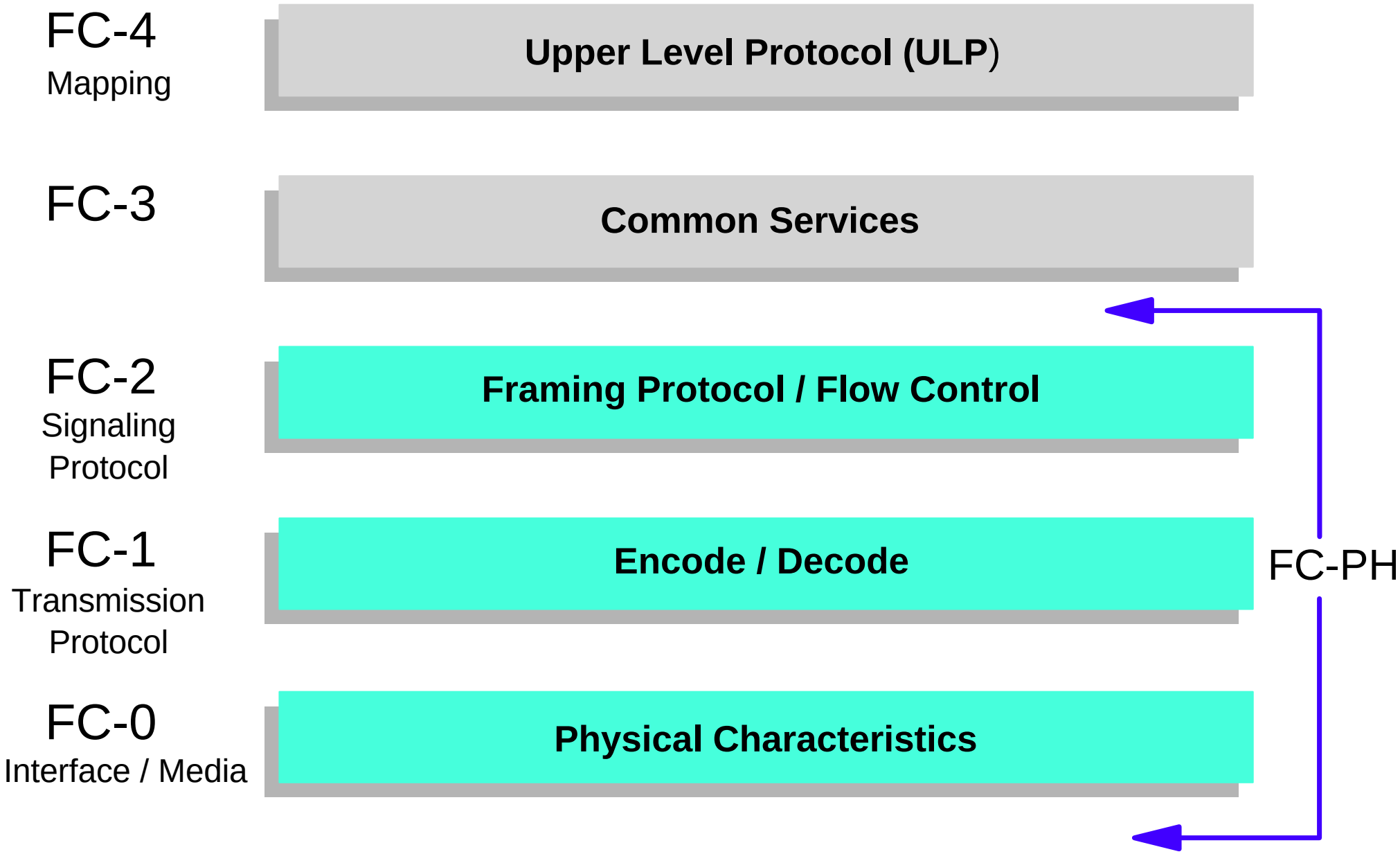
SAN: Storage Area Network



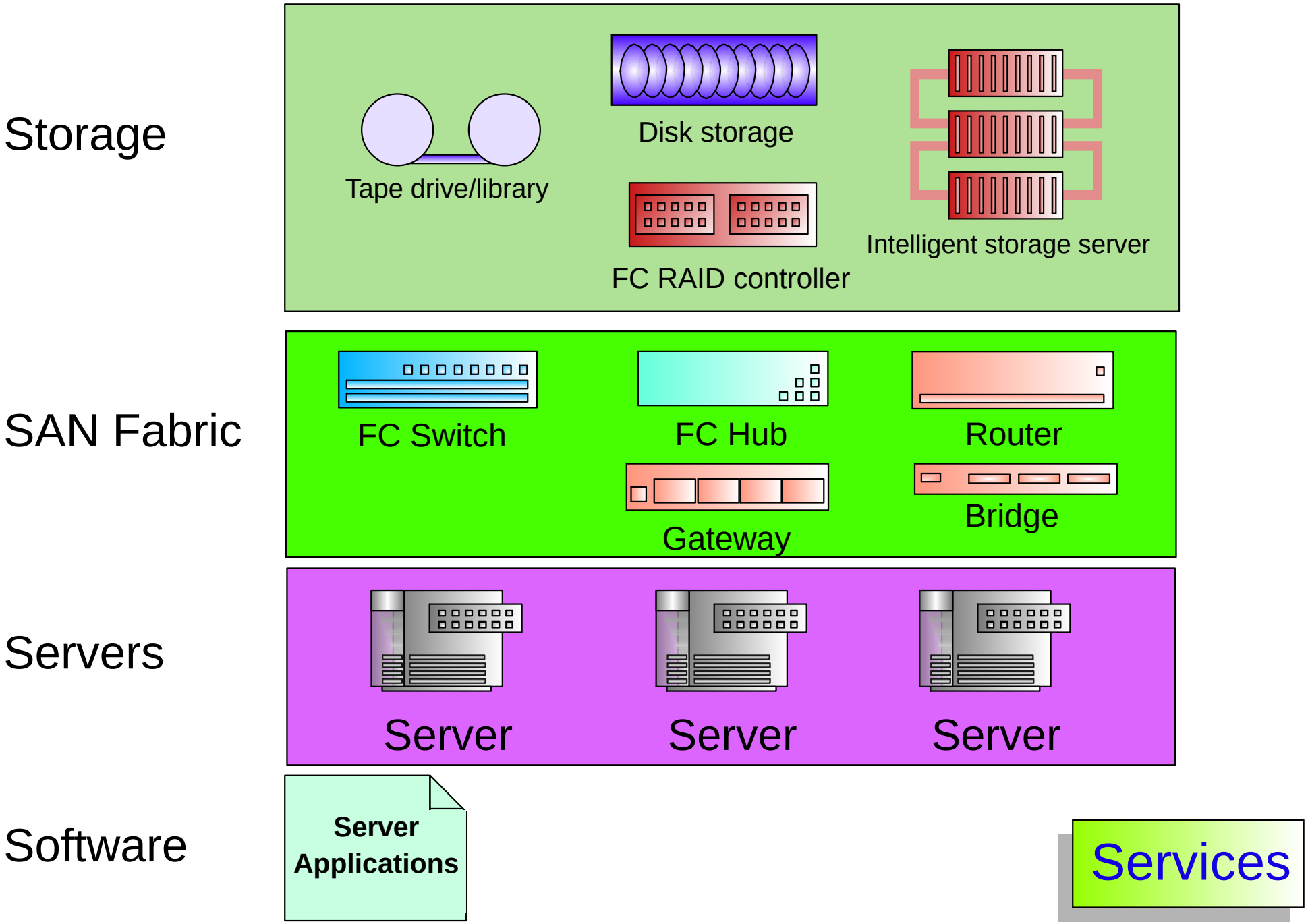
Fibre Channel ===> SAN Enabler



Fibre Channel Standards



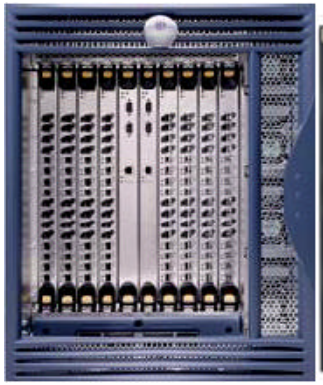
SAN Infrastructure



SAN Fabric Interconnect Components

Fibre Channel Core Switches and Directors

Brocade



McDATA

CNT

Cisco

Fiber Channel Switches

Brocade

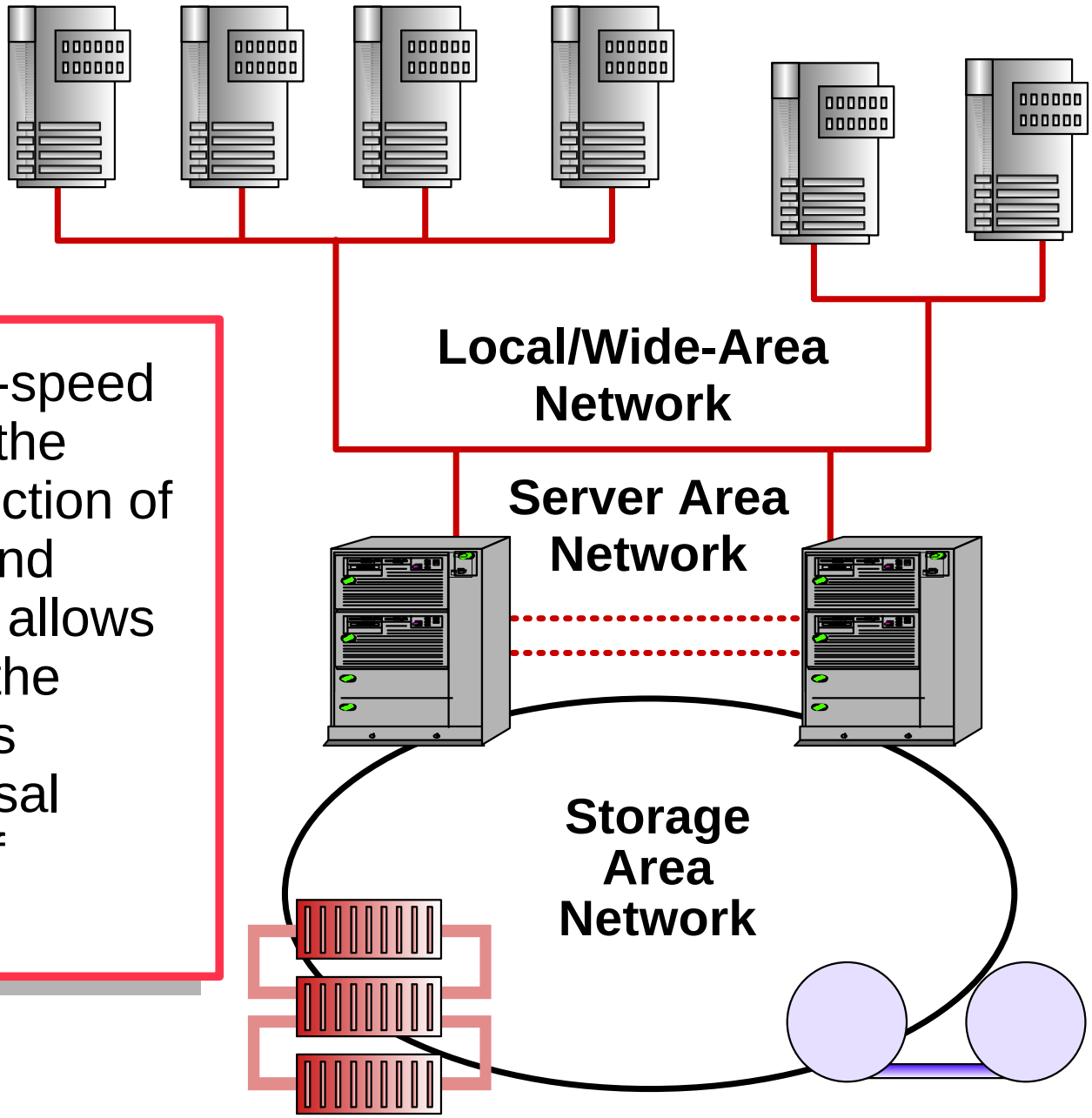
Cisco

McDATA

SAN Data Gateway

Storage Area Network (SAN)

SAN: Managed, high-speed network that enables the any-to-any interconnection of mulitvendor servers and storage systems, and allows companies to exploit the value of their business information via universal access and sharing of resources.



