IBM®

# IBM® TotalStorage® DS4800

"What does ½ Million IOP's do for your storage infrastructure"

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June 15, 2005

# Agenda

- Announcing the DS4800

- DS4000 family review

- So what's a DS4800 and why are folks so excited about it?

- What can the DS4800 do for you? A solutions overview

**IBM Outgrows Market Segment in External Disk Storage, According to Leading Market Research Firm**

**ARMONK, NY -- Jun 3, 2005** -- IBM continued its momentum in external disk storage systems in 2005 by growing factory revenue by 9.2 percent year-to-year during the first quarter of 2005, outpacing the overall external disk storage segment's growth of 6.7 percent, as measured by IDC [1] in a report released today. The report also showed IBM's external mid-range storage offerings (priced between $50,000 and $299,999) grew 49 percent year-to-year, while the overall segment grew 27 percent overall. In the face of relatively flat demand for attached disk storage for UNIX environments, IDC reported that IBM's external disk storage attachment to UNIX servers grew 8.3 percent year-to-year.

"The data from IDC indicates that IBM is gaining share by delivering innovative solutions for our clients," said Barry Rudolph, Vice President, IBM Storage. "We continue to offer the broadest portfolio of storage offerings in the industry to help clients build the right infrastructure for information on demand."

IBM continues to be a leader in the storage industry with innovative technology offerings. *The company today also announced that its midrange IBM TotalStorage DS4800 offering is generally available. Customers like Rex Hospital in North Carolina are already ordering the system. IBM is the first major storage vendor to make a 4-Gigabit per second disk storage system available to the marketplace. The IBM TotalStorage DS4800 can support both Fibre Channel and SATA hard disk drives, is designed to offer customers up to 550,000 IOPS, and through its high availability and reliability design, can help customers improve business continuity and deliver information on demand.*

IBM's external disk storage offerings are a key component of IBM's Information On Demand strategy which is helping clients to integrate their business processes to better meet core functional and business requirements.

# IBM DS Family Storage Systems

**IBM TotalStorage SVC**
- SAN Volume Controller
- Common Copy Services
- Centralized Management

**IBM TotalStorage DS6800**
- FC & FICON®
- Max 224 drives
- 8,192 LUNs
- 64 partitions
- 4 GB cache
- FC drives

**IBM TotalStorage DS8000**
- FC & FICON attach
- Max 224 drives
- 8,192 LUNs
- 64 partitions
- 4 GB cache
- FC drives

**IBM TotalStorage DS4300**
- FC attach
- Max 112 drives
- 1024 LUNs
- 64 partitions
- 2 GB cache
- FC & SATA drives

**IBM TotalStorage DS4100**
- FC attach
- Max 112 drives
- 1024 LUNs
- 64 partitions
- 2 GB cache
- SATA drives

**IBM TotalStorage DS400**
- FC attach
- Max 40 drives
- 1024 LUNs
- 64 partitions
- 1 GB cache
- SCSI drives

**IBM TotalStorage DS4500**
- FC attach
- Max 224 drives
- 2048 LUNs
- 64 partitions
- 2 GB cache
- FC & SATA drives

**IBM TotalStorage DS4800**
- FC attach
- Max 224 drives
- 2,048 LUNs
- 64 partitions
- 16 GB cache
- FC & SATA drives

**PRICE / PERFORMANCE**

**SERVICE LEVEL**

# DS4000 Series Positioning

This table represents general positioning and not technical capabilities



Increasing performance and functionality →

DS4800

DS4500

DS4300

DS4100
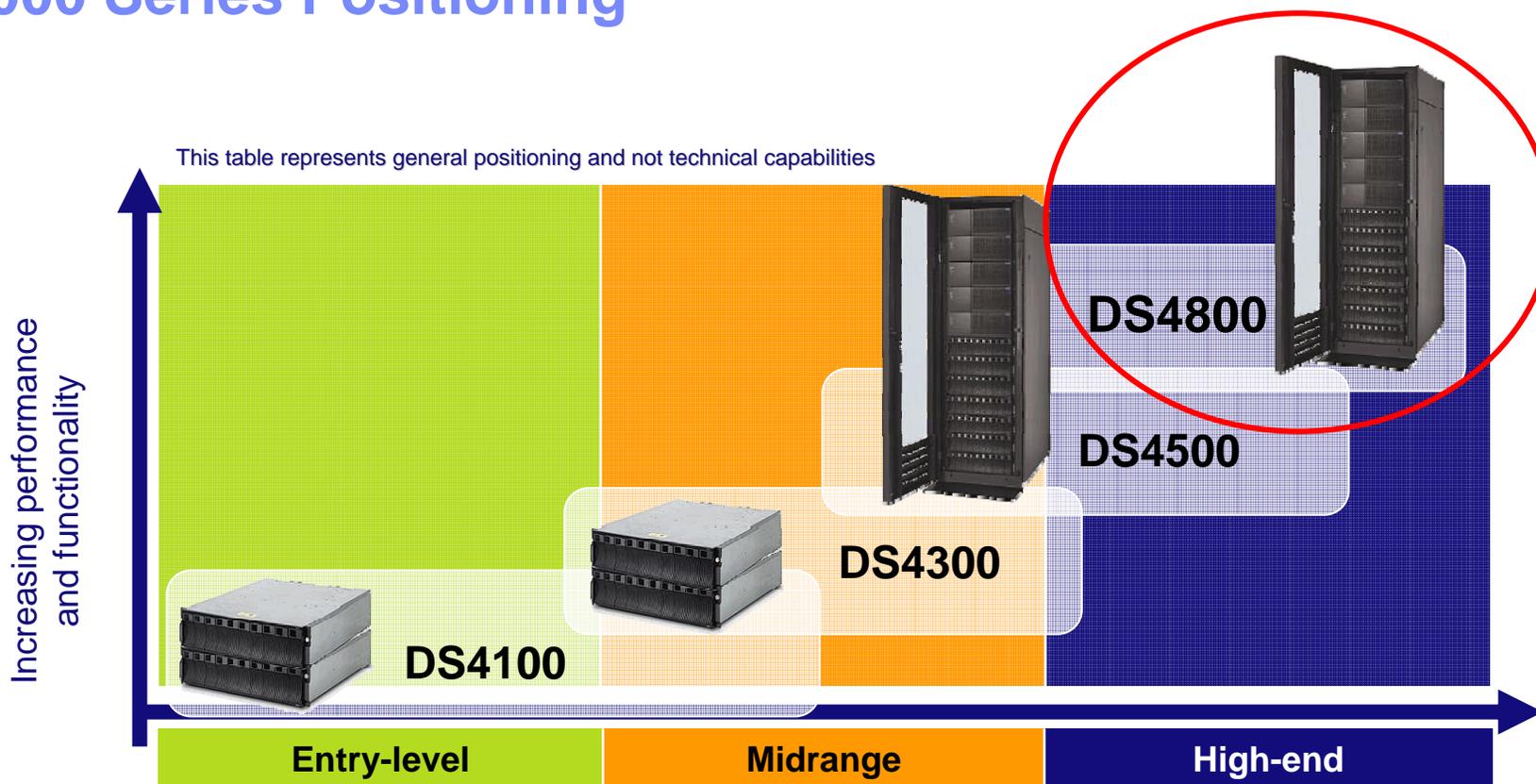
| | Entry-level | Midrange | High-end |
|---|---|---|---|
| **Workload** | Light workloads | Medium workloads | Heavy workloads |
| **Typical platforms** | Window/Linux direct attach | Homogeneous SAN | Heterogeneous SAN |
| **Applications** | SMB operational | SME business-important | SME business-critical |
| **Primary drive type** | SATA | FC / SATA | FC |
| **Data replication** | FlashCopy | FlashCopy, VolumeCopy, Enhanced Remote Mirroring | FlashCopy, VolumeCopy, Enhanced Remote Mirroring |

# DS4000 Series Benefits

- **Flexible upgrades which help maximize performance and availability**

- **Informative performance and fault tools**

- **Designed to be unique dynamic capabilities**

- **Reliable and Performance oriented**

- **Scalability for easy growth**

- **High availability features designed to avoid single points of failure**

- **Consolidates storage**
  - Up to 64 host systems (model dependent)
  - Homogenous or Heterogeneous server connectivity

- **Helps Protect Data**
  - Multiple RAID levels
  - Storage partitioning (LUN masking)
  - Redundant, hot-swap components
  - Designed to provide Fast Access to Data

- **Helps Reduce Total Cost of Ownership**
  - Consolidated storage helps reduce storage management costs
  - Price sensitive for entry level
  - 1 and 3 year warranty's standard (model dependant)

# DS4000 Storage Manager – New in v9.12/v9.14

- **Storage Manager Task Assistant provides users with a task-oriented starting point for carrying out common storage management operations – helping simplify storage administration and reduce total cost of ownership (TCO)**

- **Key new features / benefits**
  - Presents users with tasks they would normally need to perform for initial setup and configuration of our storage
  - Simplifies navigation to several important configuration and management operations whose current starting points in the GUI are not obvious to inexperienced users
  - Provides a clear starting point in the EMW and SMW
    - Launches at startup of EMW / SMW
    - User has the option to suppress
    - Can be launched via menu bar and/or task bar icon

# Introducing the DS4800

- **4 Gbps** technology is here with the latest member of the DS4000 Series of products, the IBM TotalStorage DS4800!

- **Targeted at enterprises with compute-intensive applications and replication requirements**

- **Eight 4 Gbps host and SAN interfaces support existing infrastructures - helping protect investments**

- **High performance and designed for open systems**

- **Support for 224 Fibre Channel or Serial ATA disk drives**

- **DS4000 Storage Manager designed to deliver robust functionality through an intuitive GUI**

## Five Components

Two Controller support modules

Two Controllers

One Interconnect module
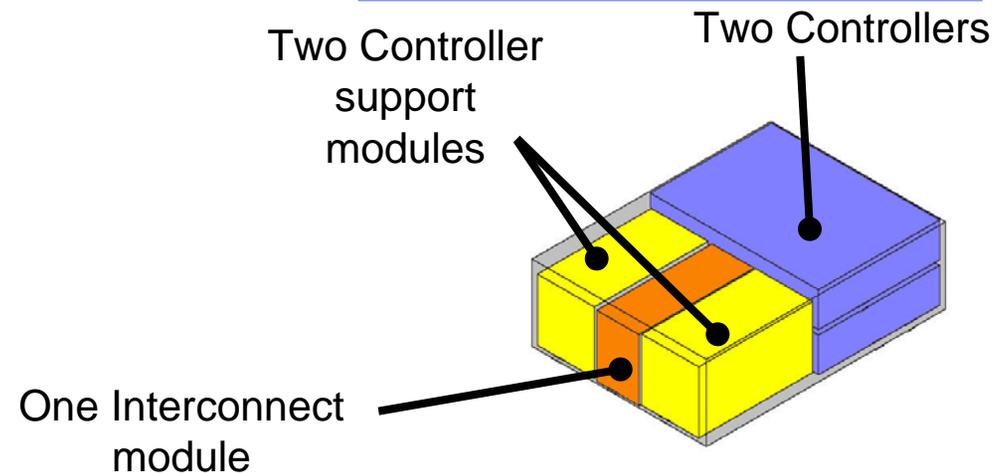
# DS4800 – Key New Features

- **6th** **Generation Enterprise Controller**
  - Proven storage heritage focused on open systems
  - 4 Gbps technology leader
  - Next generation XOR engine and 2.4 GHz Xeon processor
  - Fast memory with 2 or 4 GB of cache per controller
    - Initial release utilizes 1 GB per controller

- **Fits well into the DS4000 Series Products**
  - Same robust software, redundancy and availability provided in today's solutions
  - Enhances our extensive coverage of storage technology for both capacity-oriented and performance-oriented applications
  - Continues our tradition of upgradeability

- **Supports both 2Gb/s and/or 4Gb/s drive modules**
  - Both speeds of modules can be placed behind same pair of controllers
  - Different speed modules must be placed on different loops.

