# *NAS and SAN Scaling Together*
## *(NASD Approach)*

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# Summary

- Motivations - Specialized Storage Entity
- Actual solutions (NAS and SAN)
- NASD architecture
- Active Disks - Enabling NASD Devices
- Conclusions

# Specialized Storage Entity

Motivations:

- Storage Bandwidth becomes critical
  - video
  - Data-Intensive
  - Humankind will generate vast amounts of new data
- makes storage management easier
- increases data availability
- enables Data Sharing

# Existing Solutions (NAS)

NAS Main Properties:

- Filesystem oriented
- NFS/CIFS natural successor
- server in a Stand Alone Box with Hot-Swappable RAID
- behaves as another application execution, leading to CPU consumption

# Existing Solutions (SAN)

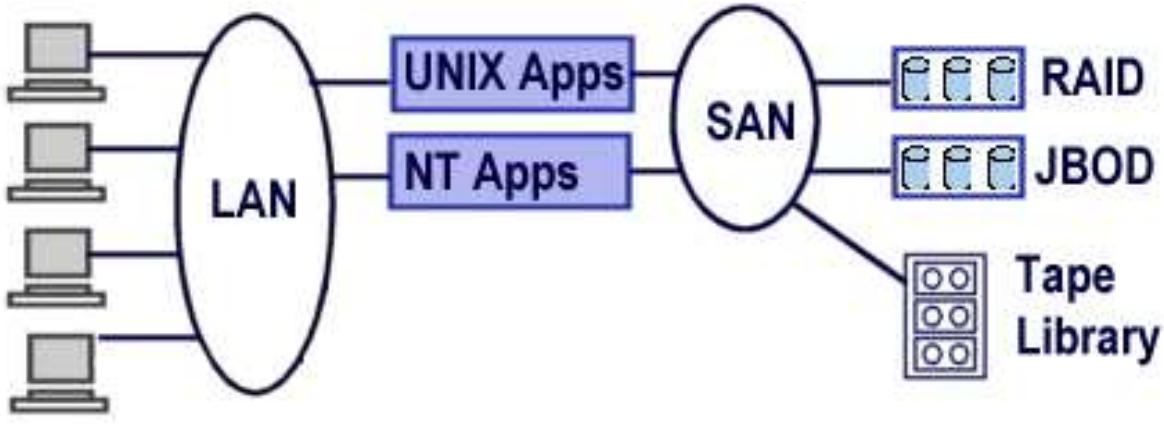
SAN Main Properties:

- set of two or more storage devices communicating through a serial SCSI Protocol
- SANs refers to the storage device itself and the network hardware to which it is attached
- block oriented
- used for high performance architectures demanding low latency and direct data access
- does not provide File Sharing, instead it allows multiple clients to access the same device without Concurrency Control Mechanism

# Differences Between NAS and SAN

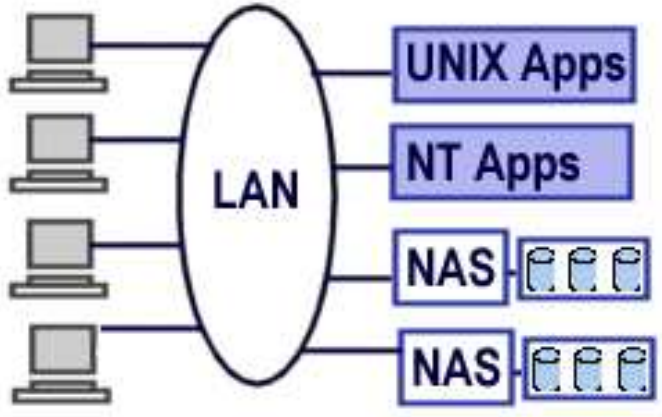
| | SAN | NAS |
|---|---|---|
| **Protocol** | Serial SCSI-3 | NFS/CIFS |
| **Shares** | Raw disk and tape drives | Filesystems |
| **Share Examples** | /dev/scd0 | /mnt/nfsmount |

