

# Backing up the Real World

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# About Data Storage Institute

1992

**Magnetics Technology Centre**

Servo, Coding,  
Magnetic CAD  
Head-disk interface

1996

Magnetic media  
Optical technology

1998

Magnetic heads  
FAR

2000

**Data Storage Institute**

Network storage

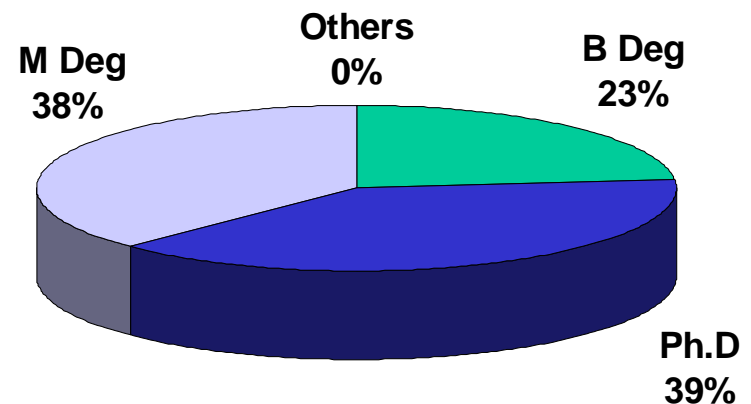
Since establishment: (as of Jun 2003)

- M.Eng students graduated 93
- PhD students graduated 34
- Undergraduate students trained 286
- IA student trained 168
- R&D staff spun out to industry 92
- (Since year 2000)
- Published journal papers 717
- Published conference papers 561
- Patent filed (granted) 122 (41)