- **No single point of failure**
  - Mid-plane is in Interconnect Module and can be replaced online

- **Batteries**
  - Changed battery type from lead-acid to Lithium Ion
  - Battery life is longer than lead-acid.
  - Helps reduce in service costs.
    - No scheduled maintenance during 3-year ownership model

# DS4800's Key points

- **Breaking the 400k cache based IOPS barrier.**

- **Auto-sensing 4Gb/s technology on host and drive side**
  - 1Gb/s, 2Gb/s, 4Gb/s

- **2Gb/s and 4Gb/s drive modules behind same controller at independent speeds.**
  - Designed to protect Investment for installed base

- **Removable mid-plane while system is operating**
  - Brings monolithic enterprise features to modular systems

- **4 Gbps host and drive interfaces**
  - Each 400 MB/s pipe provides twice the "width" of 2 Gbps
    - Requires half the host adapters and cables as 2 Gbps to maintain performance
    - Fewer components helps lower TCO and improve RAS / manageability
  - Bigger pipe helps speed up LAN replication
  - Addition to current infrastructure that's "4 Gbps ready"

- **Dual 10/100 Ethernet for out-of-band management**
  - One for customer out-of-band management
  - One for service diagnostics, serviceability
    - Designed to be isolated to help prevent exposure to customer's LAN

# DS4800 – Key New Features

- **Highest performing DS4000 Series product**
  - ➤ Designed to maximizes performance for business critical applications helping improve transaction rates and customer satisfaction
  - ➤ Bigger "engine" designed to support intense replication workloads
  - ➤ Designed to deliver max performance in 2 Gbps environments

|  | DS4800 | DS4500 | DS4300T | DS4100 |
|---|---|---|---|---|
| Burst I/O rate – cache reads | 550,000 IOPS | 148,000 IOPS | 77,500 IOPS | 70,000 IOPS |
| Sustained I/O rate – disk reads | 79,000 IOPS | 53,200 IOPS | 25,000 IOPS | 10,000 IOPS |
| Sustained I/O rate – disk writes | 22,000 IOPS | 10,900 IOPS | 5,200 IOPS | 2,000 IOPS |
| Burst throughput – cache read | 1,600 MB/s | 800 MB/s | 400 MB/s | 800 MB/s |
| Sustained throughput – disk read | 1,600 MB/s | 795 MB/s | 400 MB/s | 485 MB/s |
| Sustained throughput – disk write | 1,300 MB/s | 630 MB/s | 315 MB/s | 415 MB/s |

Note: Results achieved under ideal circumstances in a benchmark test environment at Engenio.
Actual customer results will vary based on configuration and infrastructure components.

# DS4800 – Key New Features

- **Chassis design**
  - 3 FRU types with 5 total FRU's
  - All FRU's field replaceable while system online



Controller Support
Modules
(power, fans)

Interconnect
Module
(midplane, batteries)

Controllers
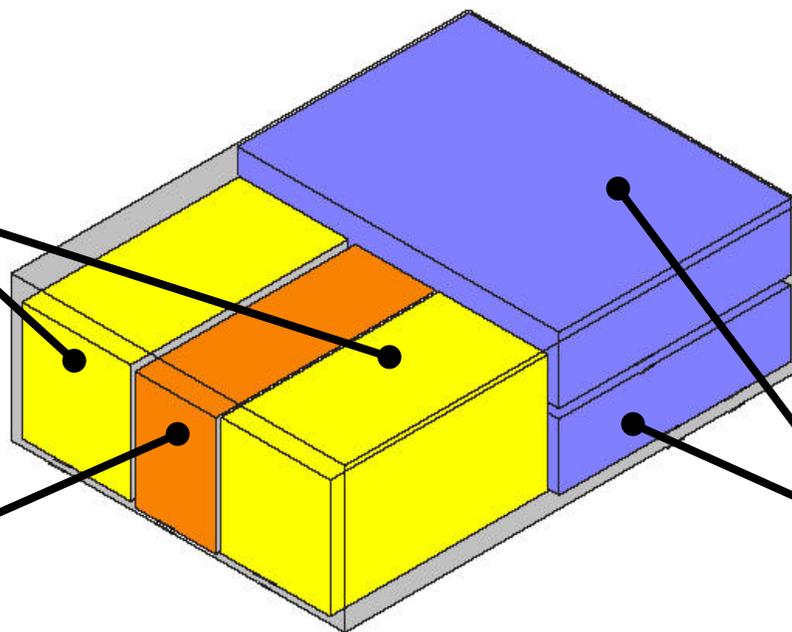
# DS4800 Hardware Components
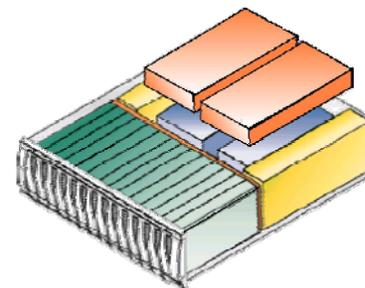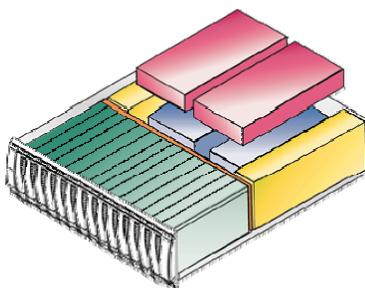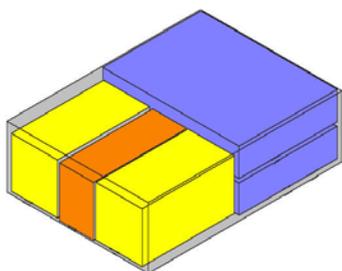
| DS4800 Controller Module | EXP710 Expansion Unit | EXP100 Expansion unit |
|---|---|---|
| <ul><li>Dual-active controllers</li><li>8 host/SAN connections</li><li>8 drive loops</li><li>Ethernet connections</li><li>Hot-swappable FRUs</li></ul> | <ul><li>14 FC Drives</li><li>Switched architecture</li><li>Redundant pathing</li><li>Hot-swappable FRUs</li></ul> | <ul><li>14 SATA Drives</li><li>Switched architecture</li><li>Redundant pathing</li><li>Hot-swappable FRUs</li></ul> |

# DS4800 / DS4500 Specification Comparison

| Dual-controller system (unless noted) | D S 4 8 0 0 | Improvement | D S 4 5 0 0 |
|---|---|---|---|
| Native host interface link speed | 4 Gbps | **2X** | 2 Gbps |
| Supported host interface link speeds | 4, 2, 1 Gbps | --- | 2, 1 Gbps |
| Host channels | 8 | **2X** | 4 |
| Total host channel bandwidth | Up to 3,200 MB/s | **4X** | up to 800 MB/s |
| Redundant drive channels | Eight 4 Gbps | **2X** | Four 2 Gbps |
| Total drive channel bandwidth | up to 3,200 MB/s | **4X** | up to 800 MB/s |
| Max drives | 224 | --- | 224 |
| Drives supported | FC and SATA | --- | FC and SATA |
| Processor | Intel Xeon 2.4 GHz | **3X** | Intel Pentium III 850 MHz |
| Processor memory (single controller) | 512 MB | **4X** | 128 MB |
| Dedicated XOR engine | Yes | --- | Yes |
| Dedicated data cache per dual-controller system (min/max) | 4 GB / 16 GB | **Up to 8X** | 2 GB |

# DS4800 / DS4500 Feature Comparison

|  | DS4800 | DS4500 |
|---|---|---|
| Supported drive enclosures | EXP710 (2 Gbps FC)<br>EXP100 (SATA) | EXP710 (2 Gbps FC)*<br>EXP700 (2 Gbps FC)<br>EXP500 (1 Gbps FC)*<br>EXP100 (SATA) |
| Maximum enclosures | 16 (224 drives) | 16 (224 drives) |
| Drive enclosure intermix | Yes | Yes |
| Storage partitions | 8, 16, 64 | 16, 64 |
| Supported replication services | FlashCopy<br>VolumeCopy<br>Enhanced Remote Mirroring | FlashCopy<br>VolumeCopy<br>Enhanced Remote Mirroring |

*EXP710 and EXP500 are not supported in the same configuration

# DS4800 – Reasons to Purchase

- **4 Gbps** may be the dominant interface by the end of 2006

- New product introductions will be **based on 4 Gbps**

- <u>Low TCO</u> with the DS4800 utilizing 4Gb/s technology designed to require up to <u>half</u> the host adapters and cables as 2Gb/s technology

- Can provide up to **twice** the speed for a comparable price

- Auto-sensing technology on host and drive side supports the use of 1Gbps and

  2Gbps technology to be implemented with 4Gbps technology to help protect

  investment

- Storage systems are staying in production longer
  - Today's systems may be around when the infrastructure is 4 Gbps

- As data continues to grow, and demand continues to increase, storage systems must keep up

- 4 Gbps is **backward compatible**, helping **protecting the investment** in your current infrastructure

# DS4800 – Reasons to Purchase

- **Wins Cache-spec game, as played by all the competitors**

- **4Gb/s technology helps make you Ready For Tomorrow Today!**
  - ➤ 4Gb = tomorrow's technology working with today's infrastructure

- **2Gb & 4Gb drive channel speeds helps protect investment**
  - ➤ Current EXP100s and EXP710s attach to DS4800
  - ➤ Simply upgrade EXP700s to EXP710

- **Part of a storage FAMILY with a strong history of reliability**

- **Storage physical capacity of over 67 terabytes with sixteen DS4000 EXP710s**

- **Supports Fibre Channel and Serial ATA disk drive technology**

# Switched EXP710 Hard Disk Module

- **Basic Information**
  - 2Gbit FC Interface (4Gbit coming later in 2005)
    - Switched Technology (FC)
  - Up to 14 x HDD, redundant components
    - FC: 36GB/15k, 73GB/10+15k, 146GB/10+15k, 300GB/10k

