Data Storage Institute

Network Storage Technology:
A Summary From The Field

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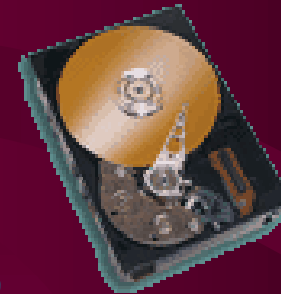
September 2000

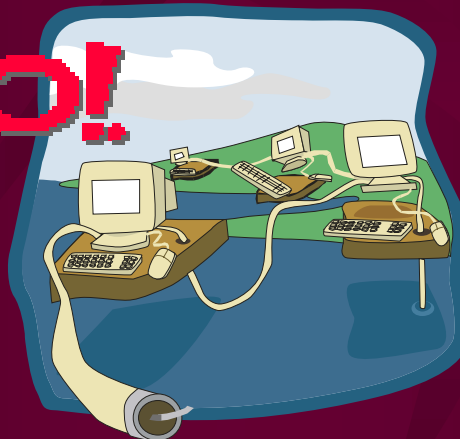patrick@dsi.nus.edu.sg
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Presentation Outline

- This presentation will discuss network storage technology, its challenges and some of the new efforts in this area

- But first:
  - Why are we even talking about network storage?
  - And, do we really need all that space?
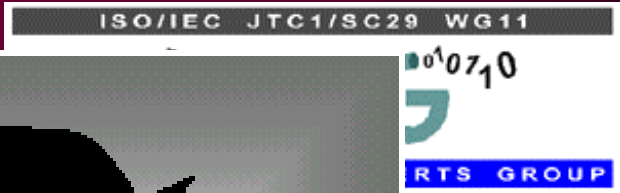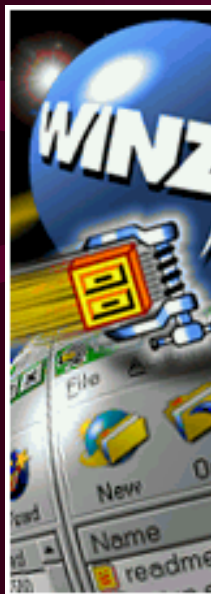
Why Network Storage?

Impossible World!

Do We Need More Storage?

- Research (AT&T Labs) has shown that a "Moore's Law" for Data Traffic possibly exists
- Operating Systems, Files and Applications today get larger and larger

Do We Need **<u>EVEN</u>** More Storage?

What are the issues of the day?

- Preconditions for the future of storage:
  - Storage must be "connected" to be useful
  - The need for storage will continue to increase and become more critical in everyday life
- Current implementations use LAN, SAN and NAS technologies
- Critical issues for the industry:
  - Scalability and High Availability
  - Performance and Security
  - Lowering Cost and Easing Management