SAN: Benefits

SAN

Modular Storage Pools

Consolidation

Storage

Servers

Economies of Scale

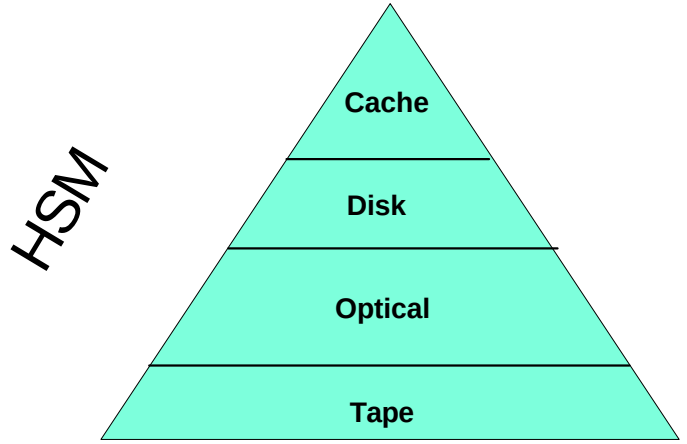
Centralized Storage Management

Scalable Over Time

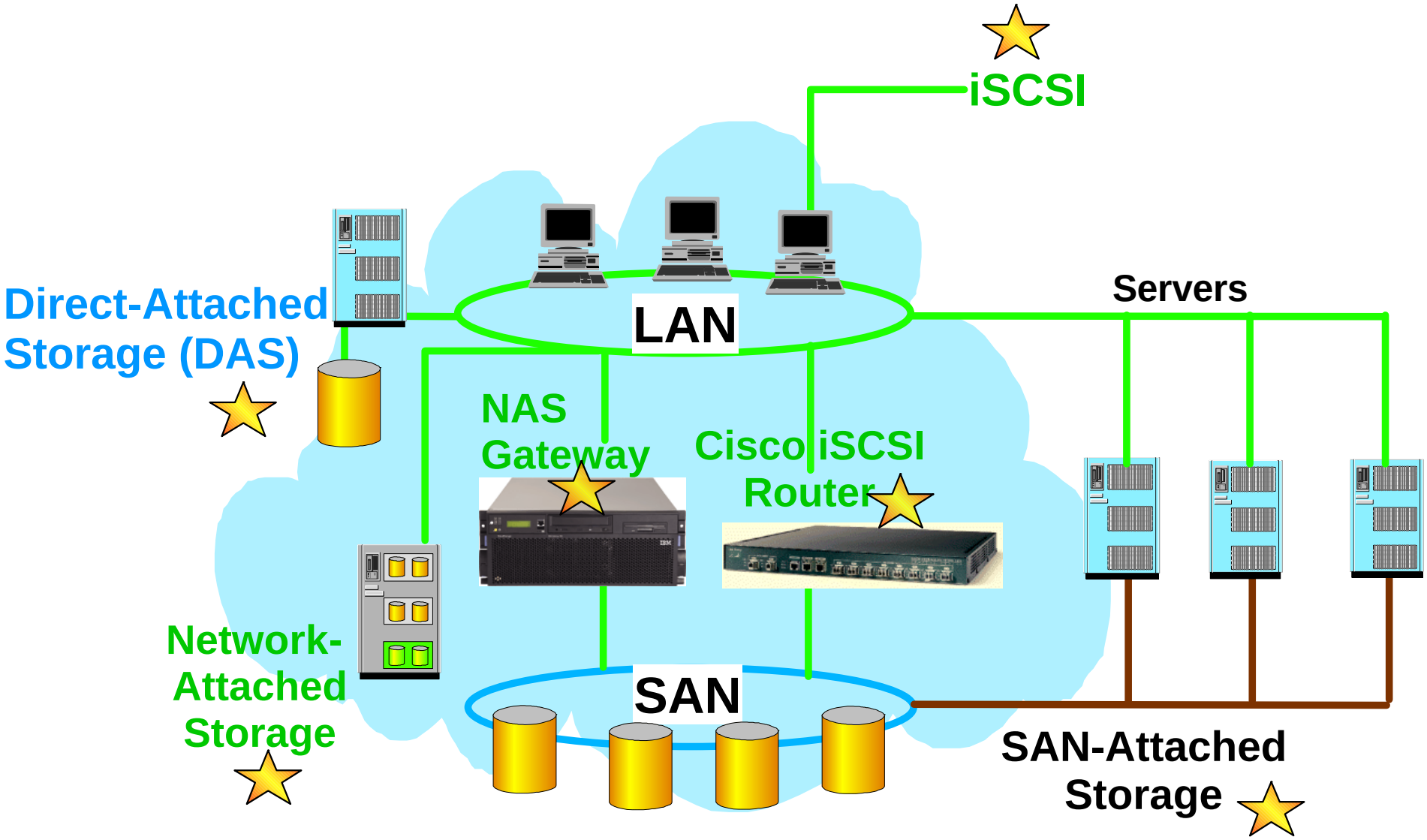
High Availability

More Sophisticated Storage Subsystems

Professional Management of the Storage Hierarchy



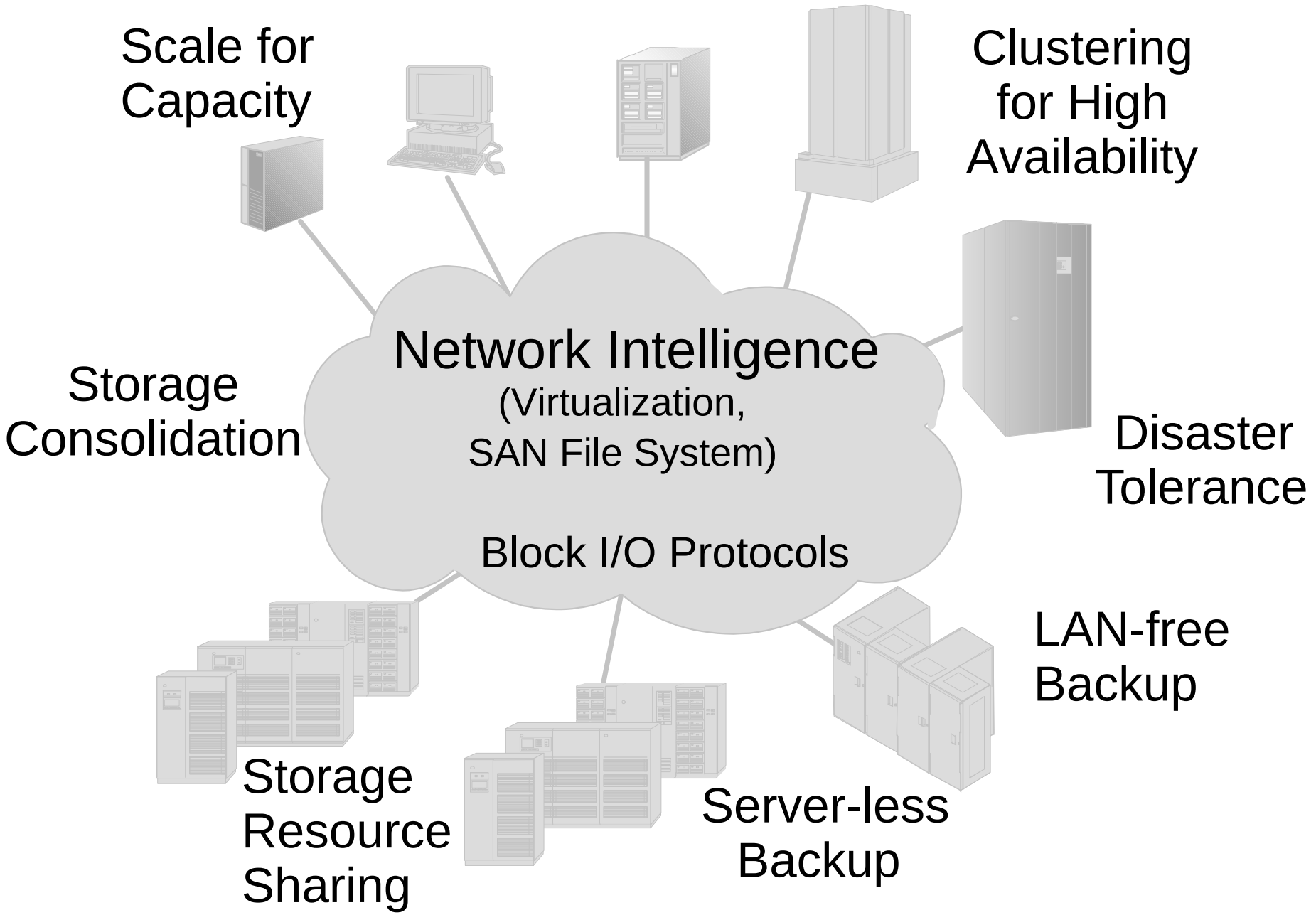
IBM TotalStorage: Infrastructure



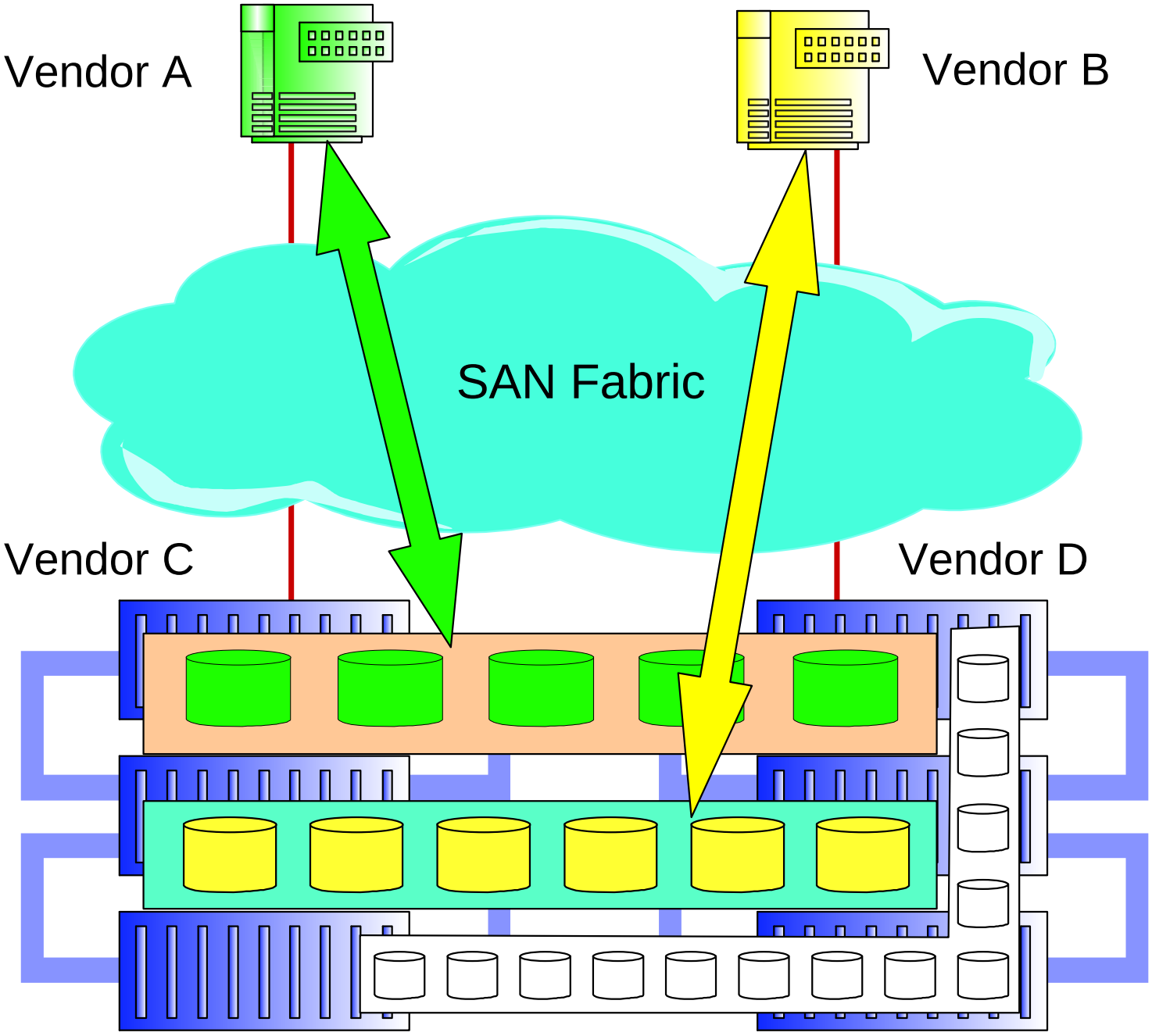
