IBM TotalStorage
“The POWER to Breakthrough”
DS6000 and DS8000 Announcement

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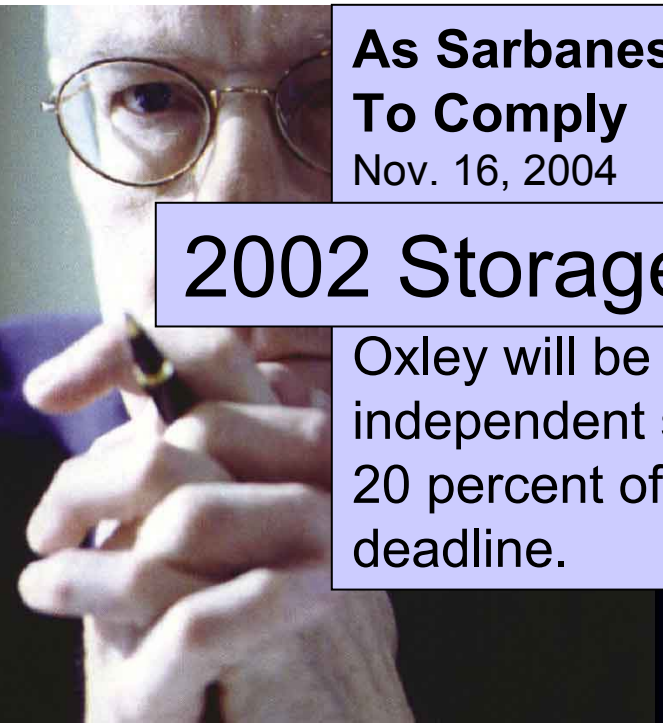
ON DEMAND BUSINESS™

There are many challenges facing businesses today that are causing them to think about managing their information more efficiently and effectively