- **Compatible with nealy the entire DS4000 series**
  - DS4800, DS4500, DS4400, DS4300 Turbo, DS4300

- **Use**
  - Performance
    - Maximum speed with maximum safety
  - Productivity
    - Reduction of arbitrated loop latencies
    - Reduction of rebuild times
  - Security
    - Eliminate the domino-effect
      No interruption of the loops by defective/failing disks
    - Diagnose errors faster than ever before

14x FC HDD

ESM Board A

ESM Board B

Power

Switched BOD (SBOD)

Crossbar Switch

HD 1  HD 2  HD 3  HD 4  HD 5  HD 6  HD 7  HD 8  HD 9  HD 10  HD 11  HD 12  HD 13  HD 14

Interface
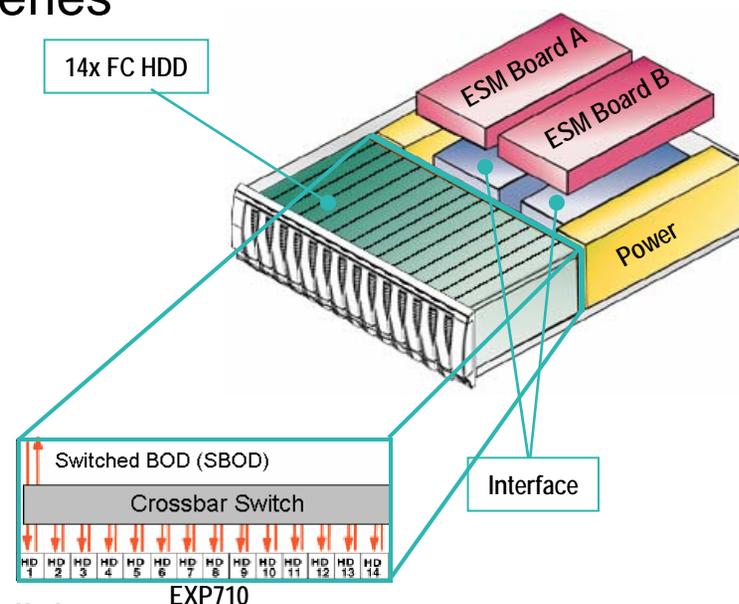
EXP710

# EXP710 – Competition

- EXP710's loop-switch technology enables direct and detailed FC communication with each individual drive

**CONTROLLER**
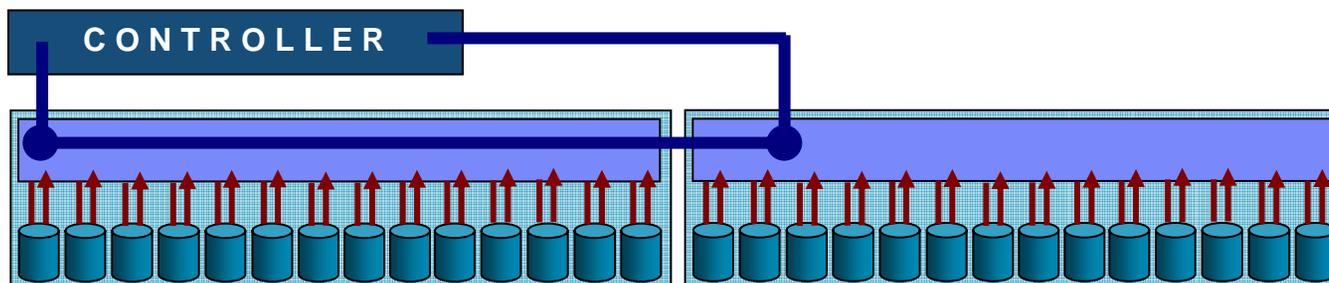
- Competitors with switched drive enclosures
  - Network Appliance (optional on FAS900 series)
  - Xyratex RS-1600-FC-SBD

- Competitors with loop-based back-ends and enclosures
  - CLARiiON CX and AX
  - HP EVA3000 (all) and EVA5000 (less than 4 drive trays)
  - HDS Thunder
  - Sun (all but one model are based on standard loop JBODs)

**CONTROLLER**
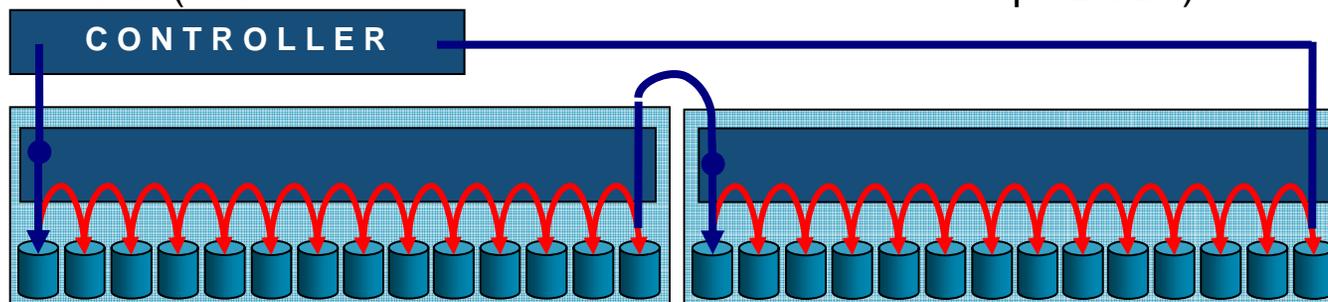
# SPC Benchmark-1™

The storage performance data that…
users genuinely trust, and analysts fully support!

The world's only industry-standard, vendor-neutral, storage benchmark. Everyone except EMC participates. They are unable, or unwilling to use the SPC-1 Benchmark on their storage systems! No one knows whether EMC products have any performance. They talk a good game but expect everyone to simply accept they have performance without ever being required to verify it.

http://www.storageperformance.org/results

# SPC Membership Is Increasing

All major storage vendors, except EMC are members of the Storage Performance Council. They do not all test their products but they are all members of the group.

**"Performance 'bench marketing' is a long-practiced art in this business," says Randy Kerns, senior analyst at Evaluator Group. "Don't believe anything regarding performance benchmarks from vendors. Skepticism is a good thing. Use the SPC benchmarks, and if a company doesn't have any, they probably don't compare favorably with the competition."**
*Is NetApp SANdbagging?,* **Byte and Switch, 3/19/2003, By Todd Spangler (www.byteandswitch.com)**

**"We believe customers should demand that all disk subsystem vendors submit to the SPC testing. If a vendor refuses, then it is time to look for a new supplier."**
*Hardware or HyperWare? Validating Disk System Performance Claims*, **Data Mobility Group, July, 2003**

Logos:
- 3PAR Serving Information
- adaptec
- a★star Data Storage Institute
- DataCore SOFTWARE
- DELL
- dot HILL
- LSI LOGIC
- Evaluator Group, Inc. Comprehensive Information Storage Evaluation
- Fidelity INVESTMENTS
- FUJITSU
- Gradient SYSTEMS
- Hewlett Packard Expanding Possibilities

- HITACHI DATA SYSTEMS
- IBM
- ideas International
- KAVI where .orgs work
- LeftHand Networks Inc.
- maranti
- NEC
- NetApp The evolution of storage.
- qlogic Simplify
- revivio
- Seagate
- sgi

- SPIRENT Communications
- STORAGETEK
- Sun microsystems
- Temple University
- TMS TEXAS MEMORY SYSTEMS
- UNISYS
- University of California, Santa Cruz
- VERITAS
- Xiotech
- YottaYotta The Yottabyte NetStorage Company

# IBM Does Well On The SPC-1

| System | SPC-1 IOPS | LRT (ms) | Capacity Tested/Total | RAID Level | Price | Cache IOPS/GB | Disks IOPS/Disk |
|---|---|---|---|---|---|---|---|
| IBM ESS 2105 | 8,009 | 2.99 | 1.3 TB / 2 TB | 5 (7+1) | $357,100 $44.58 / IOPS | 16 GB 501 | 64 - 36GB 125 |
| Sun StorEdge 9910 | 8,404 | 2.07 | 640 GB / 3.5 TB | 1 | $624,377 $74.29 / IOPS | 16 GB 525 | 48 - 73GB 195 |
| IBM DS4300 Turbo Cache Mirroring On (v8.4) | 9,100 | 2.30 | 4.8 GB / 1.8 TB | 1 | $129,470 $14.23 / IOPS | 2 GB 4,550 | 50 - 36GB 182 |
| IBM DS4300 Turbo Cache Mirroring Off (v8.4) | 12,103 | 2.07 | 4.8 GB / 1.9 TB | 1 | $133,930 $11.07 / IOPS | 2 GB 6,052 | 54 - 36GB 224 |
| 3PARdata InServ™ S800 | 12,905 | 2.62 | 1.8 TB / 2.2 TB | 1 | $254,683 $19.73 / IOPS | 20 GB 645 | 120 - 18GB 108 |
| LSI Logic E4600 4884 controller (FAStT700) | 15,701 | 1.64 | 800 GB / 2 TB | 1 | $252,343 $16.01 / IOPS | 2 GB 7,851 | 112 - 18GB 140 |
| Fujitsu Storage ETERNUS3000 | 17,546 | 1.77 | 4.0 TB / 8.3 TB | 1 | $665,379 $37.92 / IOPS | 8 GB 2,193 | 120 - 73GB 146 |
| IBM DS4500 Cache Mirroring On (v8.4) | 18,448 | 2.03 | 1.2 TB / 3.9 TB | 1 | $309,499 $16.78 / IOPS | 2 GB 9,224 | 108 - 36GB 170 |
| HPQ - EVA5000 Cache Mirroring On | 20,095 | 2.36 | 2.6 TB / 6.1 TB | 1 | $479,860 $23.88 / IOPS | 2 GB 10,047 | 168 - 36GB 120 |
| IBM ESS 800T | 22,999 | 2.53 | 4.2 TB / 4.7 TB | 5 | $802,116 $34.88 / IOPS | 16 GB 1,437 | 256 - 36GB 90 |
| HPQ - EVA5000 Cache Mirroring Off | 24,005 | 2.29 | 2.6 TB / 6.1 TB | 1 | $479,860 $19.99 / IOPS | 2 GB 12,003 | 168 - 36GB 143 |
| IBM DS4500 Cache Mirroring Off (v8.4) | 24,507 | 1.94 | 1.2 TB / 3.9 TB | 1 | $309,499 $12.63 / IOPS | 2 GB 12,254 | 108 - 36GB 227 |
| Sun StorEdge 6320 | 25,340 | 3.75 | 2.0 TB / 6.1 TB | 1 | $390,189 $15.40 / IOPS | 12 GB 2,112 | 168 - 36GB 151 |
| IBM 4 SVC + 6 DS4300 | 44,508 | 2.68 | 10.7 TB / 12.2 TB | 1 | $671,314 $15.08 / IOPS | | 224 - 36GB 199 |
| Sun StorEdge 6920 | 48,647 | 3.24 | 6.2 TB / 10 TB | 1 | $522,087 $10.73 / IOPS | | 280 - 36GB 174 |