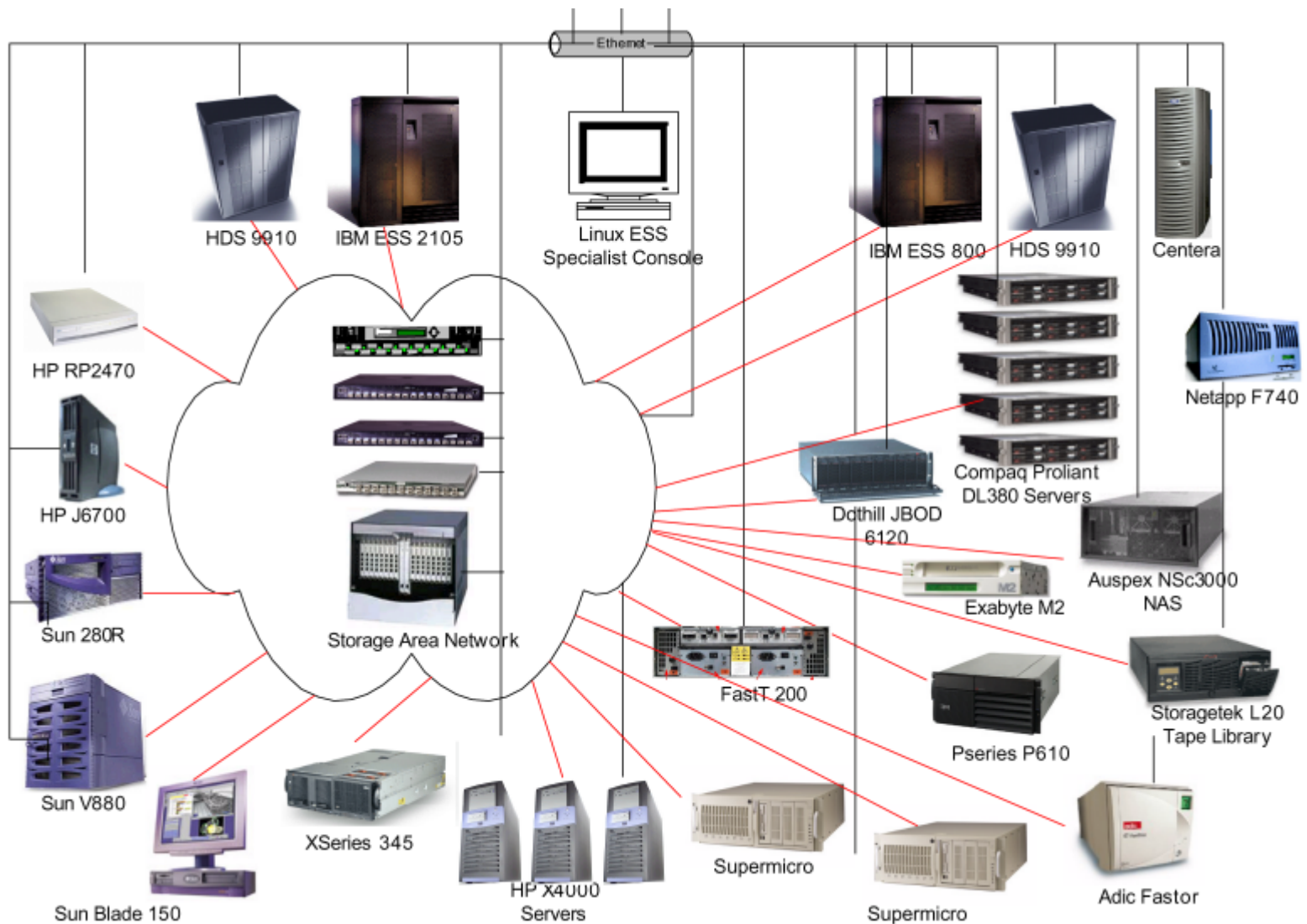
Budget : \$35 mil / year

## Current Staff (as of Jun 2003)

Research Staff	183
Visiting scientists/PDF/PMF	13
Graduate students (RS)	65
Undergraduate students	46
Faculty Associates	10
DSI staff adjunct to Univ	11



# DSI Network Storage Laboratory



Approx 9TB of online primary disk space for development and testing, Win/Lin/HP/IBM/Sun/etc

# DSI Network Storage Laboratory



■ A training program created to develop professionals and experts for the storage networking industry



■ Initiated by Data Storage Institute (DSI) and the Economic Development Board (EDB) in 2001 with the support of 10 leading storage principals



# Trends from the USA

# Terrorism Puts Focus on DR

- Interagency FED, OCC, and SEC Regulation for Core Financial Institutions was published April 7, 2003
  - “Black Hole” disasters require geographically dispersed (Asynchronous) recovery sites
- Basil 2 will require additional capital reserves for “operational” risk
- Homeland Security requires separate recoverable facilities
- Manufacturing Companies are requiring their suppliers to have a DR plan
- DR is not just a high end enterprise requirement
  - Insurance rates increase as much as 10x without a DR process



# Corporate Governance and Compliance

- Compliance is becoming a major issue
  - \$1.5B global settlement over stock research abuse
- Email is the main focus for litigation
  - Sarbanes-Oxley requires 7 years retention
- Electronic retention of paper records
  - Enables backup and retrieval
- Often an area of disconnect between technical and business executives
  - CEO/CFO face compliance fines
  - CIO believes deleting email after 90 days is a solution
- Regulations are loosely defined in terms of technology
  - Eg. "out of region" or "WORM like"