Storage Networking Comparisons

SAN	NAS	iSCSI
Topology	**Device**	**Protocol**
• Block IO • FC-Based • Storage Sharing	• File IO • IP-Based • File Sharing	• Block IO • IP-Based • Storage Sharing
• Larger Environment • Requirement for Highest Performance and Scalability	• Enterprise • Midmarket • xSPs • Ease of Management	• xSPs • Dept/Workgroup/Branch offices • Minimal SAN needs

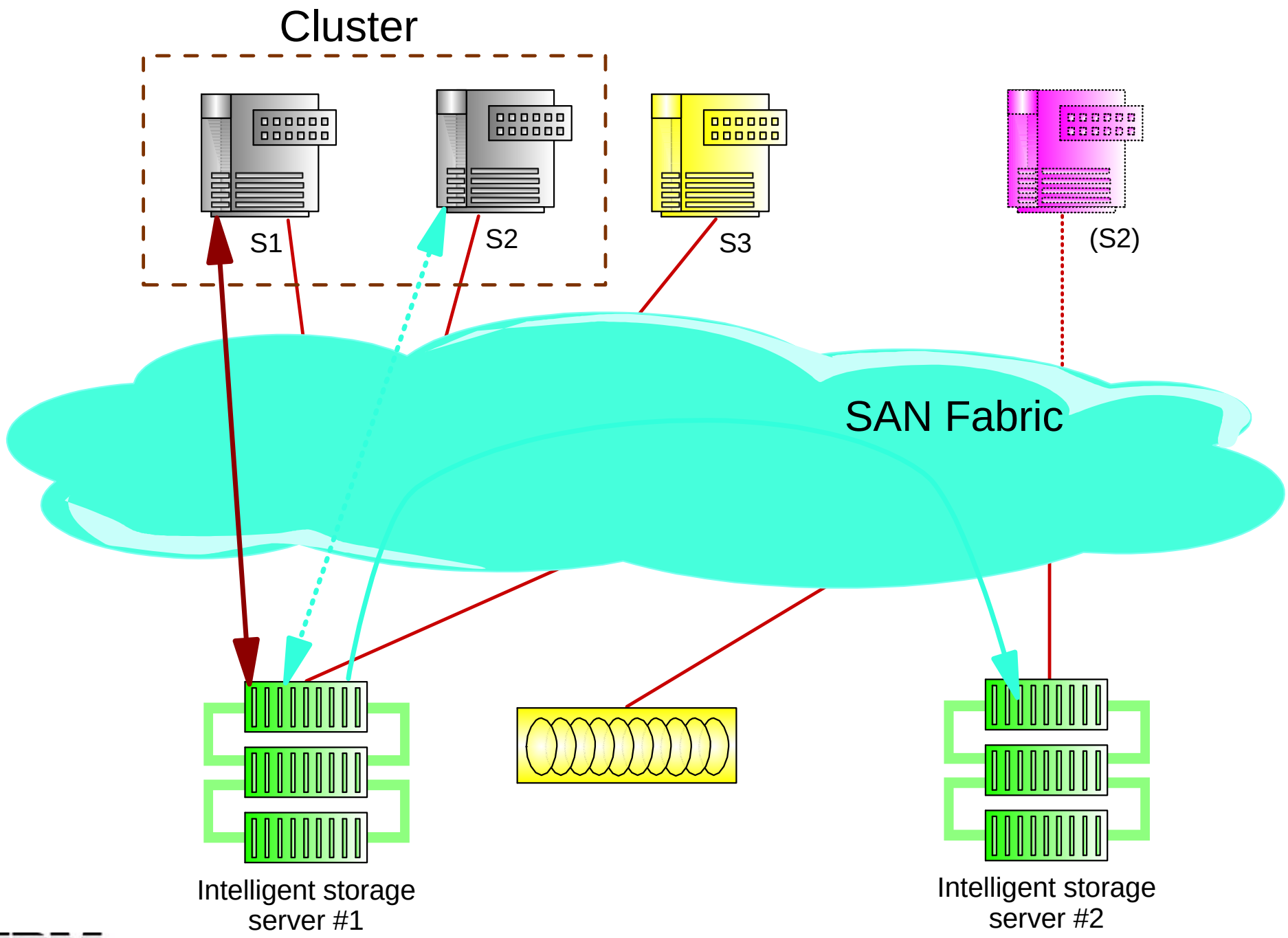
Storage Networking Facilitated Solutions