As Sarbanes-Oxley Looms, Companies Rush To Comply
Nov. 16, 2004

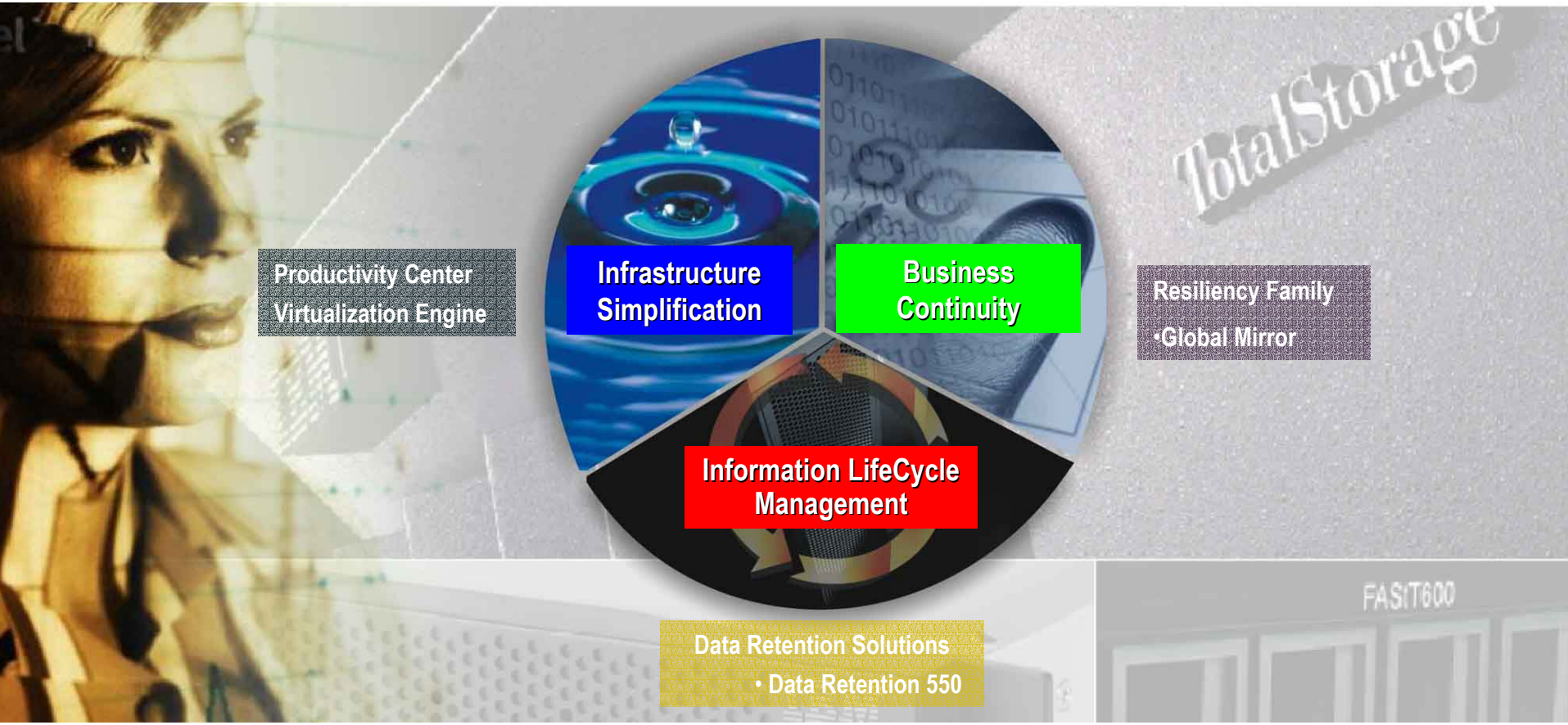
2002 Storage Manufacturers Support Act

Oxley will be a "sprint to the finish." An independent survey, meanwhile, finds only about 20 percent of companies on schedule to meet the deadline.

s risk

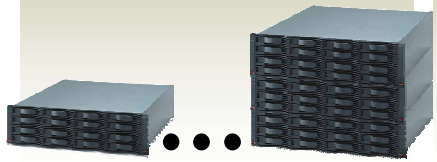
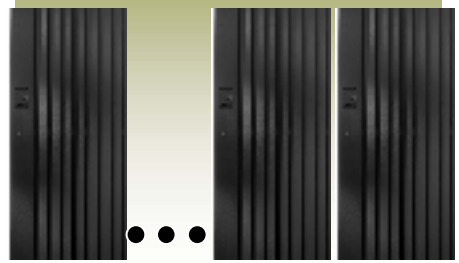
Existing Assets Not Fully Utilized: Inefficient
Ineffective

With information on demand, clients can respond with flexibility and speed to any customer requirement, market opportunity, or external threat



Information On Demand Solutions featuring IBM TotalStorage

Introducing the IBM TotalStorage DS Family

New Entry Point	Unified Family	New Standard in Pricing and Packaging	Foundation	New Standard in Functionality, Performance, TCO
				
DS300/DS400	DS4000	DS6000	ESS 750 / 800	DS8000

Common management platform

Common suite of copy services

Virtualization

Compelling price points

Industry leading service and support

Enterprise Storage Continuum

IBM TotalStorage DS Family innovations help you:

- **Simplify** the underlying IT infrastructure of storage and its management to lower cost and complexity while increasing the ability to respond to changing needs.
- Assure **business continuity**, security and data durability.
- Efficiently manage information **throughout its lifecycle**, relative to its business value.