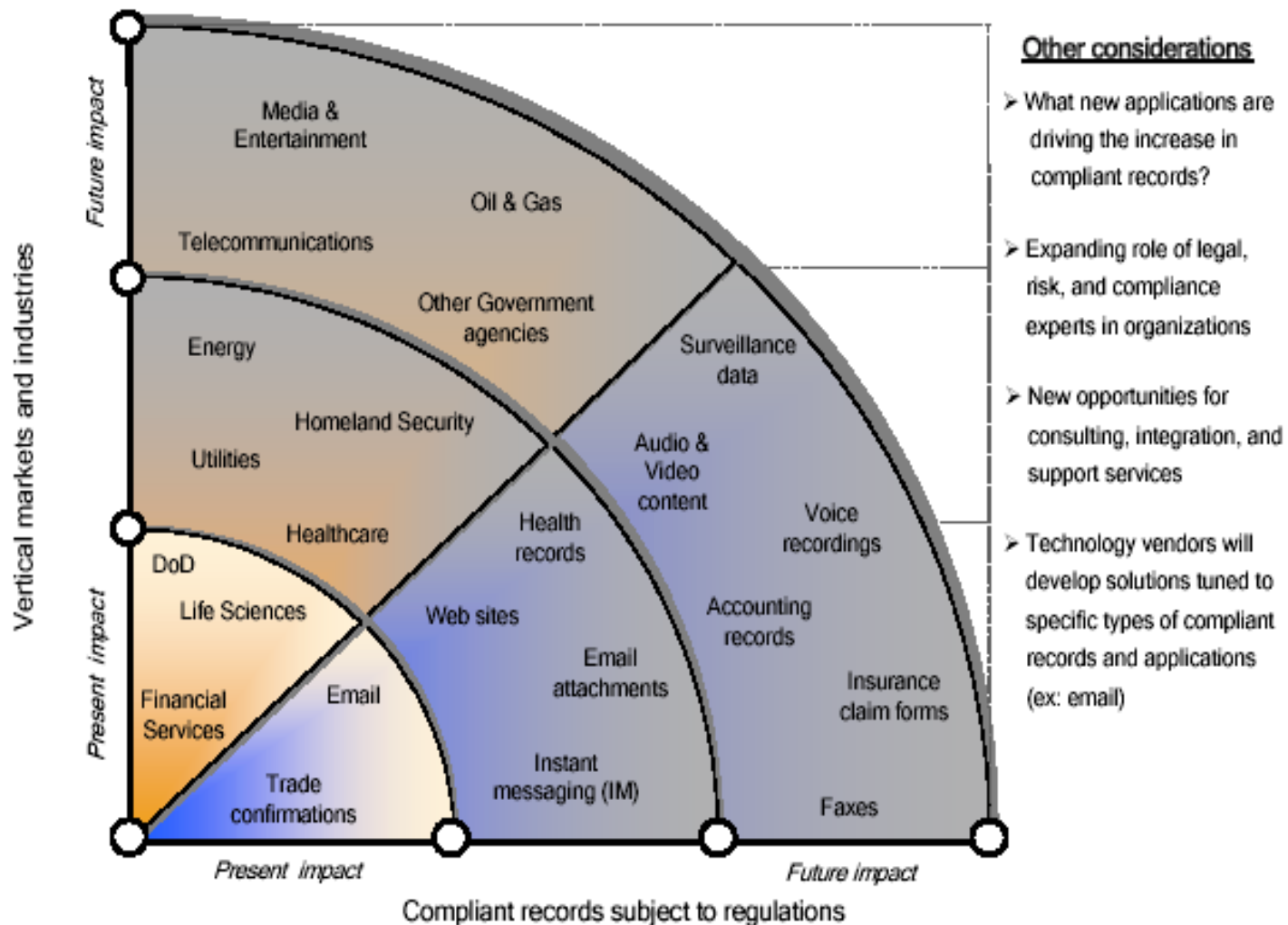


# Requirement for Records Retention

- SEC 17a-4 and NASD 3010 requires financial services firms to retain all electronic communication between employees and clients
  - 5 Wall Street firms were fined \$8.25m in December 2002
- Key requirements
  - Retain for 3 years and easily accessible for 2 years (?)
  - Retained on “non-erase able non-delete able storage media”
- Optical “ablative” WORM is no longer practical
  - Too slow , too expensive, many manufacturers are no longer in business
  - Data must be rewritten if the base operating systems changes
- Similar requirements in other verticals
  - DOD, Telco, BioMed, patents, libraries, etc

# Expansion of Compliance Requirements

“The Ripple Effect” - compliance expands in scope and depth



# What does all this mean?

- Backup, Recovery and Archiving will become more and more important, with a focus on disaster recovery
- Most initial focus areas for archiving will be on communications related data, ie. Email, IM, Digital Fax, Digital Voicemail, etc in addition to the traditional financial records
- These trends will eventually affect all companies, big and small, across various industries and sectors