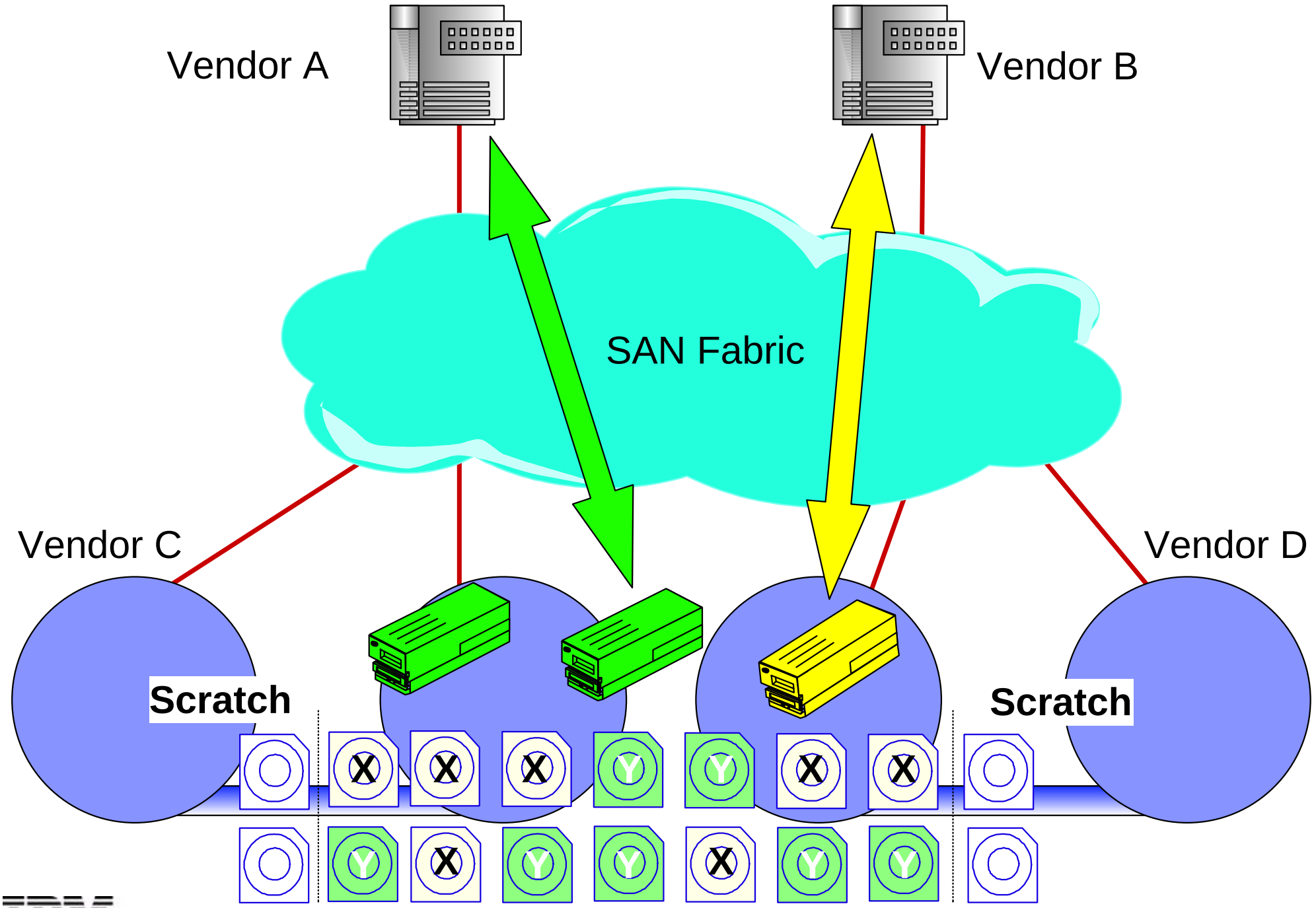
Disk Pooling



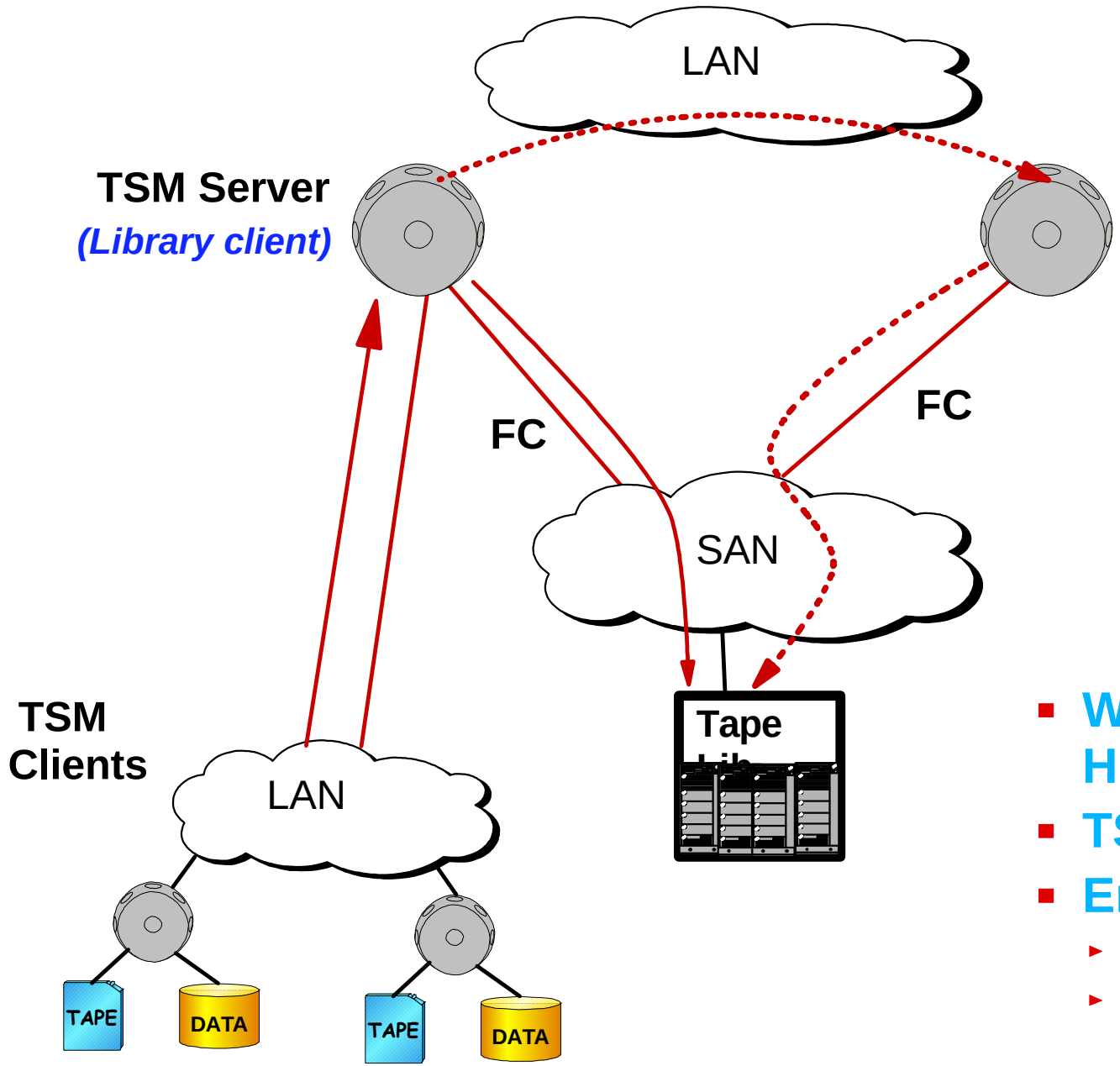
High-Availability Clustering



Tape Pooling

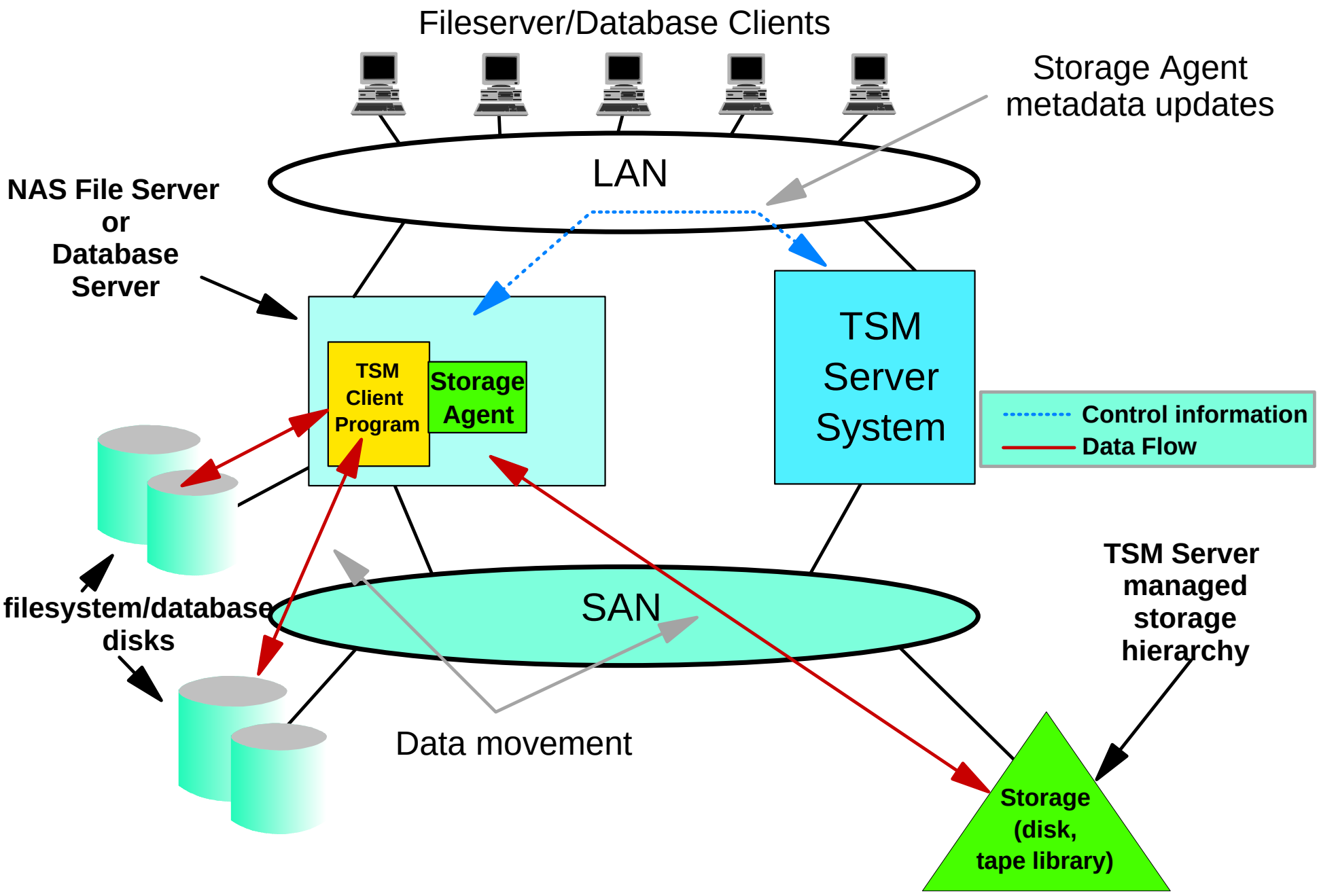


TSM Tape Library Sharing

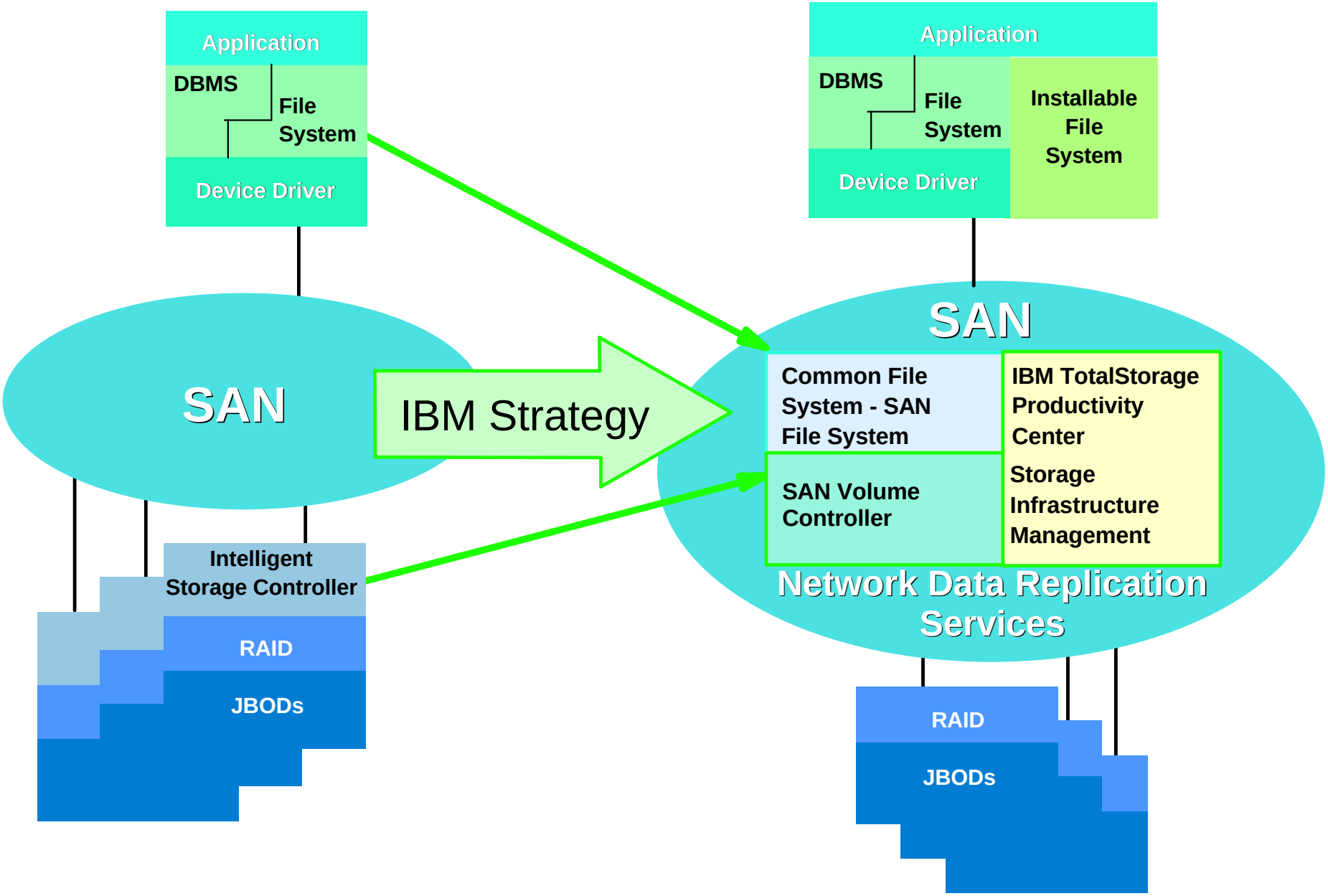


- **Windows, AIX, Solaris, HP-UX**
- **TSM tape library sharing**
- **Enhanced Connectivity**
  - **Extended distances**
  - **Resource sharing**