Enterprise Continuum of Storage Products

- 75% shared operational code with ESS
- Compatible copy services with ESS 750 and ESS 800
- Common CLI
- User written ‘scripts’ run identically on both machines
- Common management interface via SMI-S

TotalStorage DS8000 … Technology leverage enables *bigger* value and a new standard in on demand storage

- Up to **6X** performance of ESS Model 800
- Linear scalability – architected to break the petabyte barrier
- Logical partitioning enabled by IBM Virtualization Engine
- Storage capacity on demand

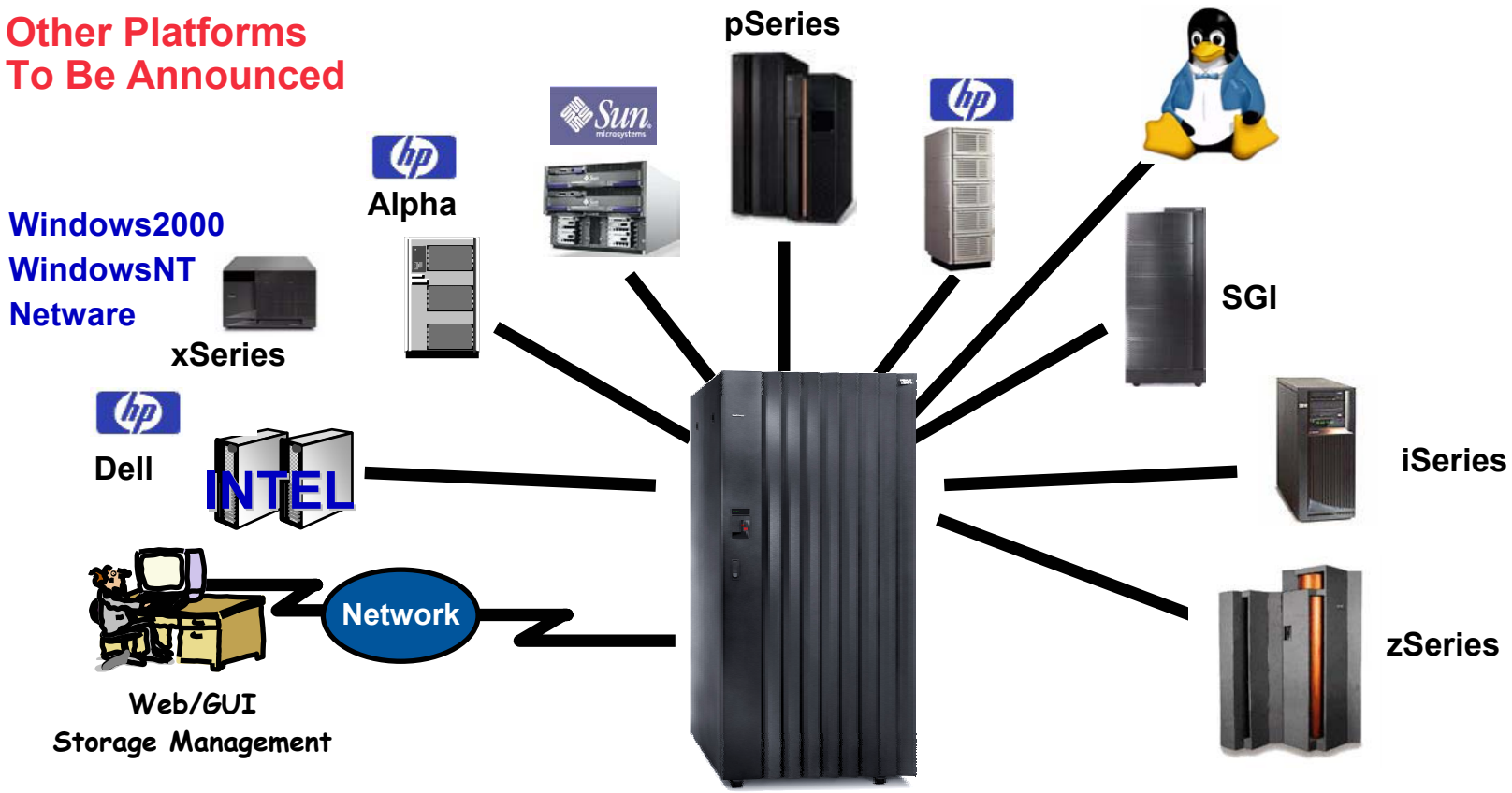
The new standard in enterprise storage

Setting New Standards in Enterprise Storage

- **Dramatic Performance**
  - POWER5 Technology
  - Up to 6X ESS base Model 800
  - ARC Cache
- **Breakthrough Scalability**
  - Physical capacity from 1.1TB up to 192TB
  - Architected to scale to over 96 Petabytes
  - Model to Model field upgradeable
  - 4 Year Warranty
- **New levels of storage consolidation**
  - Industry's first implementation of storage logical partitioning
  - Exploitation of IBM Virtualization Engine technology
- **Enterprise resiliency and business continuity**
  - Dual clustered server design and operating environment
  - Metro/Global Mirroring capabilities interoperable with current ESS models and DS6000

Video

DS8000 Connectivity

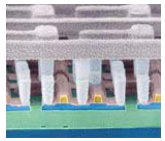


http://www.storage.ibm.com/hardsoft/products/ess/supserver.htm

IBM is the Technology Leader

Chips

Copper



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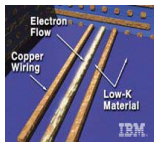

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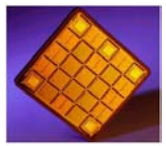


MCM

V-channel Tunneling 2Ghz imbedded SRAM

Carbon Nanotubes Electron-Projection Lithography (EPL)

System Design

- High speed switch Interconnects
- Balanced architecture for application performance
- I/O Subsystems
- Self Managing Servers
- Book Technology Construction
- Hardened Components

Performance/TCO

Reliability

- Designed to prevent failures vs. recover
- First Failure Data Capture
- CPU deallocation
- Chip Kill Memory
- Bit Steering