What is LAN, SAN and NAS?
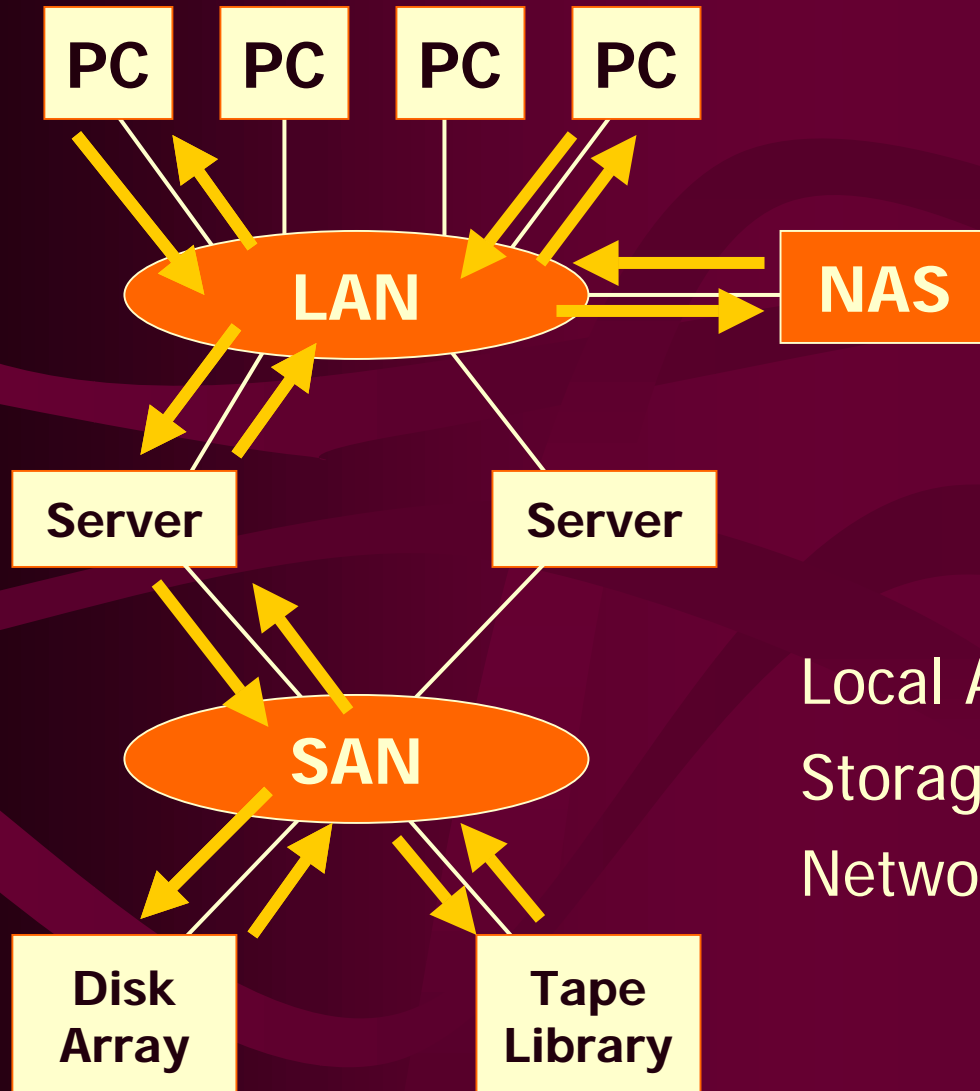
Local Area Network (LAN)

Storage Area Network (SAN)

Network Attached Storage (NAS)

Scalability and High Availability
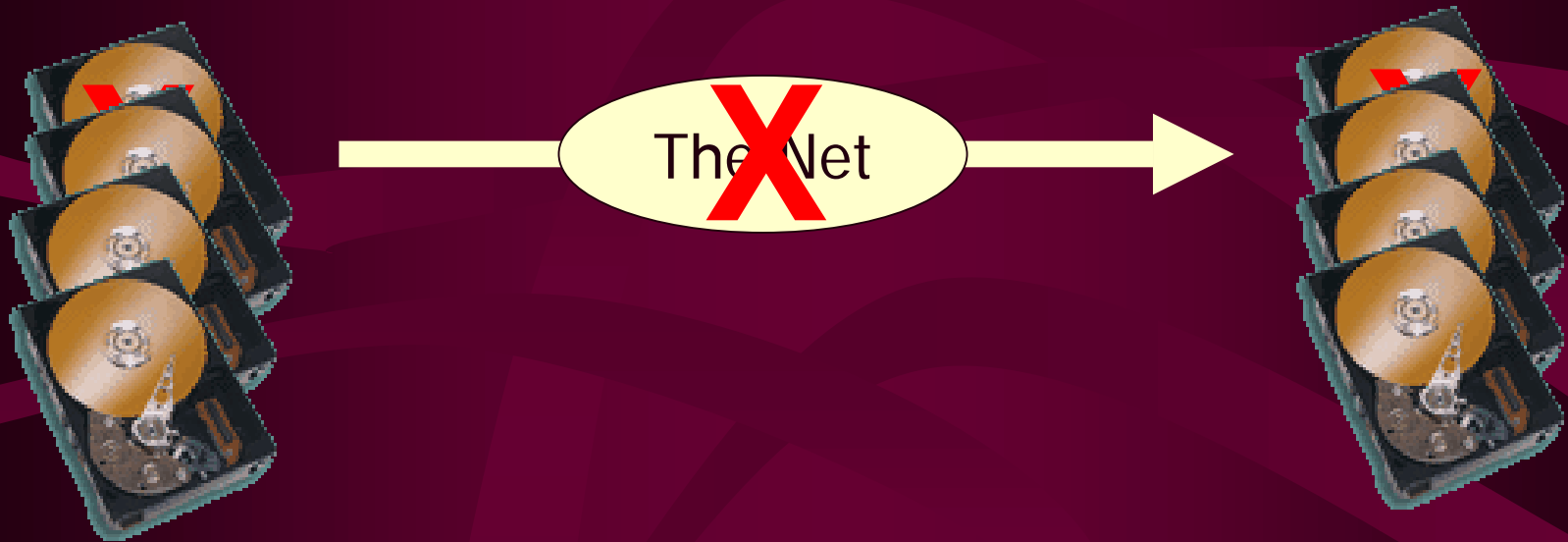
Performance and Security