LAN-free Backup with TSM Storage Agent

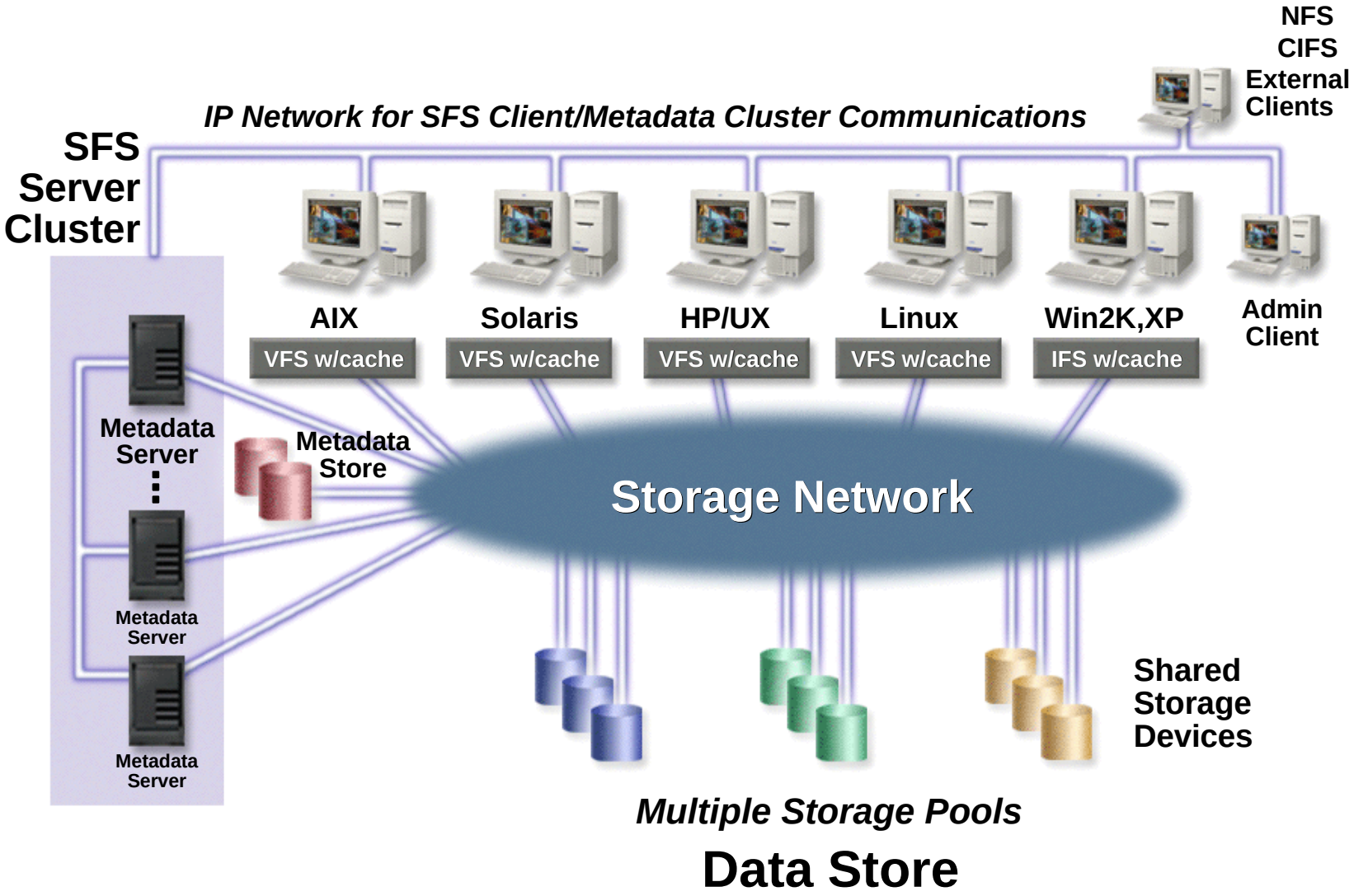


Intelligence Moving into Storage Network

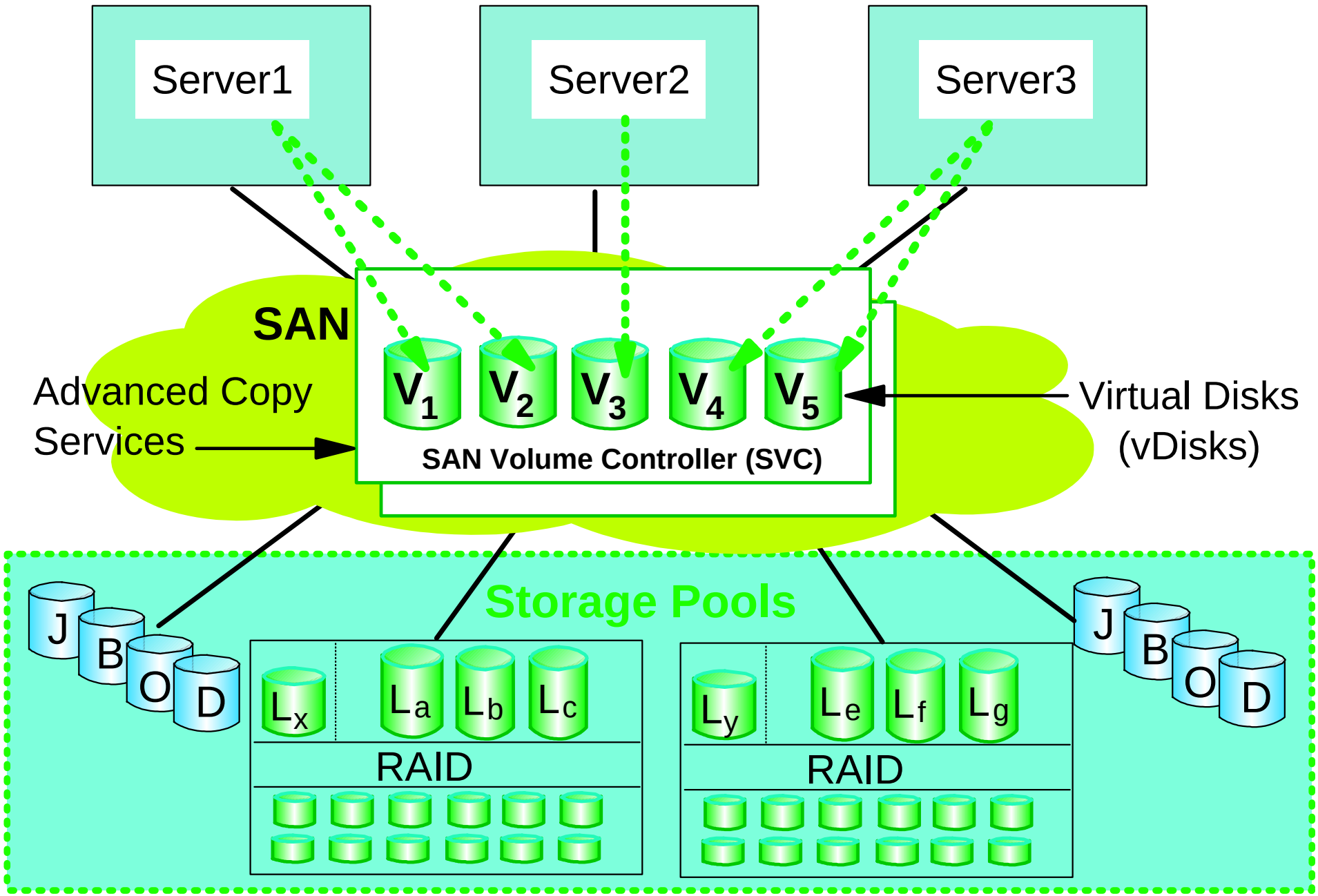


IBM TotalStorage SAN File System (SFS)