24x7xForever

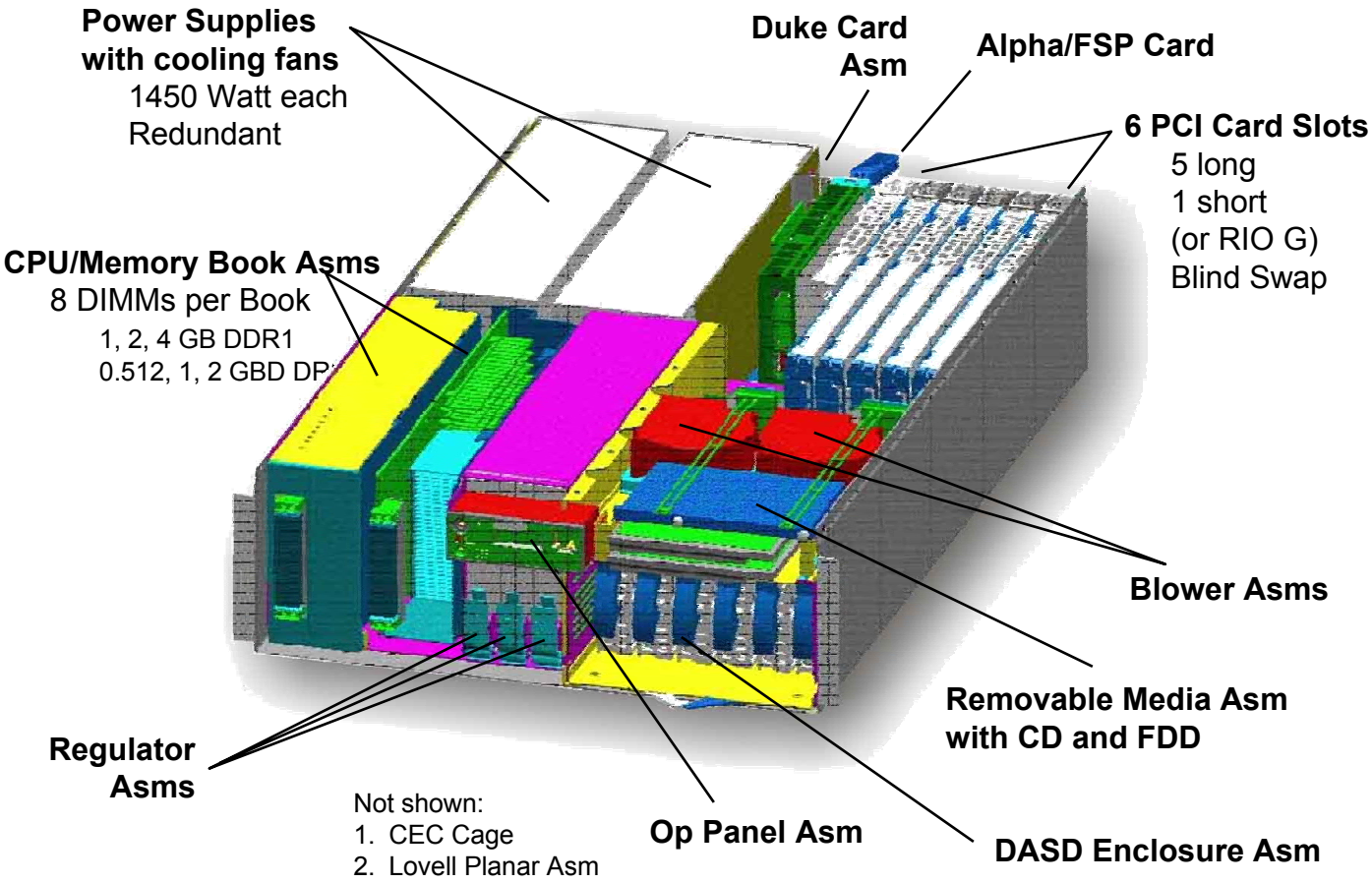
Partitioning / WLM

- True Logical Partitions
- Virtual machines
- Workload manager
- Intelligent Resource Director

Utilization/TCO

POWER5 Server Technology Leadership

POWER5 server designs have specifically incorporated storage requirements in their development and implementation



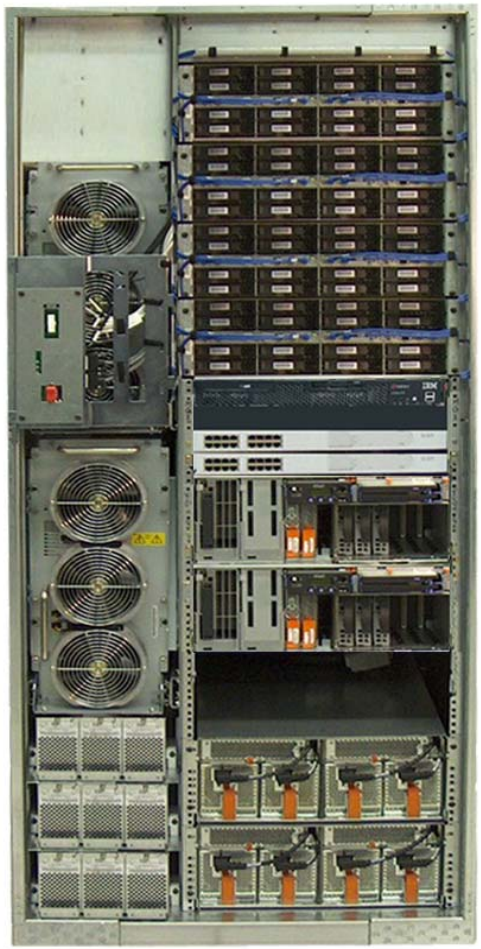
The Foundation for *Storage System LPARs*