# DS4800 is a screamer!

| System | SPC-1 IOPS | LRT (ms) | Capacity Tested/Total | RAID Level | Price | Cache IOPS/GB | Disks IOPS/Disk |
|--------|-----------|----------|----------------------|-----------|-------|---------------|-----------------|
| IBM DS4300 Turbo Cache Mirroring On | 9,100 | 2.30 | 4.8 GB / 1.8 TB | 1 | $129,470 $14.23 / IOPS | 2 GB 4,550 | 50 - 36GB 182 |
| IBM DS4500 Cache Mirroring On | 18,448 | 2.03 | 1.2 TB / 3.9 TB | 1 | $309,499 $16.78 / IOPS | 2 GB 9,224 | 108 - 36GB 170 |
| HPQ - EVA5000 Cache Mirroring On | 20,095 | 2.36 | 2.6 TB / 6.1 TB | 1 | $479,860 $23.88 / IOPS | 2 GB 10,047 | 168 - 36GB 120 |
| IBM DS4800 Cache Mirroring On | 42,254 | 2.12 | 13.7 TB / 16.4 TB | 1 | $741,670 $ 17.55 / IOPS | 4GB | 224 - 73GB 188 |

This price is at list…

This price is discounted 28%…

# IBM® TotalStorage® DS4800

Solutions

Harold Pike

June 15, 2005

# Information Management – Today's Realities

Compliance: Increasing emphasis on data retention for regulatory compliance

Business continuity, security, and optimization are the top IT priorities facing decision makers… Business continuity displays extremely high levels of implementation among all industries–

IBM IT Trends 1H04

The volume of information is growing rapidly while IT budgets remain flat.

Overall, about a quarter of businesses are currently implementing IT simplification projects – IBM IT Trends 1H04

***Clients are looking for solutions to achieve Information on demand***
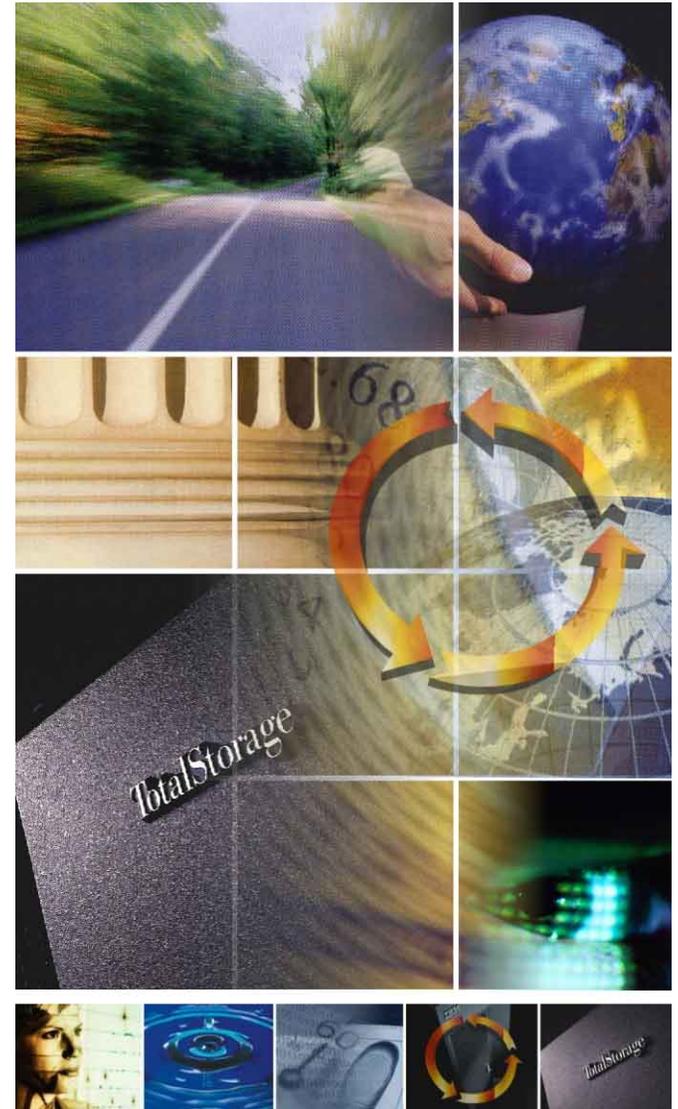
*With information on demand, businesses can respond with flexibility and speed to any customer requirement, market opportunity, or external threat*

## Getting there involves:

**1.** Simplification **of the underlying IT infrastructure and its management are required to support the changes in the business and lower cost and complexity**

**2.** **Assuring** business continuity**, security and data durability**

**3.** **Efficiently managing information** over its lifecycle


INFRASTRUCTURE SIMPLIFICATION


Business Continuity


IBM
Information LifeCycle Management

# Infrastructure Simplification

*Efficient utilization and automatic management of all IT resources (servers, storage, and network) required to meet business needs*

- **Business Drivers**
  - Expense containment
  - Business growth
  - Reduce operational risk

- **Key technology enablers**
  - Consolidation (Scale up and Scale out technology)
  - Virtualization
  - Automated management

- **Benefits**
  - Improved system optimization and TCO
  - Higher personnel productivity
  - Greater application availability and infrastructure resiliency

# Reducing Complexity

## Requires Breakthrough Technologies

Windows Servers

Unix Servers

Networking

Management Servers

Linux Servers

Windows Server

Unix Server

Networking

Storage

Linux Server

Virtual Servers, Storage, Networks

Virtualization

Servers

Networking

Storage

## Complex

- Islands of computing and data
- Disparate management tools
- Manual Provisioning

## Physical Consolidation

- Fewer devices and licenses
- Disparate management tools
- Labor intense provisioning

## Logical Simplification

- Pools of resources
- Multiple OS's per server
- Rapid Provisioning
- Automated management

# Lower Total Cost of Ownership with DS4800 Enterprise Storage Consolidation

**HP EVA**

**EMC Clarion**

**IBM DS4000**

**IBM 7133**
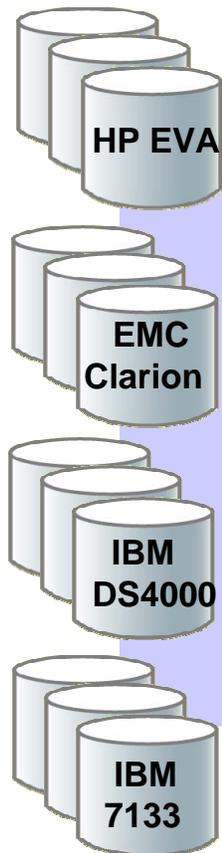
## Physical Consolidation

- Fewer devices and licenses
- Unified management tools
- Simplified provisioning

- Reduce number of storage systems
  - Up to 3x performance of a DS4500, CX700 or EVA5000
  - About 2x usable FC capacity of CX700 or EVA5000

- Simplify storage networks
  - Fewer network connection due to 4Gbit pipes (about 2x network bandwidth of CX700, 4x of EVA5000 or DS4500)
  - Fewer switches / ports / HBA's
  - Fewer servers needed

## DS4800 lowers costs through consolidation of older IBM and non-IBM midrange storage arrays

# Logical Simplification
## DS4800 with the SAN Volume Controller

SAN Volume Controller

SAN Volume Controller

LUN 1 | LUN 2 | LUN 3

**DS4800**

LUN 1 | LUN 2 | LUN 3

**Competitor controller**

LUN 1 | LUN 2 | LUN 3

**Competitor controller**

LUN 1 | LUN 2 | LUN 3

**DS4000**

**SAN Peer-to-Peer (PPRC) "x"**

**SAN FlashCopy "outside the box"**
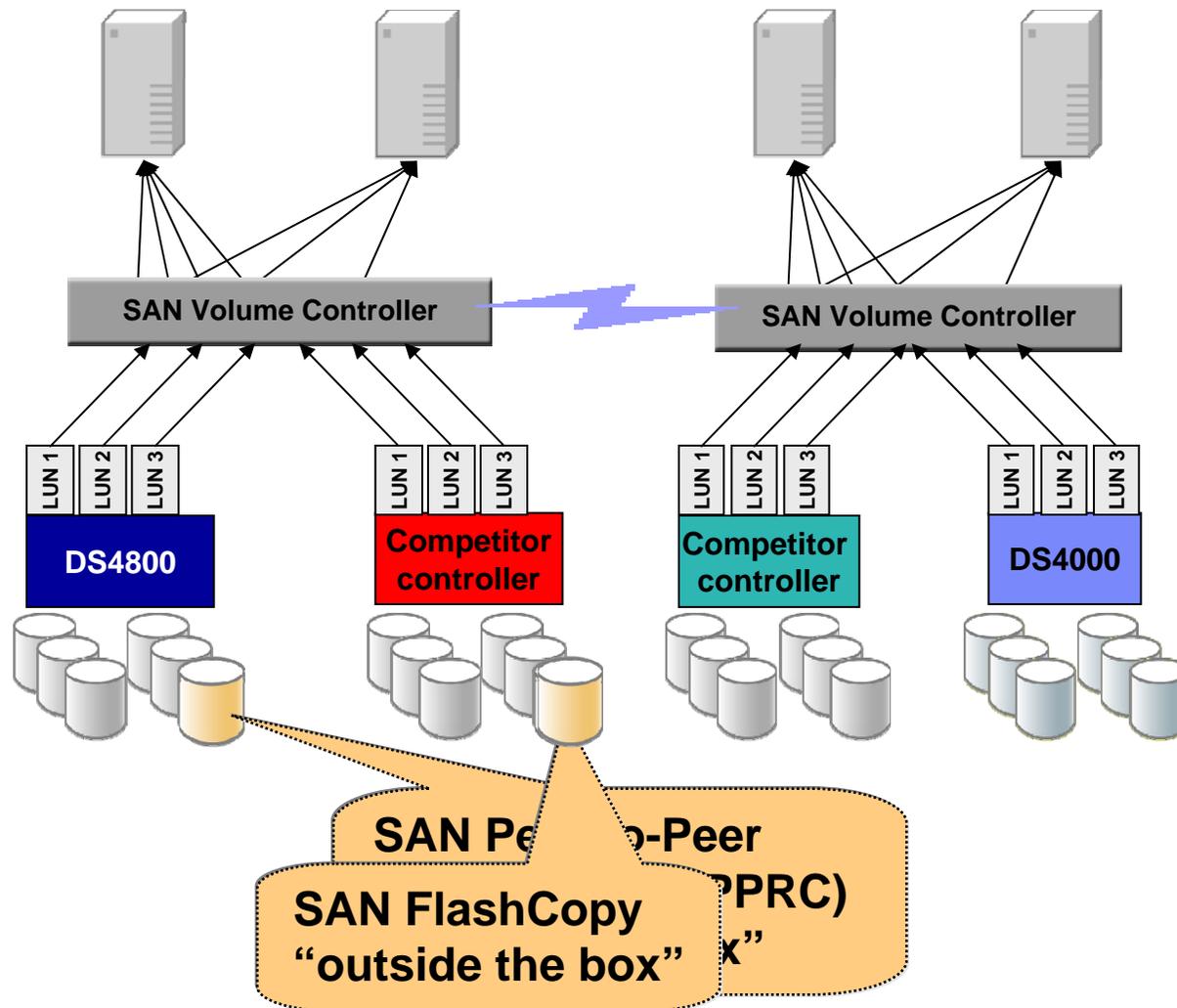
- DS4800 is part of unified pool of storage
- Simple, non-disruptive storage growth
  - No server / application downtime for storage changes / migration
- Single, comprehensive management from a central point cross vendors
- Unified disaster protection and replication functions
- Freedom of Choice – integration with /supports disk systems from IBM, HPQ, EMC, HDS