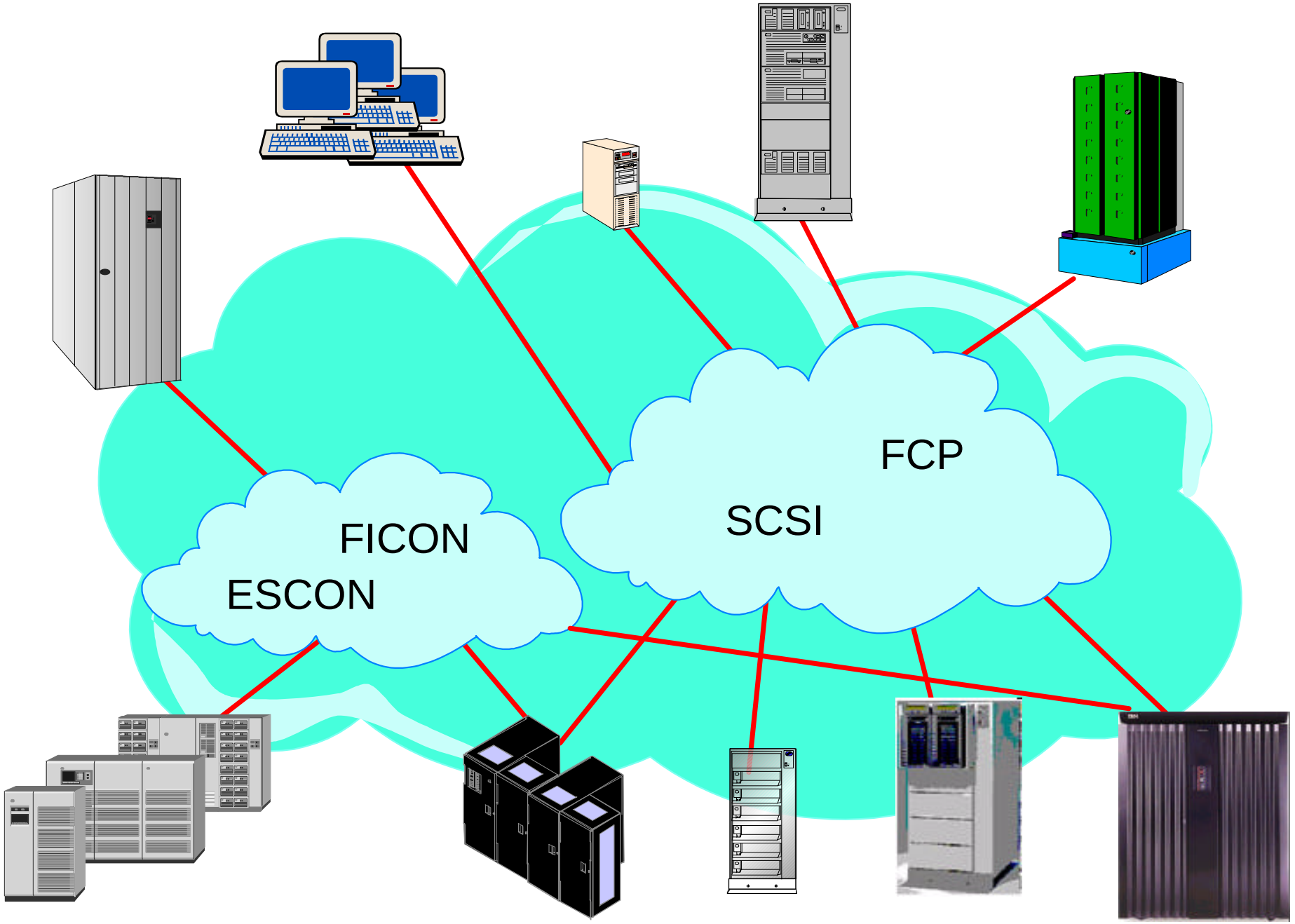
File System Virtualization



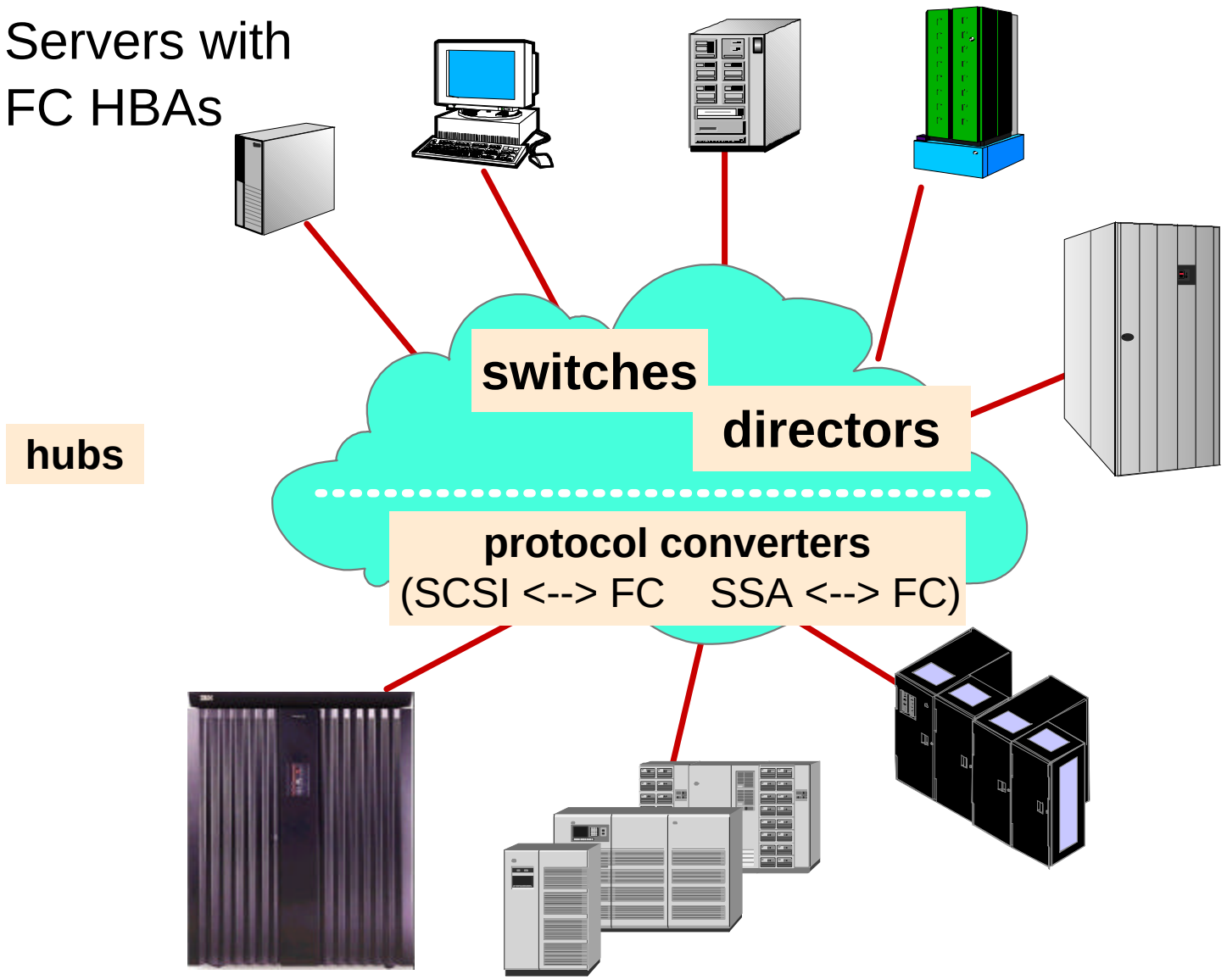
IBM TotalStorage SAN Volume Controller



Evolving to Enterprise SAN

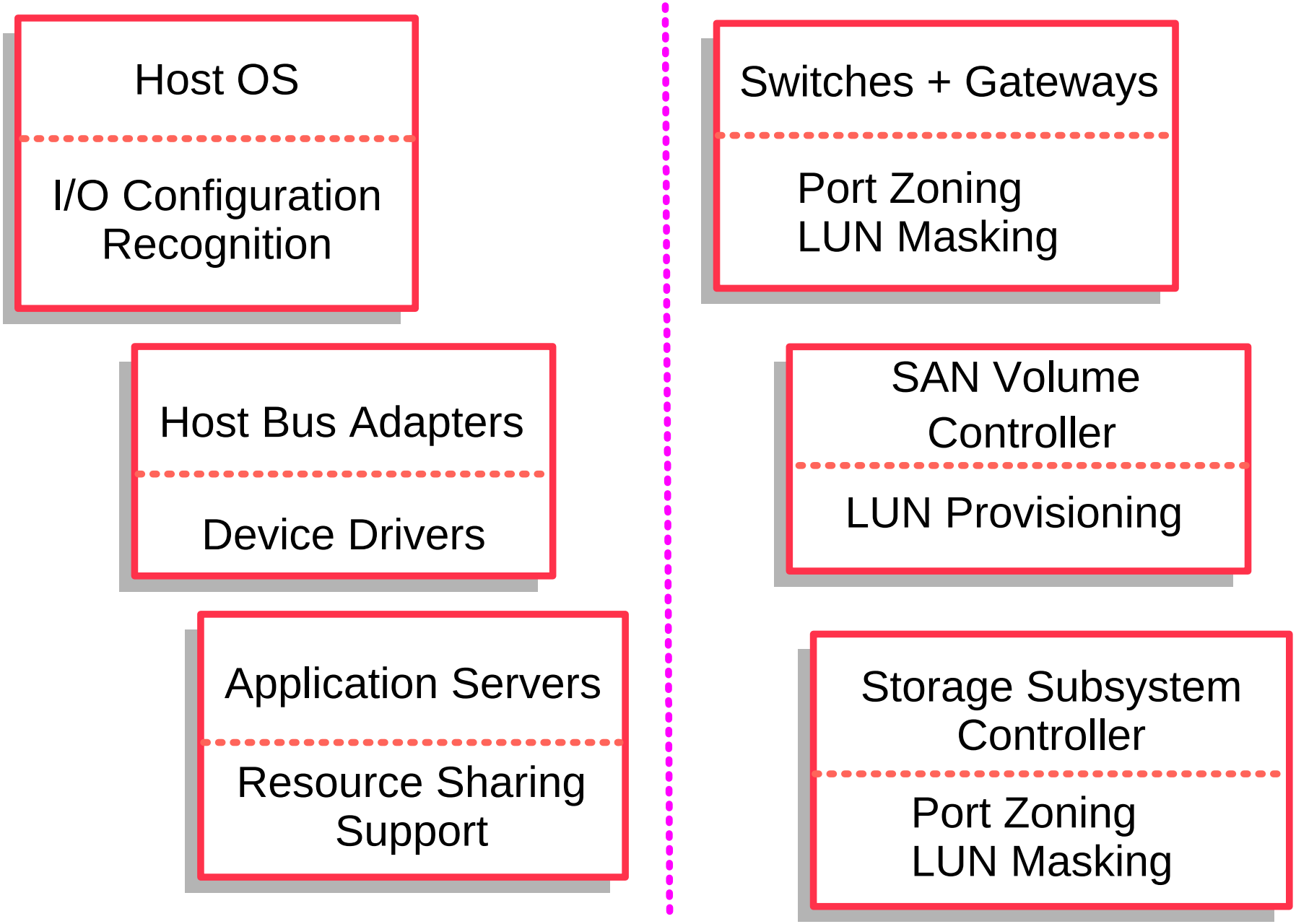


SAN: Any-to-Any Connectivity?

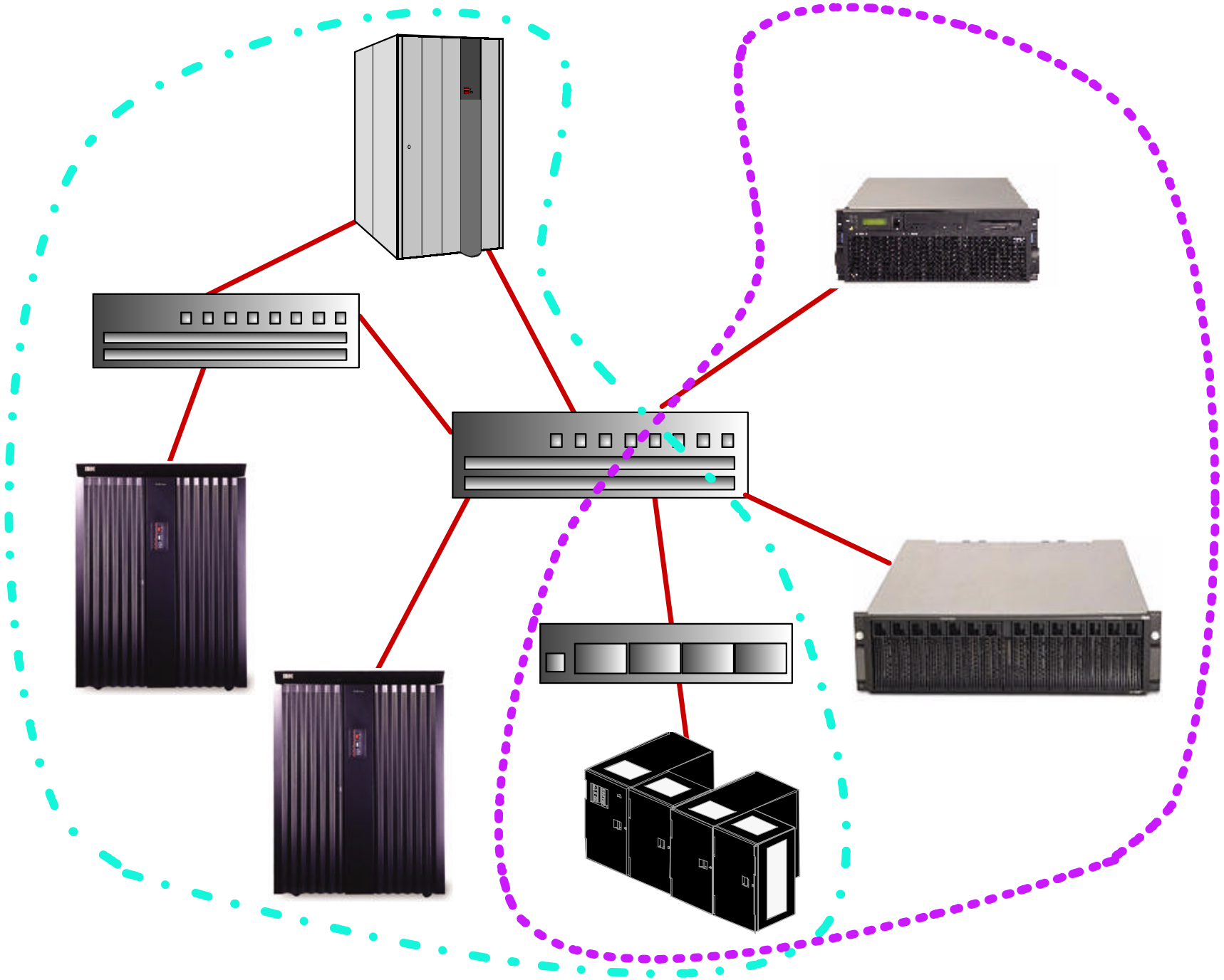


? Data Sharing ? Data Integrity ?