DS8000 Hardware Overview

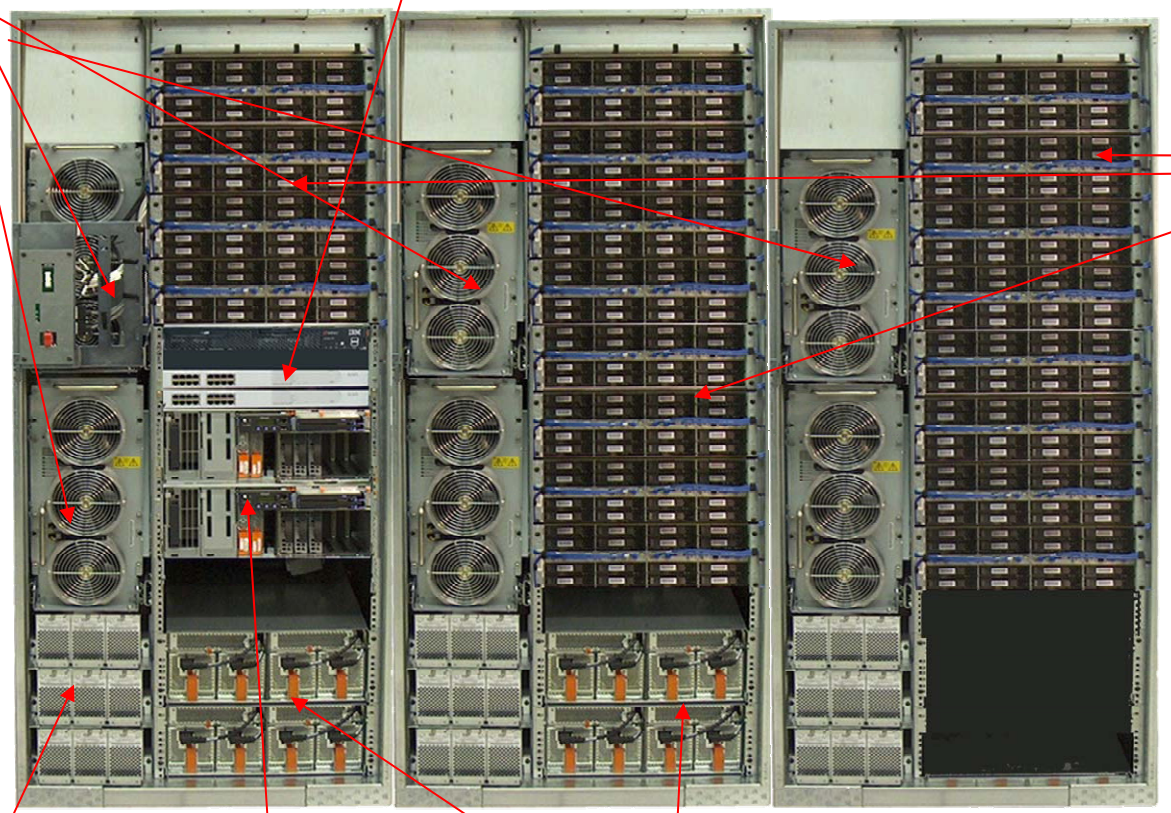
- **2-Way (Model 8100)**
  - Two dual processor servers
    - Up to 128GB Cache
  - 8 to 64 2Gb FC/FICON – 4 to 32 ESCON Ports
  - 16 to 384 HDD
    - Intermixable 73GB 15Krpm, 146/300GB 10Krpm
  - Physical capacity from 1.1TB up to 115TB

- **4-Way (Model 8300)**
  - Two four processor servers
    - Up to 256GB Cache
  - 8 to 128 2Gb FC/FICON – 4 to 64 ESCON Ports
  - 16 to 640 HDD
    - Intermixable 73GB 15Krpm, 146/300GB 10Krpm
  - Physical capacity from 1.1TB up to 192TB