# Business Continuity

***Protecting critical business assets, managing risk and aligning recovery costs based on business risk and information value***

- Business Drivers
  - Business risk reduction
  - Operational continuity
  - Asset protection

- Key technology enablers
  - Resilient infrastructure
  - Point in time copy, Metro/Global Mirroring
  - Centralized, efficient management
  - Platform and application specific automation

- Benefits
  - Minimize / Eliminate Business Interruptions
    - Revenue Protection
  - Resume Business Operations **quickly** after a significant interruption - outage
  - Meet IT, Operational and Regulatory requirements
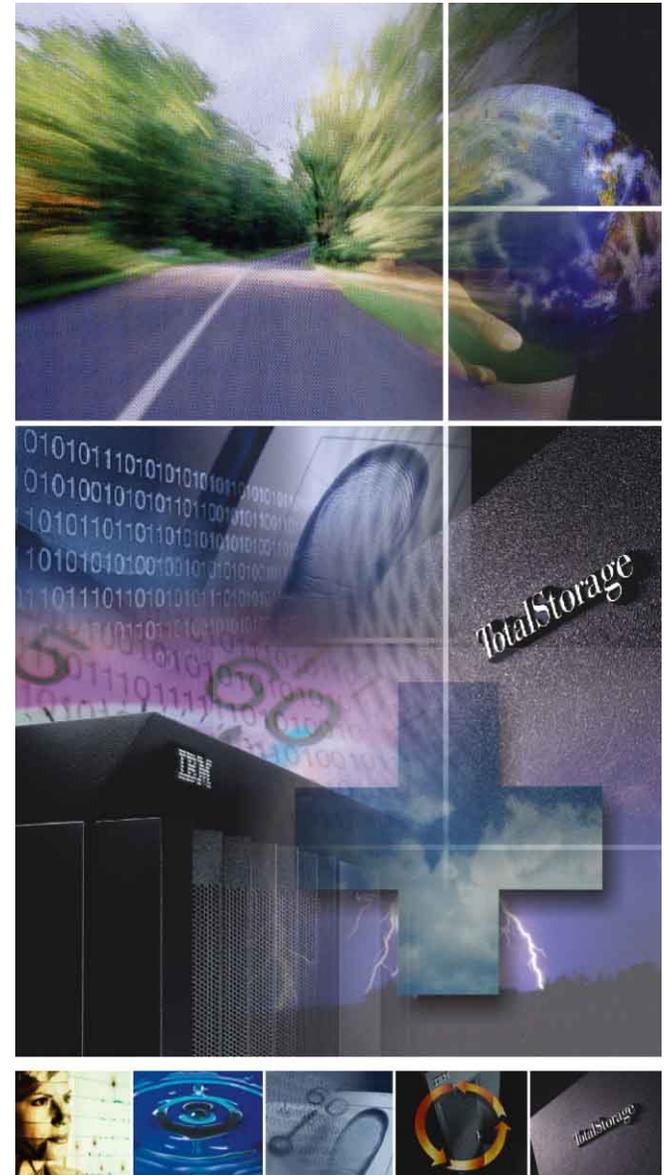
# Aspects of Business Continuity

**Business Continuity**

**High Availability**
Fault-tolerant, failure-resistant infrastructure supporting continuous application processing

**Continuous Operations**
Non-disruptive backups and system maintenance coupled with continuous availability of applications

**Disaster Recovery**
Protection against unplanned outages such as disasters through reliable, predictable recovery

**Protection of critical Business data**

**Operations continue after a disaster**

**Recovery is predictable and reliable**

**Costs are predictable and manageable**

# Tiers of recovery define cost of storage

*Recovery from a disk image*  *Recovery from tape copy*

**Cost**

**Metro and Global Mirror with server failover integration**
**Tier 7 – Disk Mirroring with automated recovery**

**Metro and Global Mirror**
**Tier 6 - Disk mirroring**

**Software-based replication**
**Tier 5 -Two phase commit (transaction integrity)**

**FlashCopy – Volume and file level**
**Tier 4 - Point in Time disk copy**

**Tier 3 - Electronic Vaulting**

**Tier 2 - Hot Site, Restore from Tape**

**Tier 1 – Restore from Tape**

| 15 Min. | 1-4 Hr.. | 4 -8 Hr.. | 8-12 Hr.. | 12-16 Hr.. | 24 Hr.. | Days |

**Recovery Time Objective**

# 4Gbit DS4800 boost LAN- and Server-free data backup

- **Use TSM LAN free backup functionality to free up LAN and appl. server resources from data protection tasks**
- **Simplifies data protection**
  - Central backup for all data located on the SAN
  - Automation of backup
- **DS4800 improves backup/restore time**
  - DS4800 4Gbit pipes allow for more data transferred
  - FlashCopy allows for online backup of application
  - Exploits TSM multi-session backup & restore capabilities

**Heterogeneous UNIX & WIntel server**

**TSM backup server**

SAN

**TSM LAN and server free backup**

**IBM DS4800**

**IBM 3582 ATL**

**LTO 3 drives**
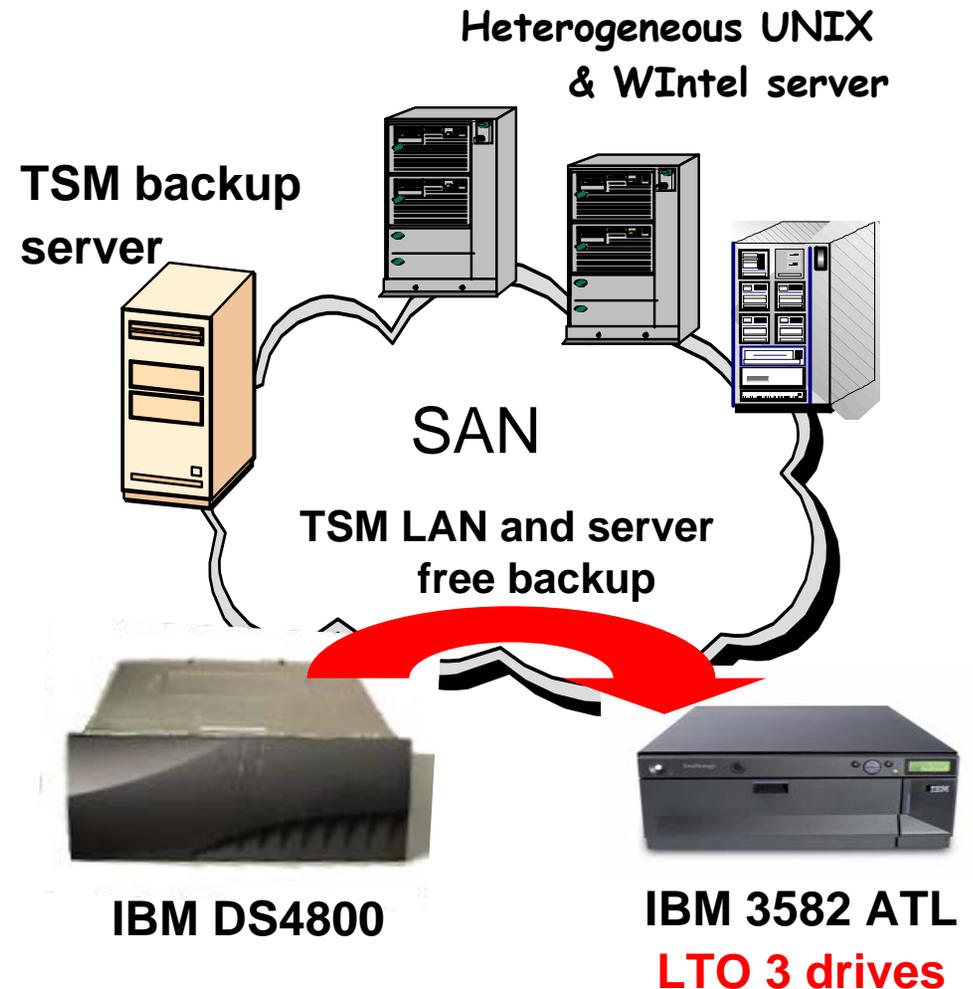
# Increased Application Availability with DS4800 Integrated Backup for Databases

- **Provides an integrated backup solution for databases**
  - To disk for rapid recovery
  - To tape for long term archive
- **Improves application availability by providing quick restores of corrupted/damaged databases from secondary disk storage**
- **Exploits tiered DS4000 Disk Hierarchy (Fibre Channel and SATA) & advanced features (FlashCopy & VolumeCopy) and Tape for remote backup**
- **First implementation for DB2 on AIX Integrated with TSM**
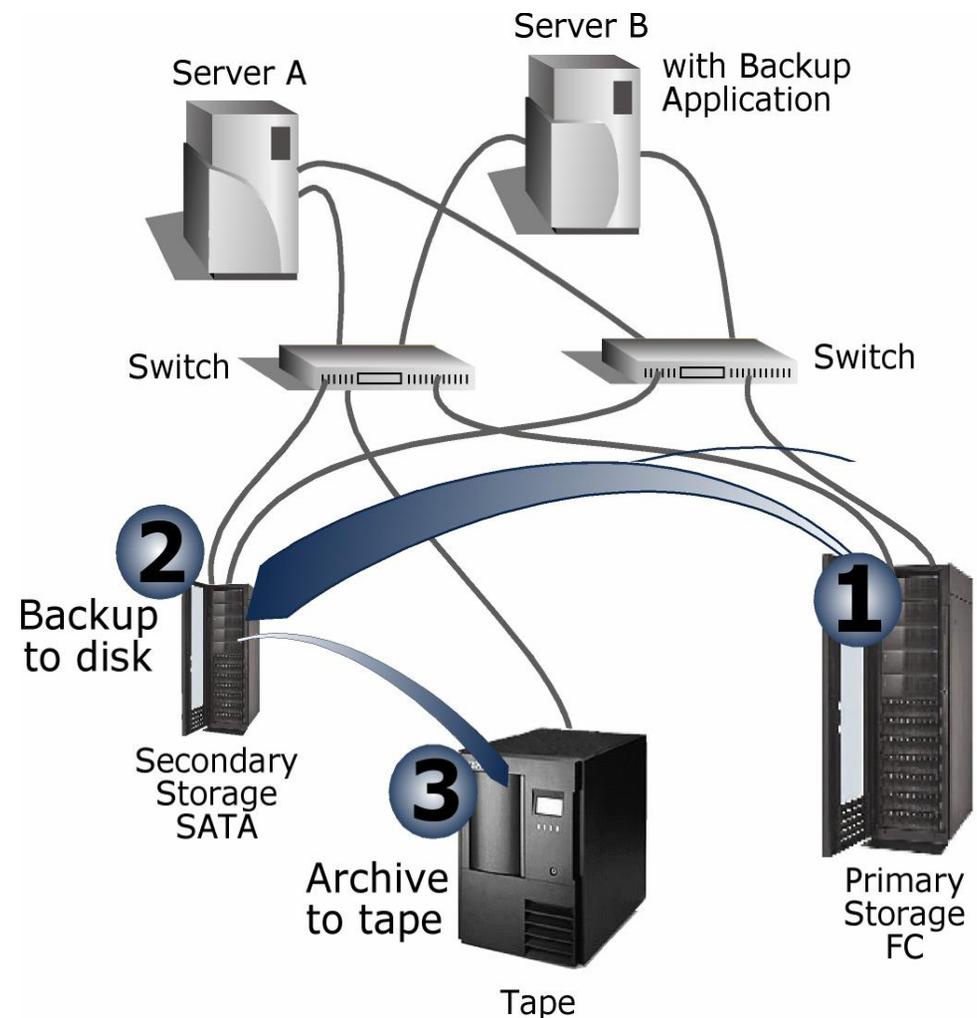
# Unique High Availability Solutions Using DS4800 Metro Mirror with End-to-end 4Gbit Fibre