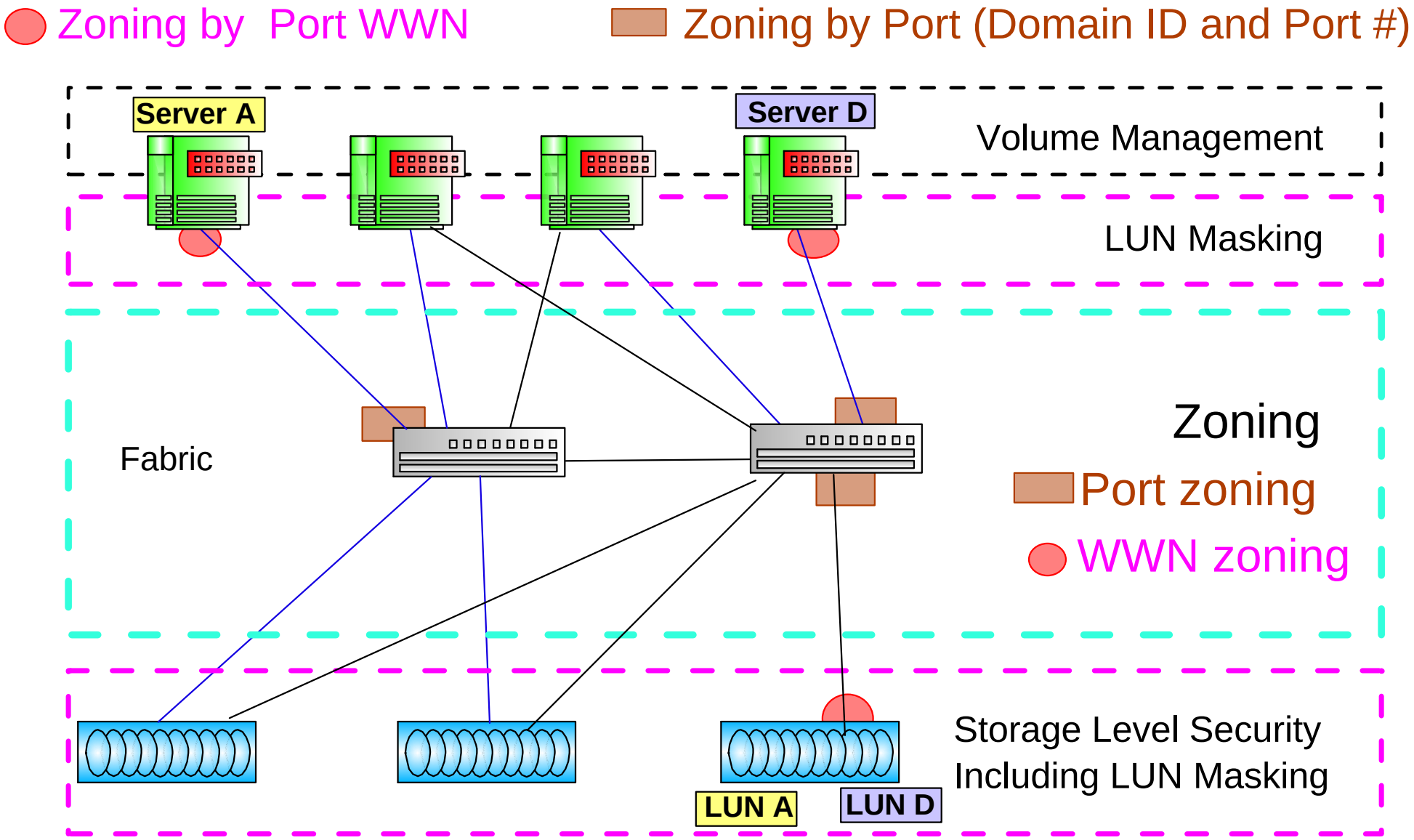
Managing Volume Access: Implementation Levels



Zoning: SAN Segmentation



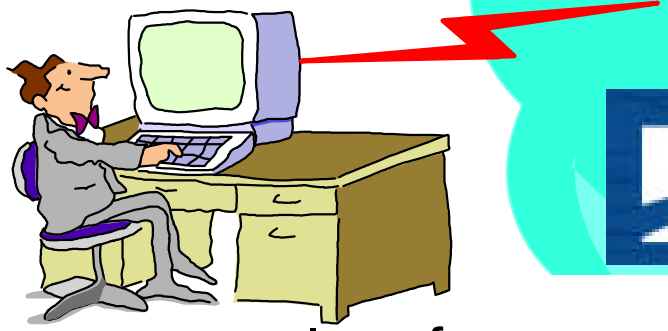
Zoning and LUN Masking



LUN Masking - typically implemented by storage server or SAN Volume Controller

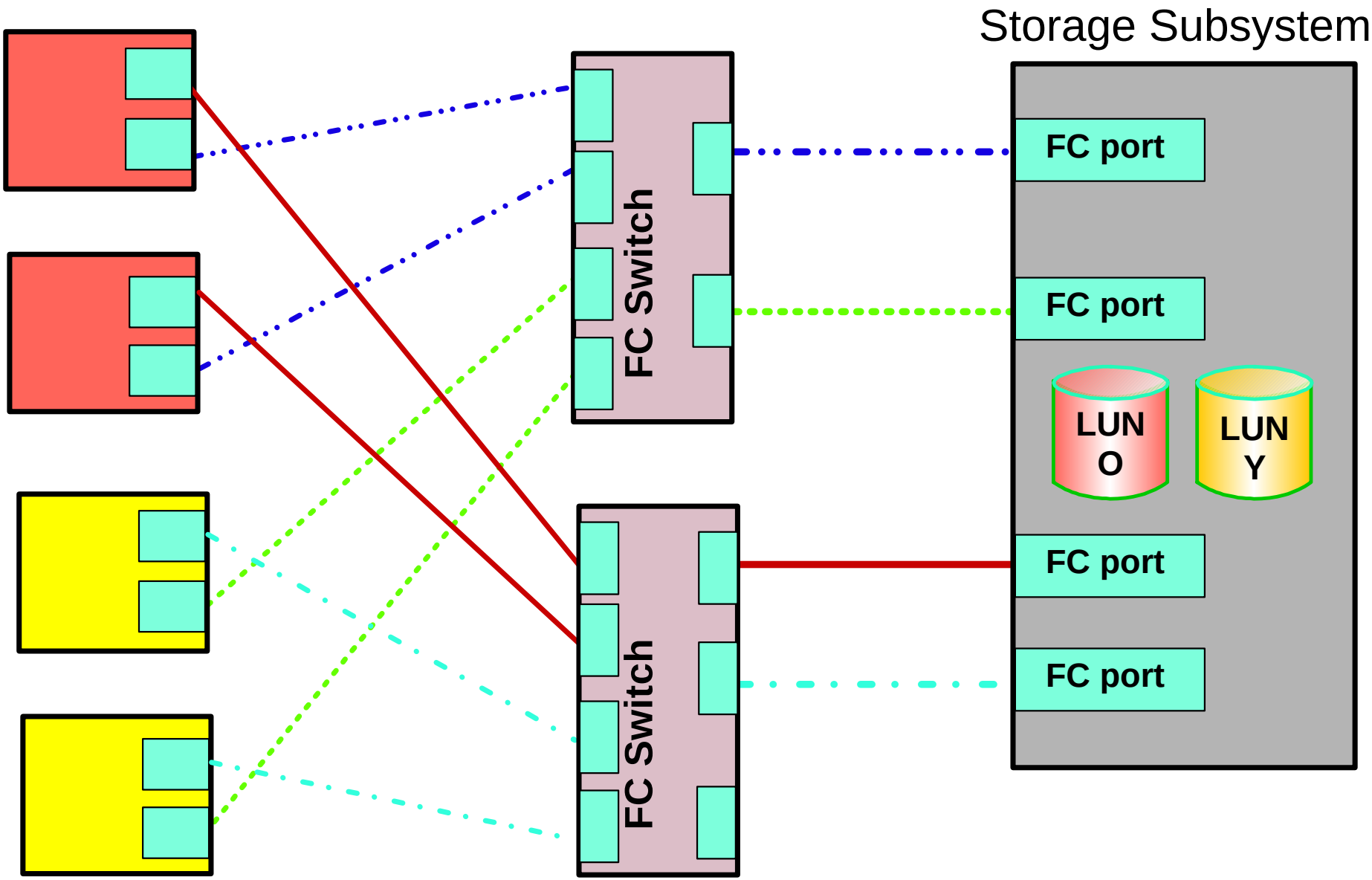
FC Switches: Creating the SAN Fabric

- Facilitates Any-to-Any Connectivity
- Restricts Any-to-Any Connectivity (Zoning)