# Typicall NAS and SAN Usage




Clients' applications are connected to a SAN-like network

# Typicall NAS and SAN Usage




Clients' applications receive Data from a File Servers

# Combining NAS and SAN

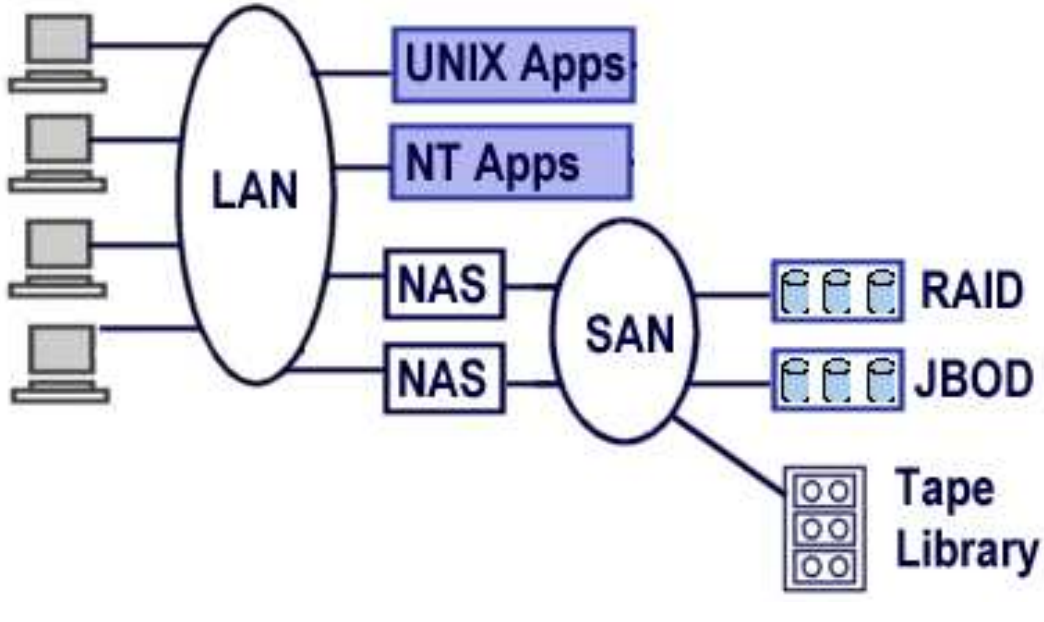
**NAS Flaws:**

- server Bottleneck (*store-and-forward, concurrency control and metadata consistency*)
- becomes worse if server also bridges traffic between diferent networks

**SAN Flaws:**

- controller Bottleneck (*a controller is needed to operate access to devices*)
- incapacity to present File Sharing due to the Block Oriented Interface
- security matters are not solved easly

# NAS And SAN Collaborating




NAS Distributing Files which are stored in a SAN-like environment

# NASD Architecture

**Scalable Solution**

- embbeds disk management functions in the device
- Variable Length Object Interface (metada is Known only at the drive)
- File Managers grant persistent capabilities over Object access
- clients holding access to a specified Object, contact directly with the drive. The drive replies back directly without File Manager assistance
- accesses are validated against Cryptographic Techniques at the device