**Tier 6**

- **Maintain and protect your current copy of primary data at remote site via Metro Mirror (with no data loss)**
  - Maximum distance 10km
  - Application and server transparent
- **DS4800 and IBM SAN32B switch allows industry first end-to-end 4Gbit remote mirroring solution**
  - Significantly improve the time required to establish the mirror & Improvement on response time
  - Allows for lower number of links which reduces over all cost

**IBM DS4800 primary site**

**Heterogeneous UNIX & WIntel server**

**SAN**

**4GBit**

**4GBit**

**IBM SAN32B**

**4GBit**

**IBM DS4800 Secondary site**
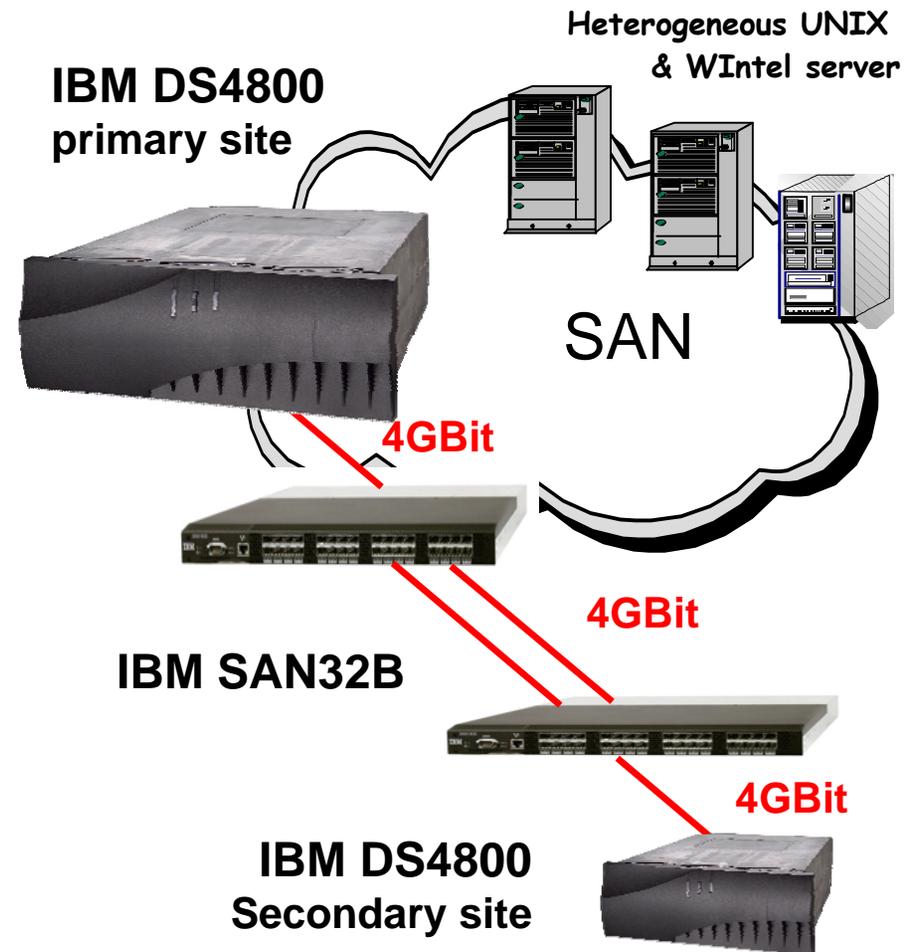
# DS4800 Enhanced Remote Mirror Mode Switching Provides Unique HA Benefits

**Tier 6**

- **Some applications are impacted by overhead of Metro Mirroring during peek operation**



1 - Host request
4 - Send to remote
Controller
3 - Status transfer
2 - Cache / disk write
6 - Status from remote
5 - Cache / disk write
Controller
Primary Site
Remote Site
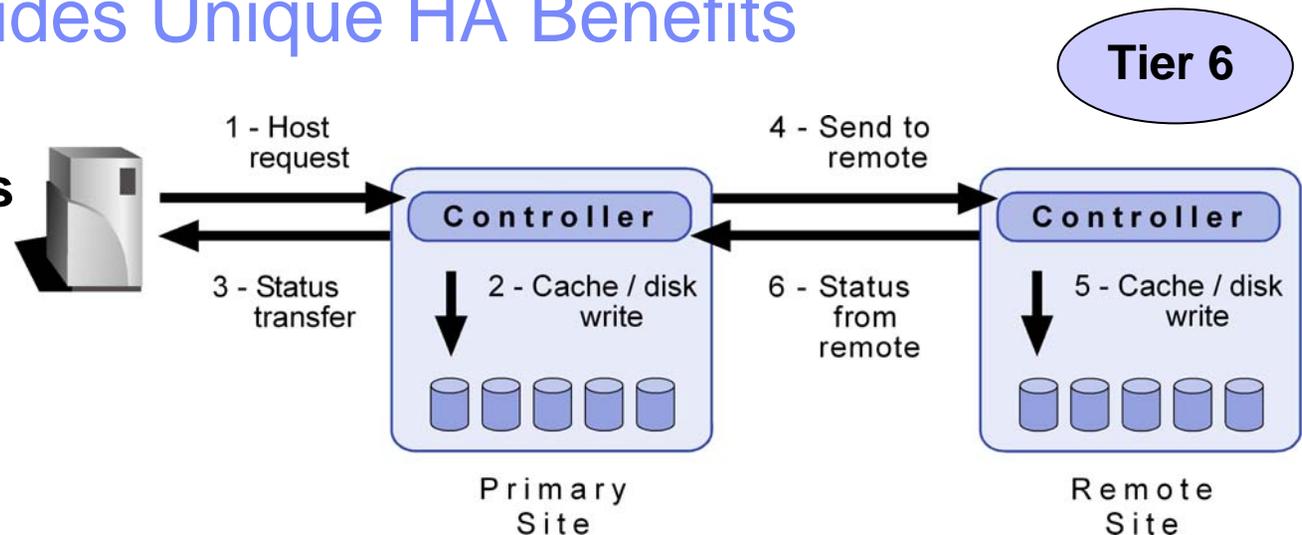
- **Unique on the market IBM DS4800 allows for dynamic copy mode switching into asynchronous copy mode**
    - Provides performance improvement – compared to synchronous – for primary site I/O (subsystem and application)

- **During off-peek operation copy mode can be switched back to synchronous copy in order to do, e.g., backup operation on the secondary site**

# Long distance HA Solutions Using DS4000 Global Mirror and IBM Multi-protocol Router

**Tier 6**

- **Need for distances beyond 10km**
  - Second data center is located further out
  - Need to store critical data in a different geography
- **Cost of IP is a more effective approach than FC**
- **Fibre right-of-way is not available**
- **DS4800 Global Mirror allows to copy data asynchronously over IP based connections**
  - Consistency groups guarantee data integrity of databases and prevent out-of-order updates
  - Delta re-synchronization allows for fast recovery from broken communication link

**IP IntraNet IP WAN ATM**

**IP Router**

**Server**

**IP Router**

**Server**

**Multi protocol Router**

**Multi protocol Router**

**SAN**

**IBM SAN16B-R**

**IBM SAN32B**

**SAN**

**IBM DS4800**

**IBM DS4800**

**Up to 5000 km**
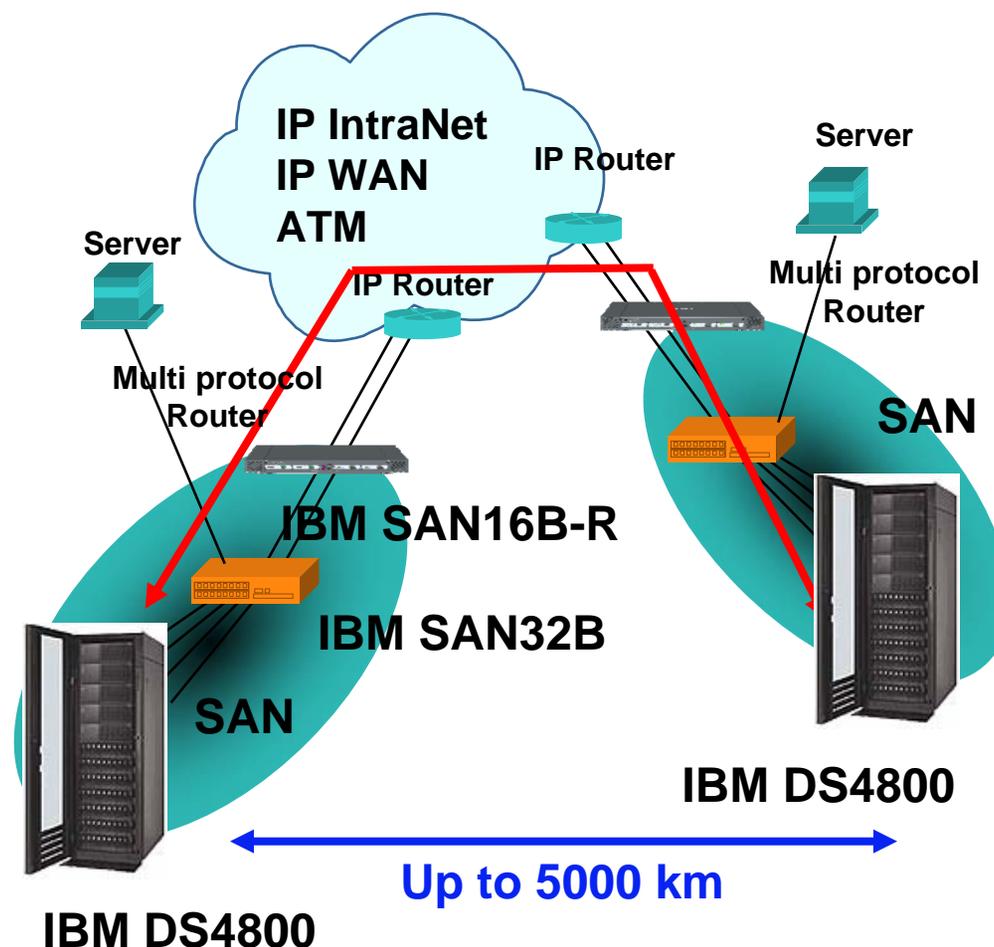
# Server automation Using Continuous Availability for Windows

Tier 7

- **Effective High Availability and D/R Solution for MS Clusters in metropolitan distances**