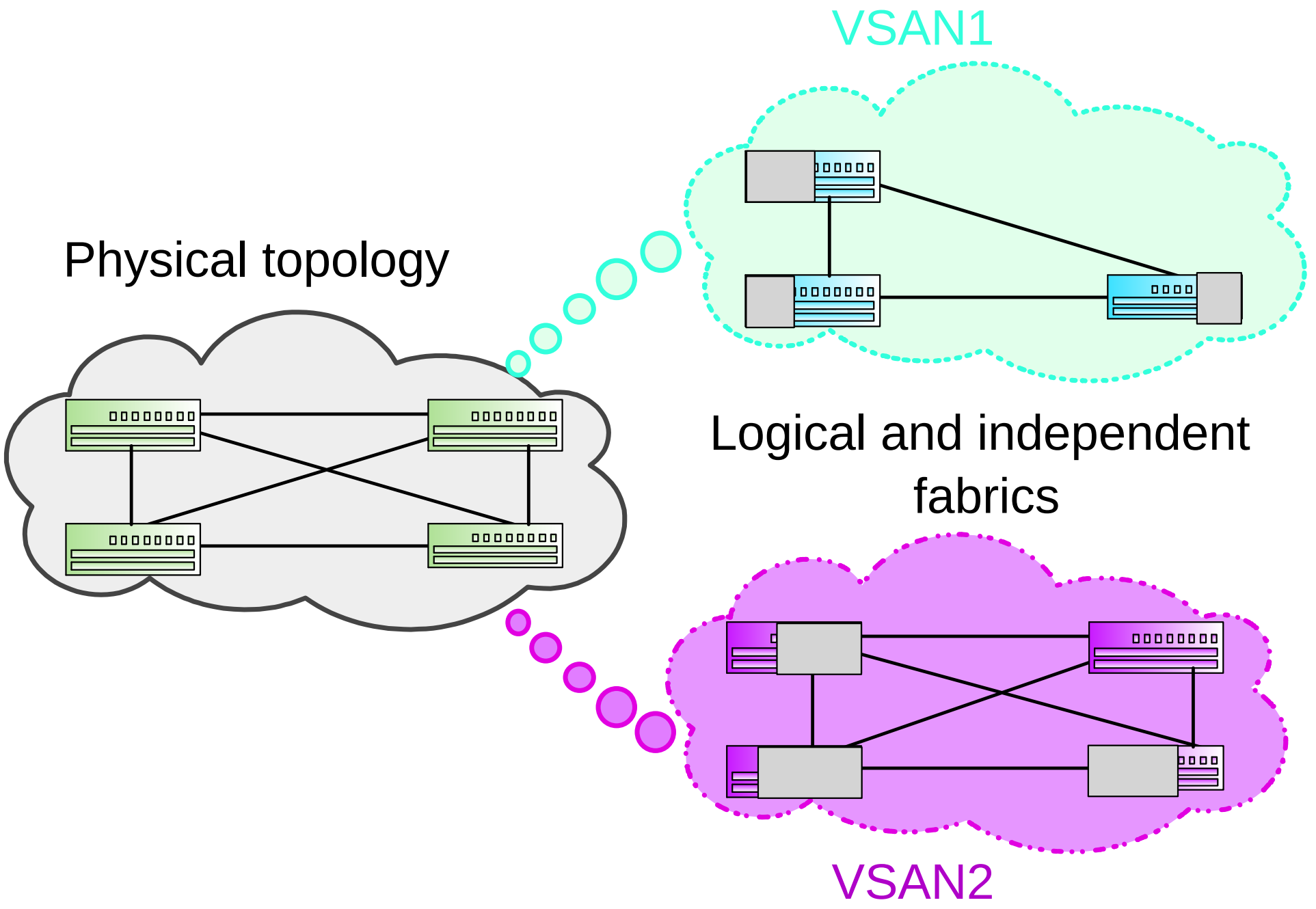


Management Interface
such as
IBM TotalStorage
SAN Switch Specialist

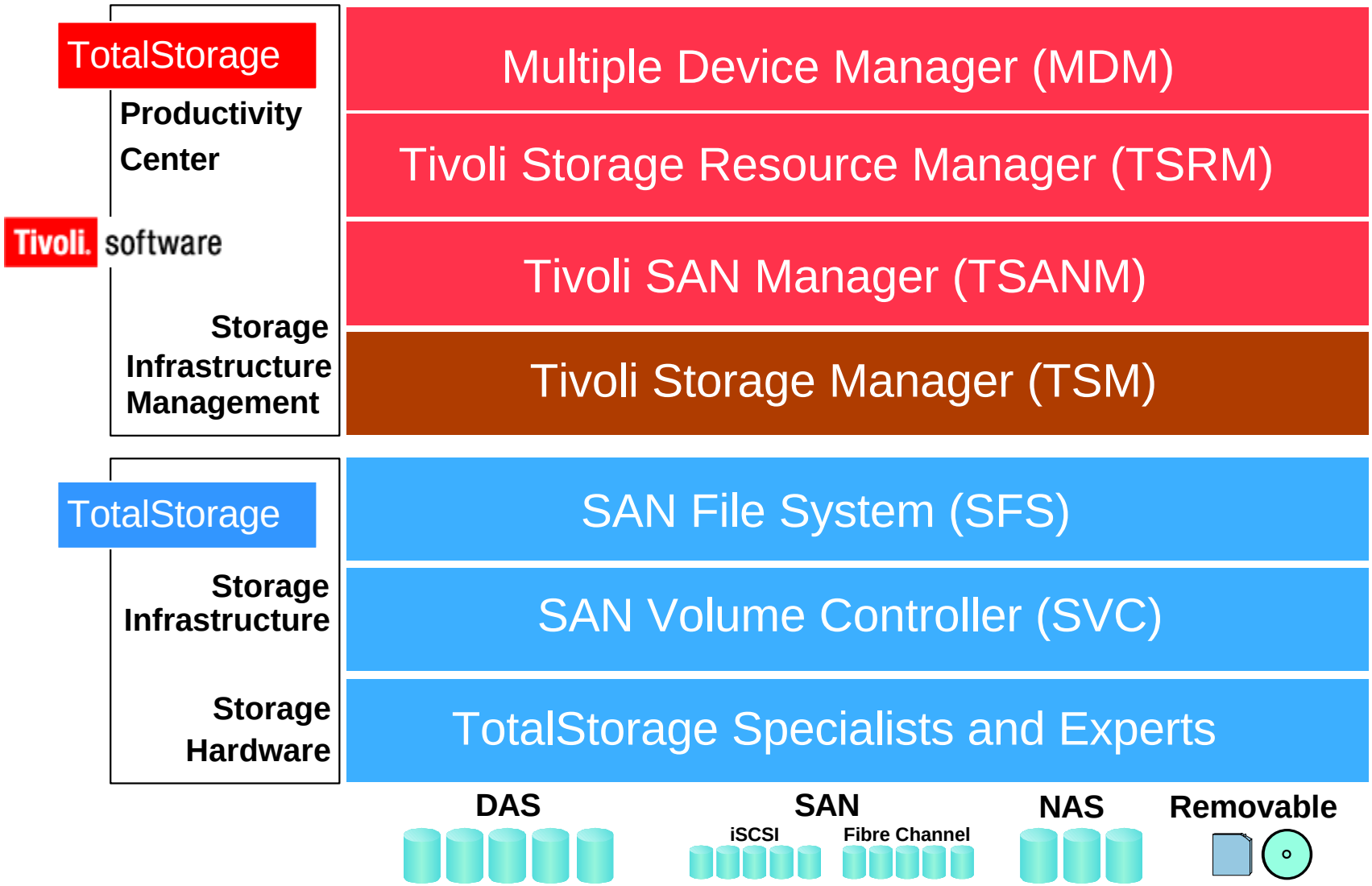
Managing Access with Zoning/LUN Masking



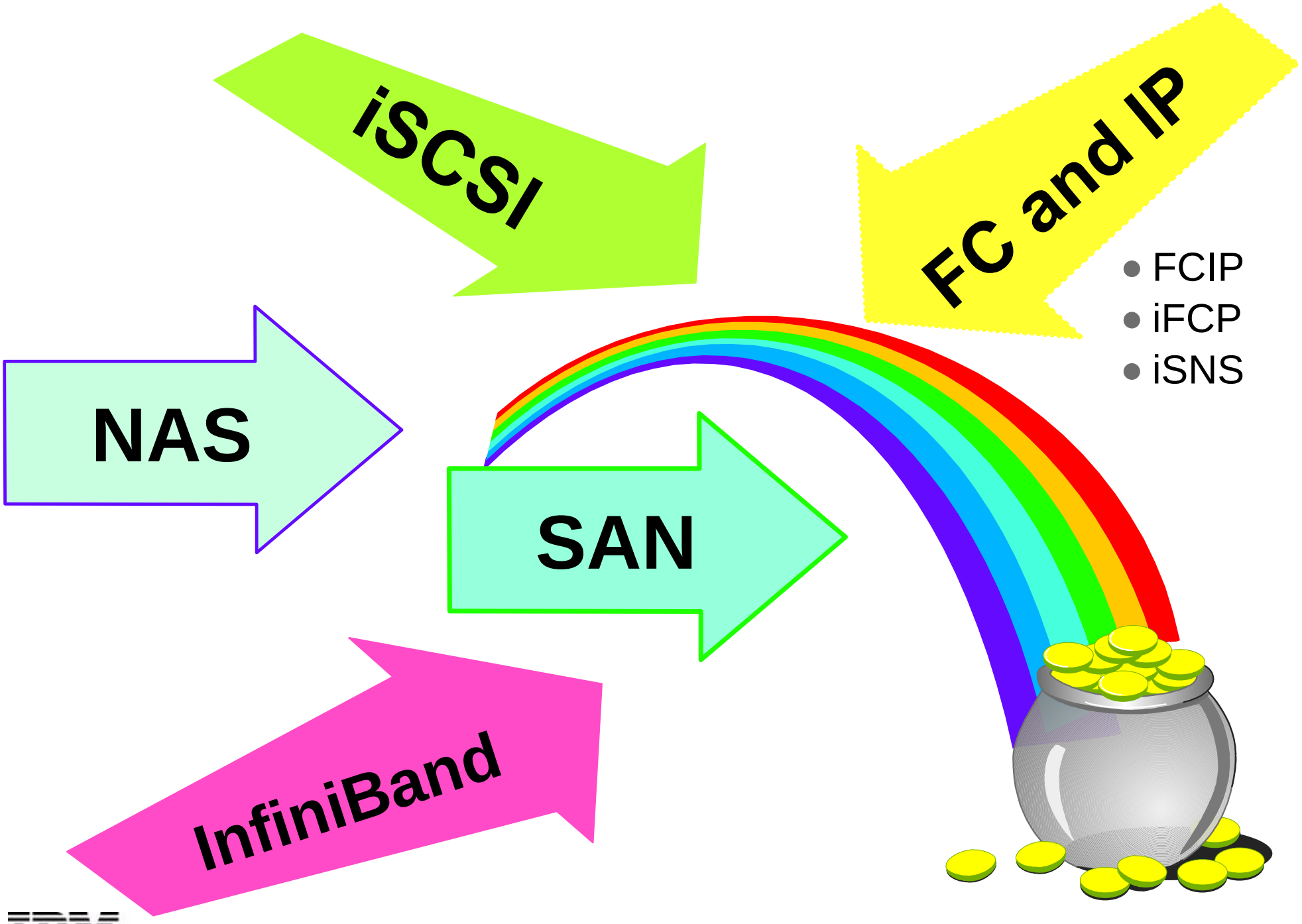
Cisco Virtual SANs (VSANs)



IBM TotalStorage Open Software Family



Storage Networking Futures



Summary

- Approaches to connect storage are:
  - DAS: Direct-Attached Storage
  - NAS: Network-Attached Storage (IP)
  - iSCSI: Internet SCSI (IP)
  - SAN: Storage Area Network (FC)
- NAS provides file sharing and the emerging iSCSI technology provides pooled storage in IP networks as basis for IP SANs.
- SAN is a separate network dedicated to storage and uses primarily Fibre Channel to provide scalable bandwidth and flexible connectivity.
- The SAN infrastructure facilitates the development of new applications such as: resource sharing, device pooling, LAN-free server-less backup, server clustering, and disaster recovery.
- The SAN network infrastructure enables the development of networked-based solutions such as centralized storage provisioning and SAN-wide data replication services.

References

- Course SN700 - Introduction to Storage Networking
- Course SN710 - Planning and Implementing a SAN
- Course SN820 - SAN Volume Controller Planning & Implementation
- www.ibm.com/services/learning - Training information
- SG24-6419 Designing and Optimizing an IBM SAN
- www.ibm.com/san IBM Storage Area Network
- www.fibrechannel.org Fibre Channel Industry Association
- www.t11.org Device Interfaces and Drafts of FC Standards
- www.snia.org Storage Network Industry Association

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