The Net

CONFIDENTIAL!

Cost and Manageability

Heterogeneous System Support

Multi-Vendor, Multi-Platform Interoperability

SAN

LAN

End - to - End Management

WWW

Performance and Scalability

SINGAPORE
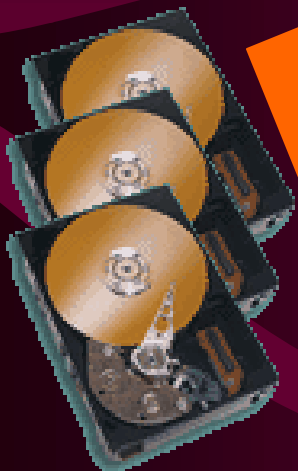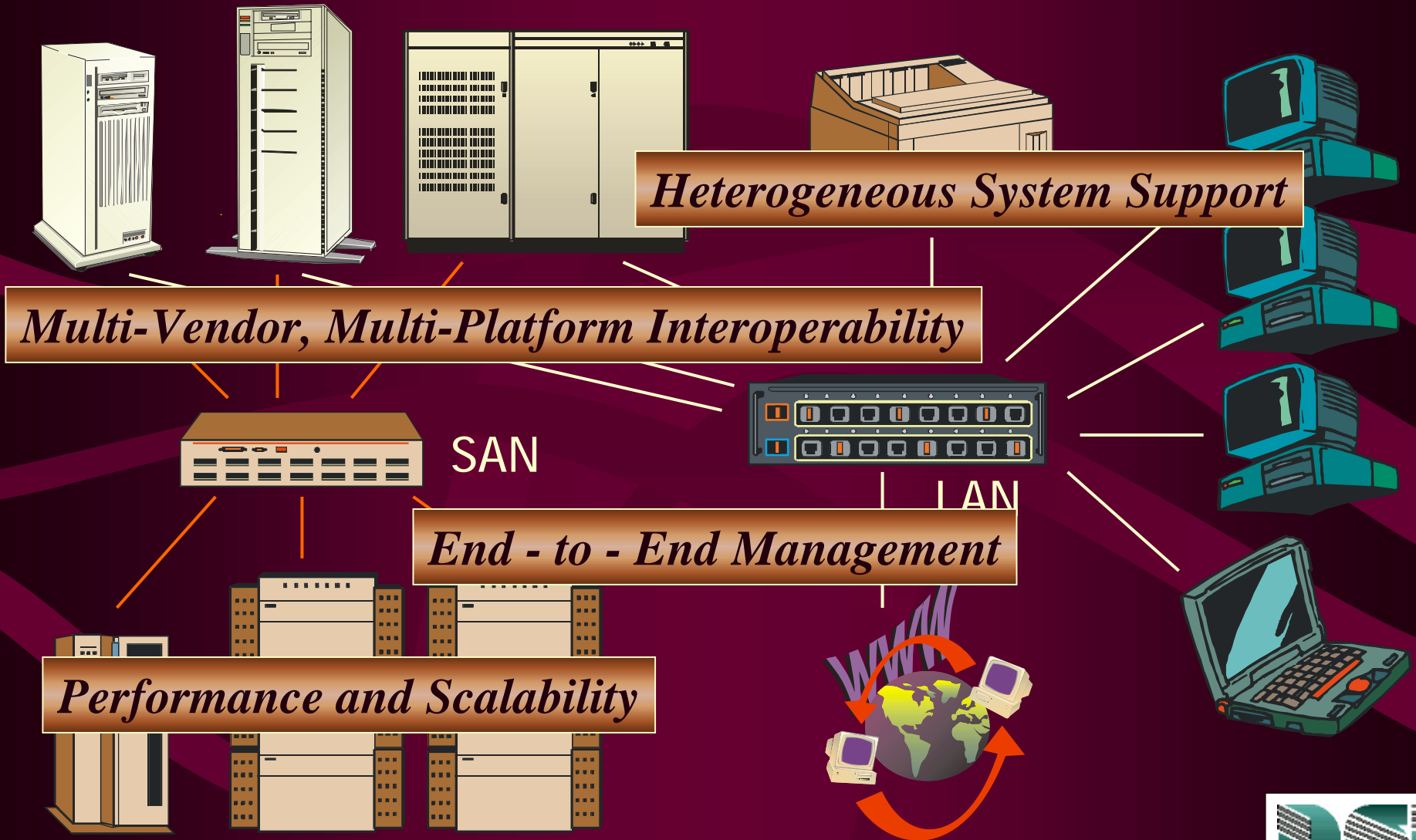
Solutions