- **Allows uninterrupted customer service and reduced risk of downtime for critical Windows applications in a clustered environment**

- **Complete D/R Solution – includes automated failover of Server, Storage and network components**

- **Integrates 2-node cluster server (MSCS) with automatic failover to surviving node – no manual intervention required**

- **Supports DS4800 (DS4000) thru SVC**

Multiple heartbeats



Geographically Dispersed Sites
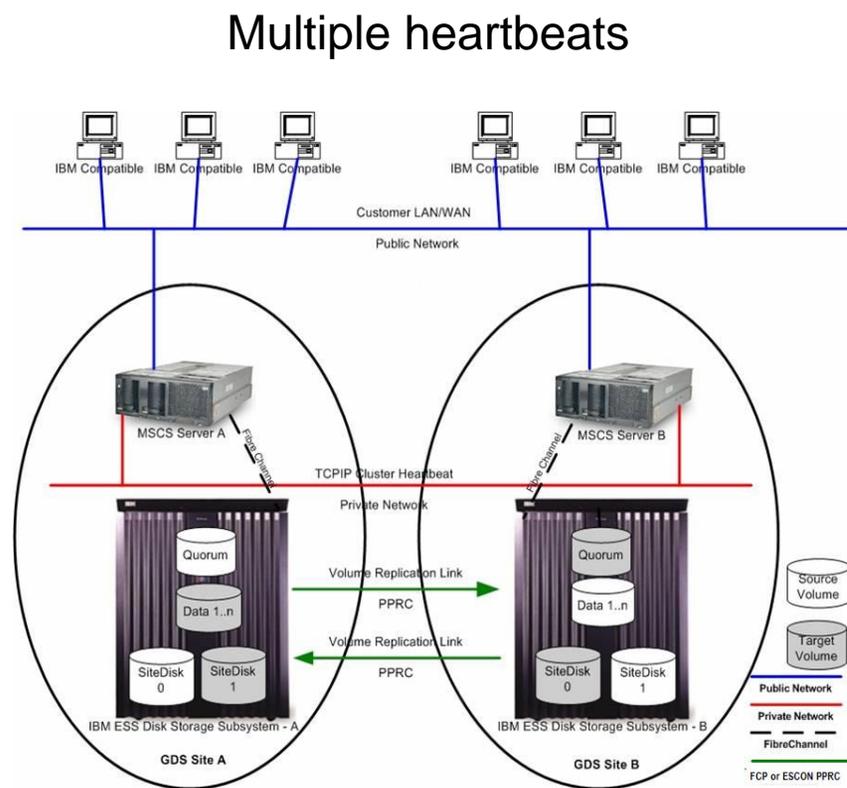
# Server Automation Using Continuous Availability for AIX (HACMP-XD)

Tier 7

- **Offers a High Availability as well as an effective D/R solution for geographically dispersed AIX clusters**
- **Integrates HACMP with unique data replication code to provide a fully automated disaster tolerant solution**
- **Resources automatically failover to surviving AIX node – no manual steps required**
- **Designed for Continuous Business operations, reduced admin intervention & increased resiliency to planned and unplanned interruptions**
- **Supports DS4800 (DS4000) thru SVC**



Production Site  WAN  Recovery Site
Router  Router
LAN  LAN
RS232 Link  RS232 Link  RS232 Link
Server A  Server B  Server C  Server D
SVC  SVC
Metro Mirror
Primary storage  Secondary storage
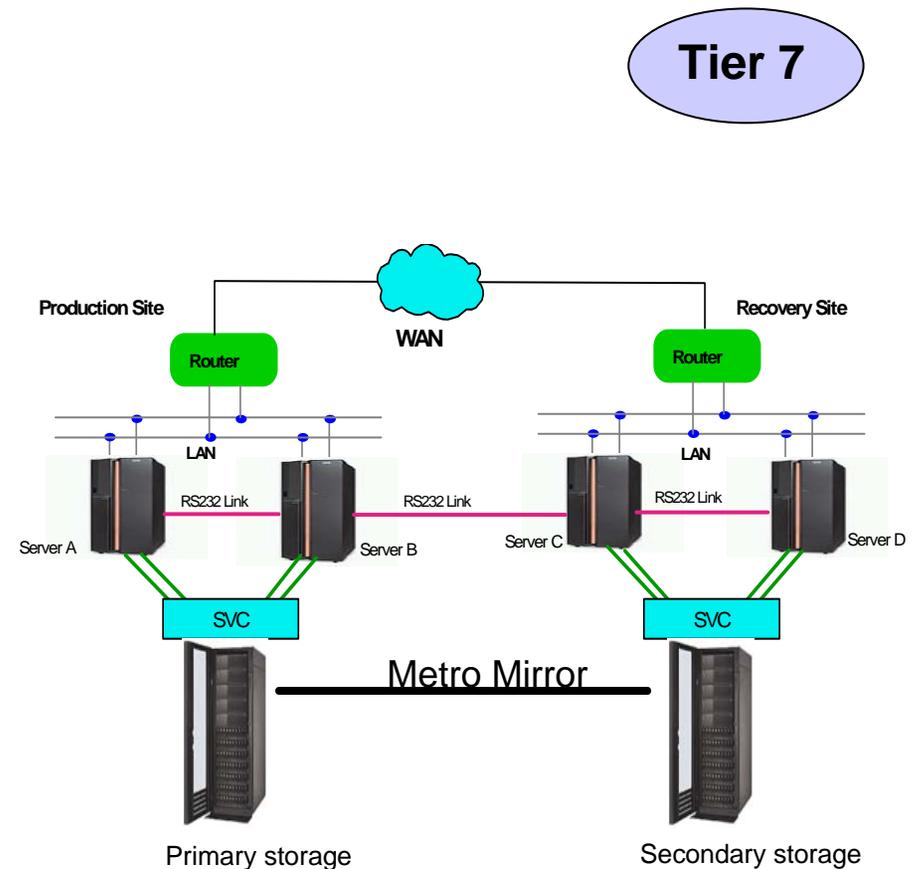
# Information Lifecycle Management (ILM)

*Managing business data through its lifecycle from conception until disposal, in a manner that optimizes storage and access at the lowest cost*

- Business Drivers
  - Information growth
  - Information has become mission critical
  - Compliance
  - Business risk

- Key technology enablers
  - Policy-based archive management
  - Records retention and disposition
  - Automated storage management
  - Non-erasable, non-rewriteable storage
  - Tiered storage
  - Nearline storage

- Benefits
  - Enable policy automation
  - Storage resource optimization
  - Help meet the challenges of compliance
  - Risk management
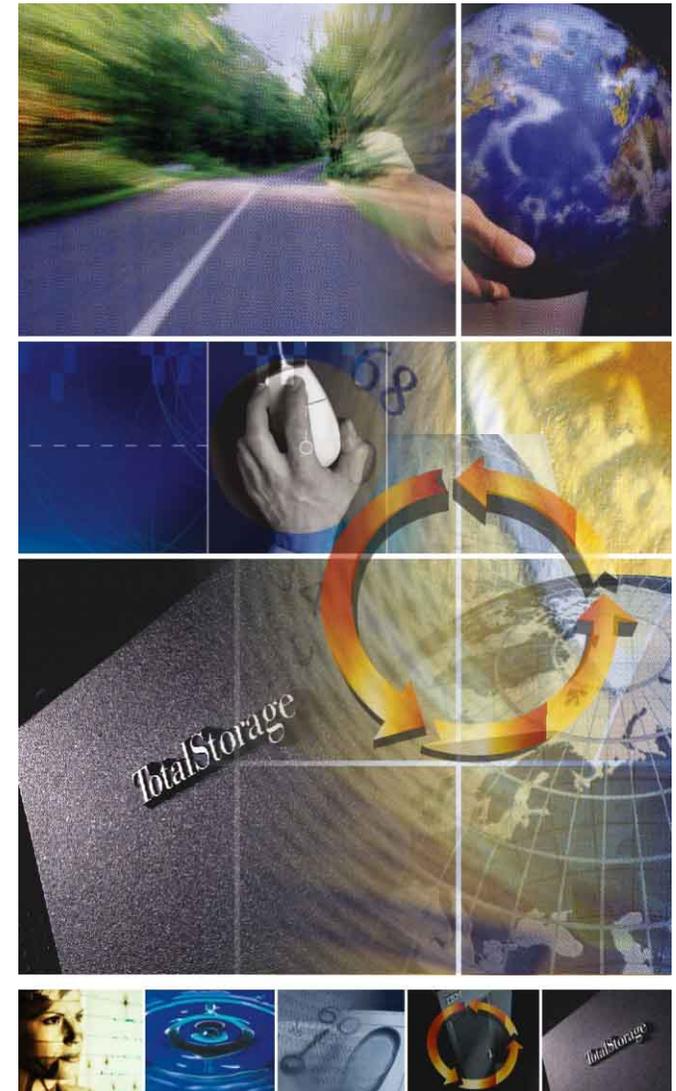
# ILM Is Key to Information On Demand strategy