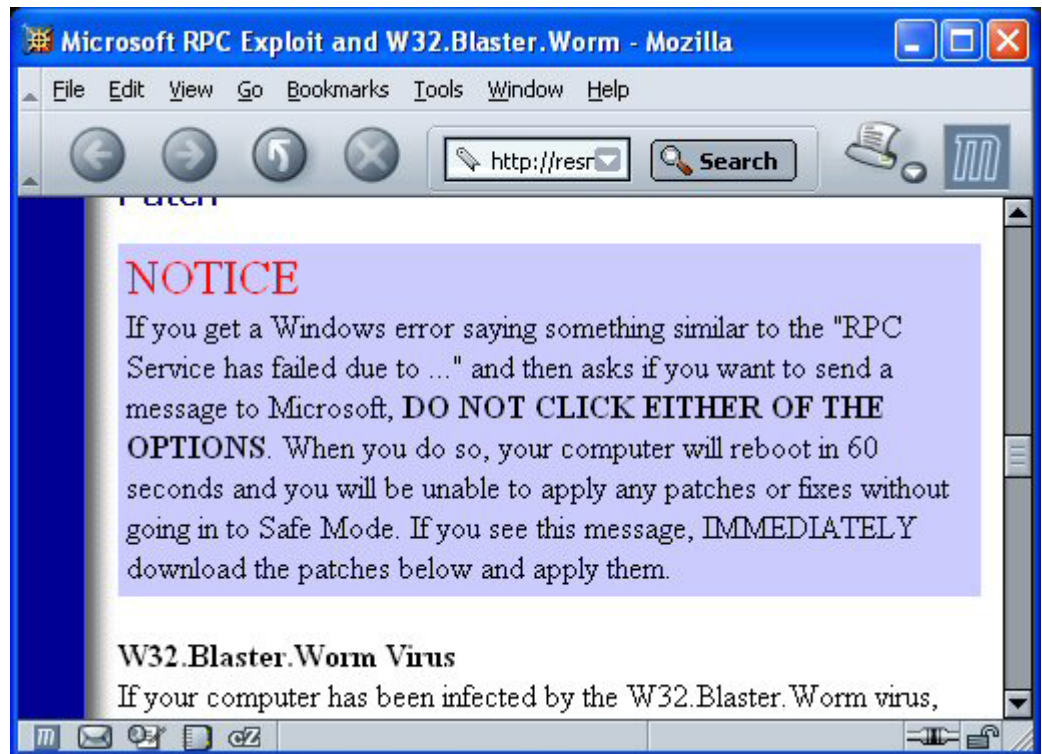
# Backup and Recovery

Test Results of the VXA-2

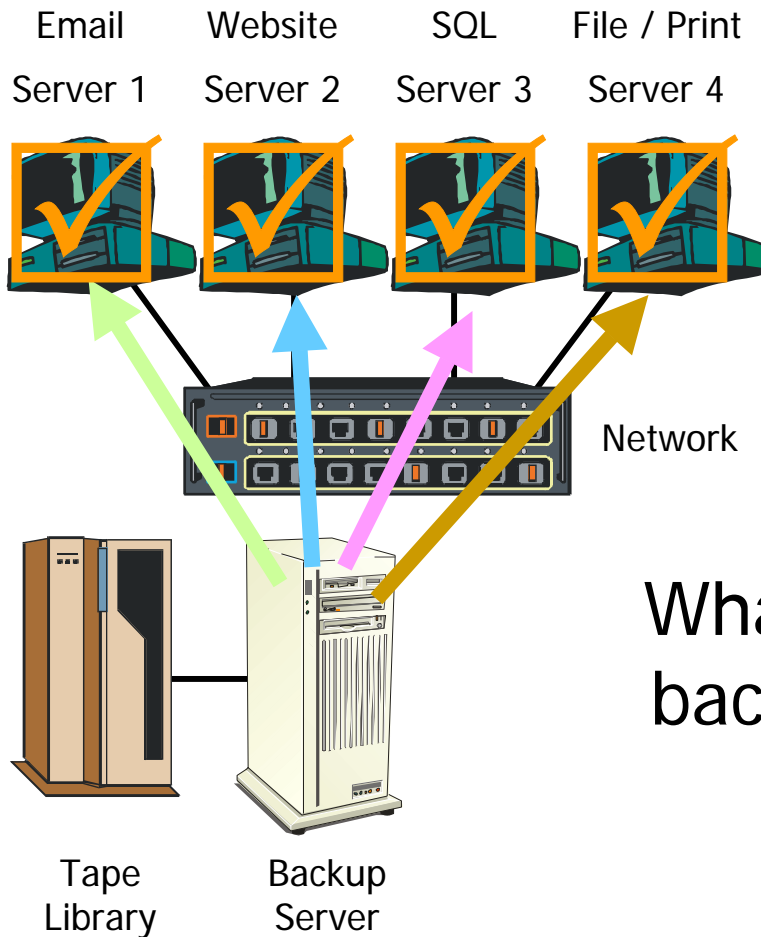
# Why do Backup?