- Organisations involved:
  - Companies from all industry fields: systems, communications, storage, etc . . .
  - Organisations like SNIA, FCIA, etc . . .
  - Research Labs: Universities, NASA, DSI, etc . . .
- Existing solutions:
  - RAID
  - SCSI
  - PCI

Some Key New Technologies

- Fibre Channel
- Infiniband
- JIRO
- iSCSI
- Fibre Channel over IP
- Gigabit Ethernet
- IPv6
- High Areal Density
- Modular Connected Storage Architecture

Modular Connected Storage Architecture

Security Authentication Identification

Central Bus

RAM

I/O Modules

<u>Networking:</u> Ethernet, Fibre Channel, ATM, etc
<u>Wireless:</u> Infrared, Bluetooth, GSM, PCN, CDMA, 3G, etc
<u>Audio/Video:</u> RCA, Cable, Satelite, etc
And so on . . .

Data Storage Modules

<u>Magnetic:</u> HDD, RAID Array, Tape, etc
<u>Optical:</u> CDROM, CDR, DVD, DVDR, DVDRAM, Optical Jukebox, etc
<u>Others:</u> FlashROM, Memory Stick, etc
And so on . . .

Data Processing Modules

Data Searching and Mining
Voice-to-text and Text-to-Voice
Optical Character Recognition
3D Rendering Engine
<u>Audio/Video Conversion:</u> MP3 to Audio, Digital Movie to DVD, etc
<u>File System Compatibility:</u> NFS, NTFS, FAT/FAT32, etc
And so on . . .

Potential Partners in Industry

Storage Systems
Seagate
Maxtor
Quantum
EMC
Xiotech
Legato
Brocade
Gadzoox
Auspex
StorageTek
Veritas

Test Sites
Housing Development Board
Infocomm Development Authority
National University of Singapore
Nanyang Technological University