Many businesses are now focused on defining an Information On Demand strategy based in part on the information lifecycle
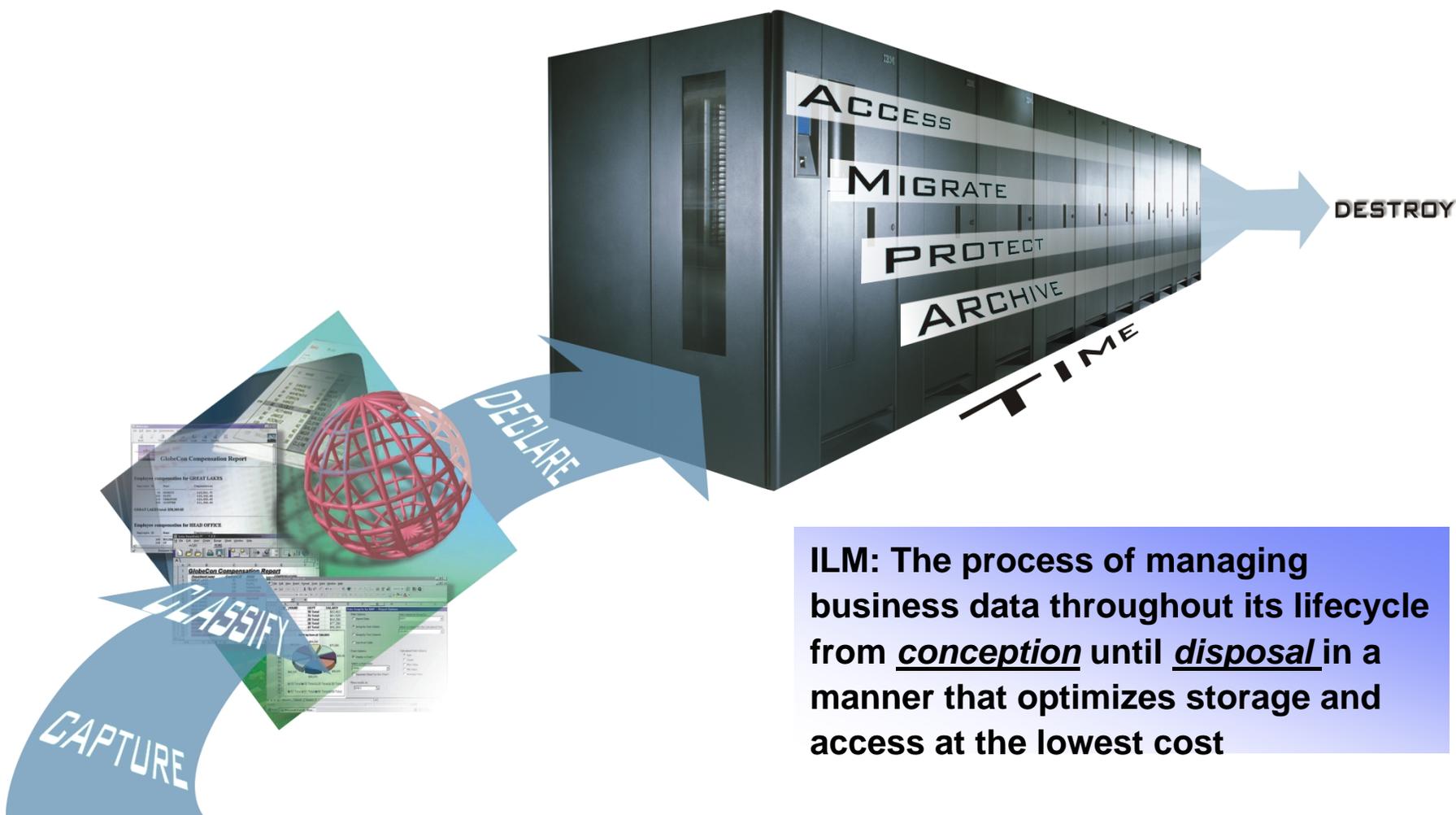


**ILM: The process of managing business data throughout its lifecycle from _conception_ until _disposal_ in a manner that optimizes storage and access at the lowest cost**

# DS4800 Tiered Storage Optimizes Cost/Performance Points for Two User Communities

- **Production Servers have data that is frequently updated**
  - Fibre Channel drives should be used for performance and reliability under heavy usage: EXP710 drawers

- **Analysis Servers (Business Intelligence, Data Mining, DSS, development, testing, archival) have data that is written on a set cycle (e.g., each evening)**
  - SATA drives can be used for high capacity and low price points: EXP100 drawers

- **Complete (byte-by-byte) replication of one logical drive (source) to another (target) within a storage system**
  - Using VolumeCopy (or perhaps FlashCopy)

Production Server      Analysis Server

Copy Service

Base / Primary → Volume Copy

FC     DS4800     SATA
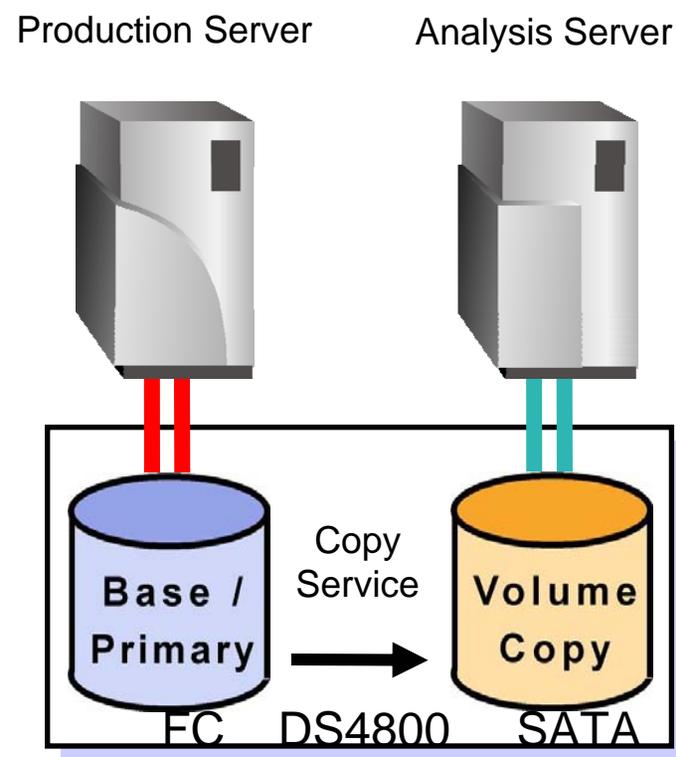
# DS4800 in Streaming Applications

**Ingest Station**

**NLE**

**MPEG Encode**

**Tape Library**

**Content Manager**

**Audio Dubbing**

**Firewall**

**Router**

**WWW**

**WWW**
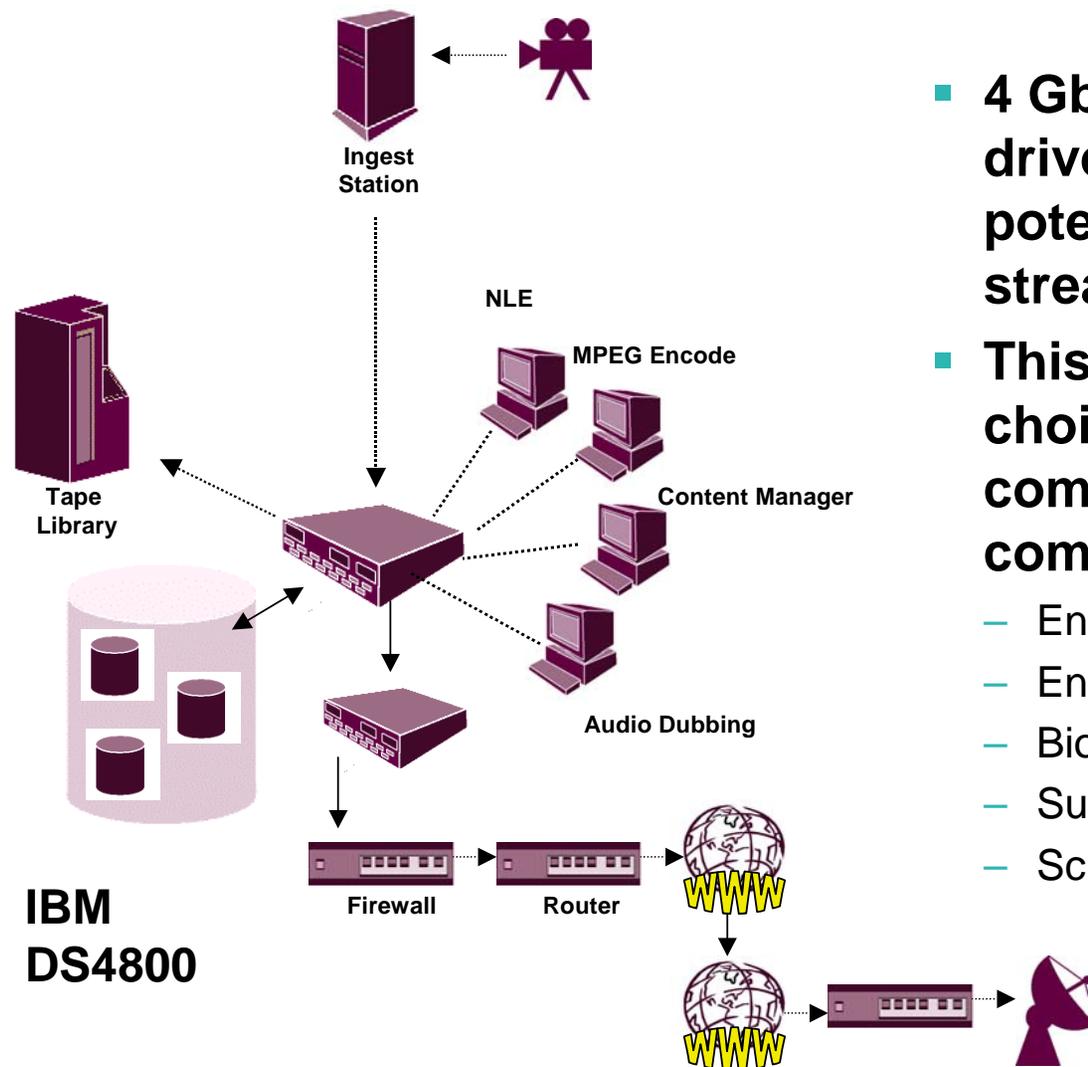
**IBM DS4800**

- **4 Gbit Fibre connect and the 8 drive and host ports can potentially offer up to 3.2Gbit/s streaming performance**

- **This makes DS4800 the perfect choice for high-performance computing (HPC) and technical computing environments**
  - Energy
  - Entertainment and digital media
  - Biosciences
  - Supercomputing
  - Scientific research and development

# DS4800 – "The Power to Break Through"
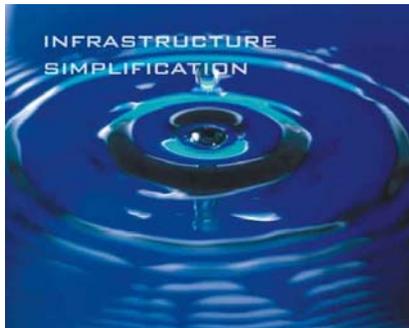
- *First major storage vendor to provide 4Gbit Fibre with more than 500.000 IOPS*

- *Same software as DS4000 line to allow customers to leverage existing skills*

- *Low cost product designed to support open server environments*

- *Industry leading advanced functions supporting resiliency, continuous operations, data availability, and recoverability*

- *Out-of-the-box integration with application data protection allow fast deployment and secure operation for mission critical application and data*

- *Availability, Performance, and Capacity needed to support mission critical, on demand workloads*

- *Cost effective solution for mission critical and reference data applications*

# Questions

Now is the time to ask!

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