- Severe Virus Attack
- Operating System Crash
- Hard Disk Failure
- Data Loss, Accidental or Intentional
- Natural or Man-made Disasters

In today's uncertain times, the only thing you can be sure of, is your backup

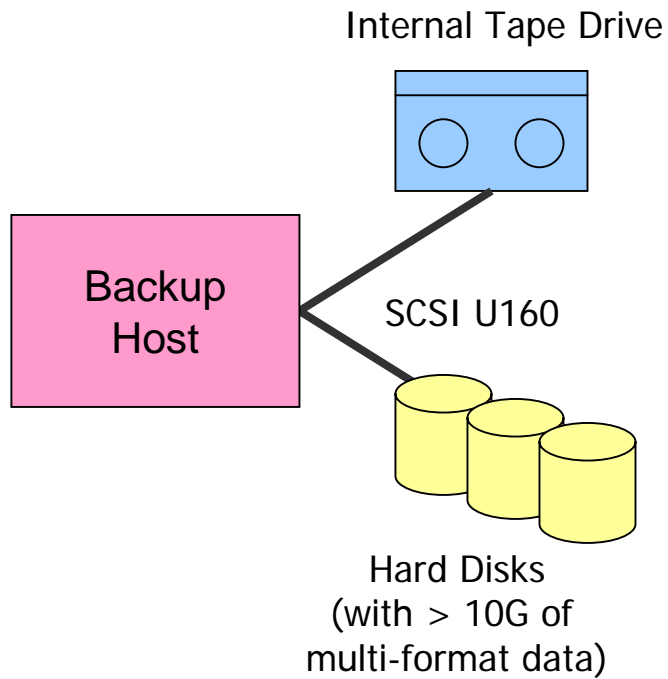


# Backing up Multiple Servers



What is the time taken to backup all your systems?