Technology Development
Hitachi Data Systems
IBM
Silicon Graphics
Sun Microsystems
Compaq
Dell
Sony
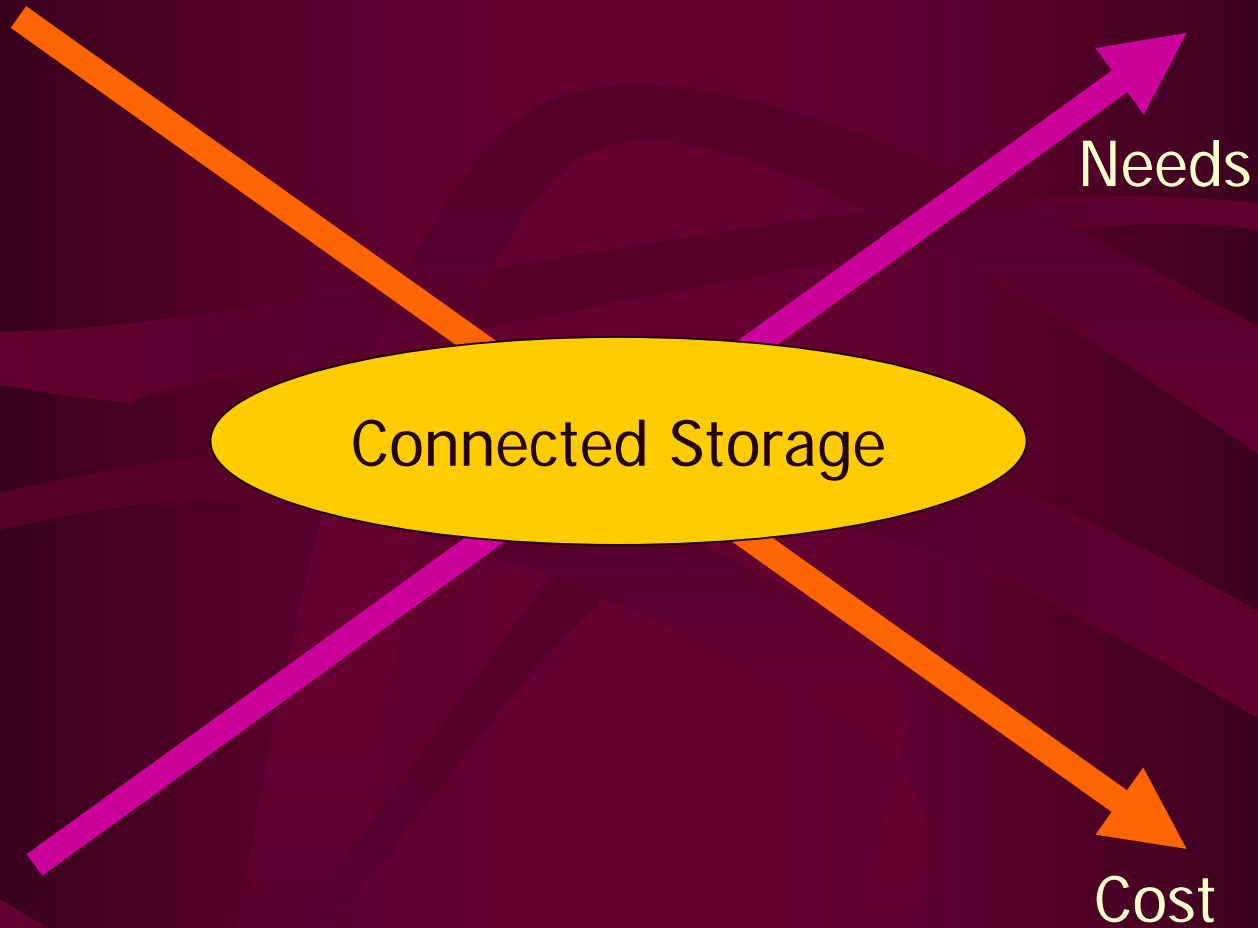Matsushita
Philips
RedHat
Caldera

MCSA Development

Content Providers
National Library Board
Bertelsmann AG (BMG)
Remote Backup
Singapore ONE
MediaCorp
Singapore Press Holdings

Service Providers
SingTel
Starhub
Singapore CableVision

Is There a Trend?

Needs

Cost

Connected Storage

The Future

- A long term solution must be able to meet current and future security, reliability, scalability and performance needs and still be economical

- New and radical ideas will continue to be explored