# NASD Architecture (Cont.)

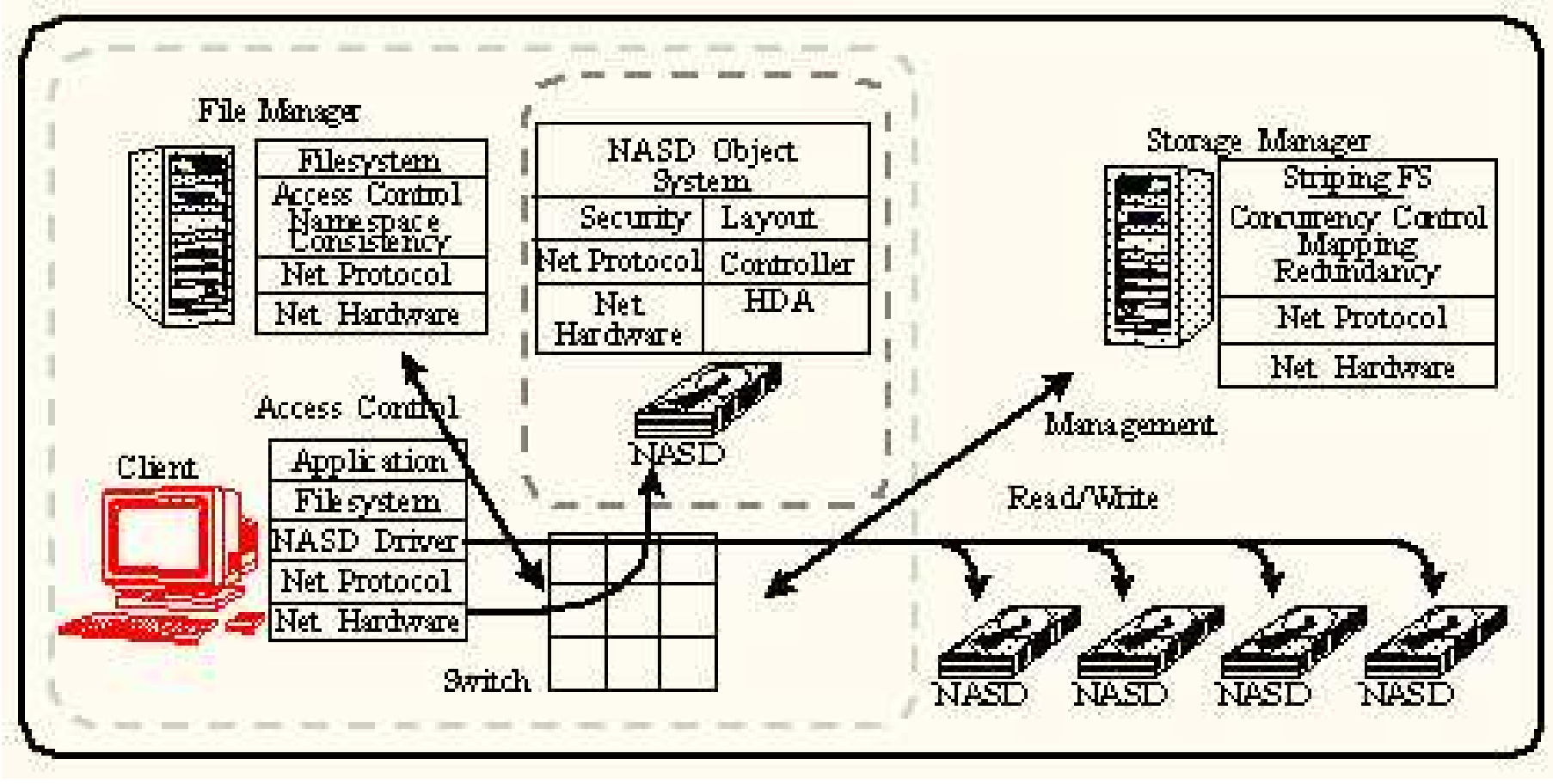
**NASD Standard Properties:**

- *Direct Transfer*
- *Asynchronous Oversight*
- *Cryptographic Integrity*
- *Object-based Interface*

# Active Disks and NASD Devices

- Smart Drives with *Microprocessor*, *Memory*, and *Comunication Subsystem*
- .18 microns circuit production frees space at the device which may be used to embbed a 200MHz processor
- enables NASD procedures like filesystem management and cryptographic tasks
- extra CPU cycles may be used to execute Applicational code
- this approach extends Cluster Based Processing

# NASD Overview



# Conclusions

- Need for Distributed Data
- NAS and SAN as Two Distinct Phylosophies to Grant Distributed Storage
- NAS/SAN Hybrid Solutions are the New Trends
- NASD as a Scalable Hybrid Approach
- Enabling NASD With Active Disks