# Test Procedure



DDS-4



VXA-2



Win2K

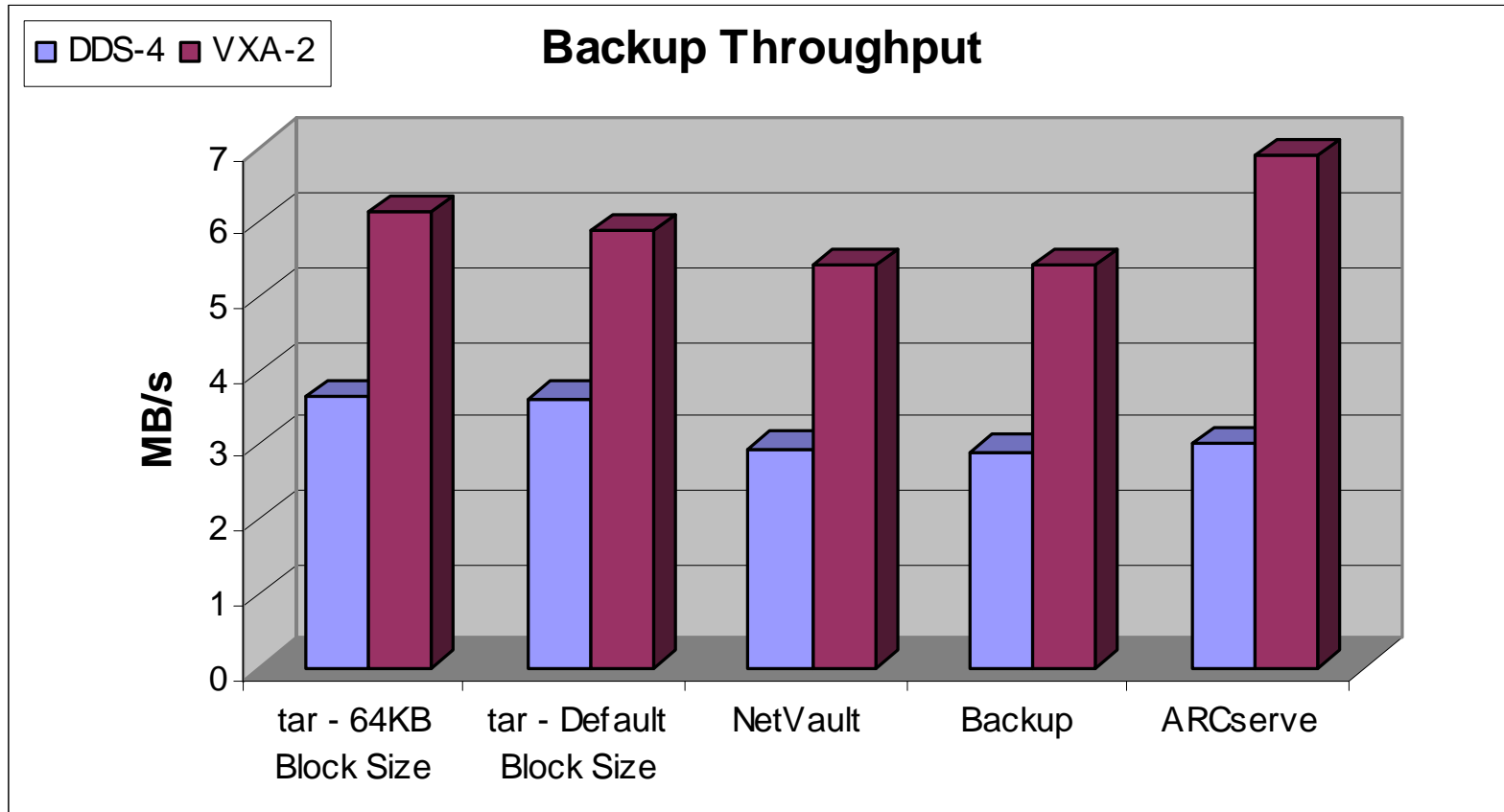


Linux

Microsoft Backup  
(Windows 2000)

Linux Tar  
(RedHat Linux 7.3)

# Test Results – Performance



Source: VXA-2 Versus DDS-4 Review,  
Data Storage Institute 2003

Furthermore:  
VXA-2: 80G  
DDS-4: 20G

	DDS-4	VXA-2
tar - 64KB Block Size	3.66	6.12
tar - Default Block Size	3.63	5.88
NetVault	2.95	5.41
Backup	2.91	5.43
ARCserve	3	6.88



# Test Results – Lessons Learned

- Platform, Software and Hardware configurations can and will affect your performance
- Different platforms and Software will require different drives, configurations and setups
  - Setup carefully!
  - Take time to read up!
- The VXA-2 consistently outperformed the DDS-4 drive across all configurations

# Conclusion

- Backup and Disaster Recovery is serious business
  - And will become even more serious in the future!
- Having more and more data and increasing number of servers to protect means shorter backup windows
- Good and fast backup solutions are critical to “digital information insurance”

# Thank You

<http://nst.dsi.a-star.edu.sg/mcsa/>