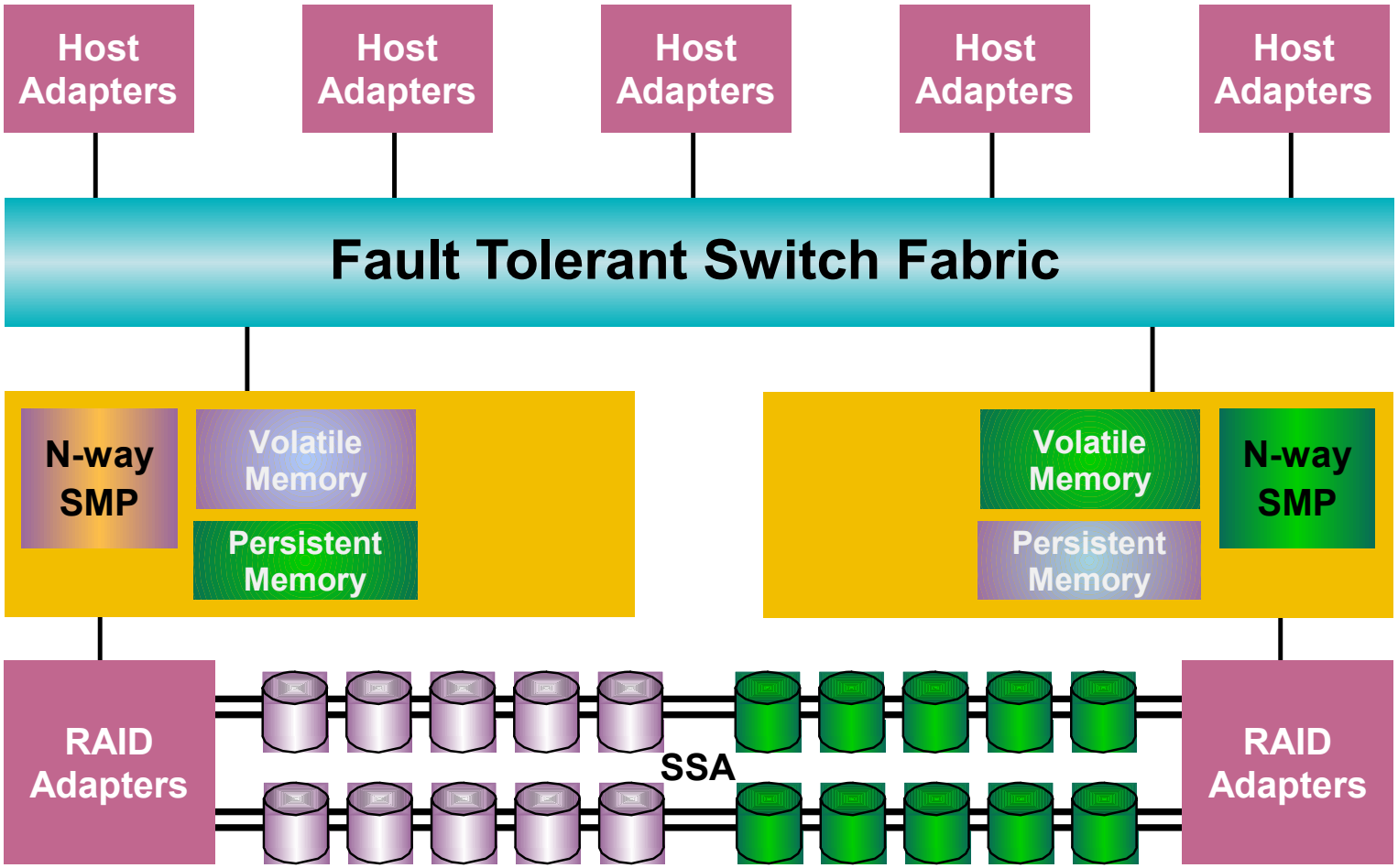
IBM TotalStorage DS8100 (2-Way)



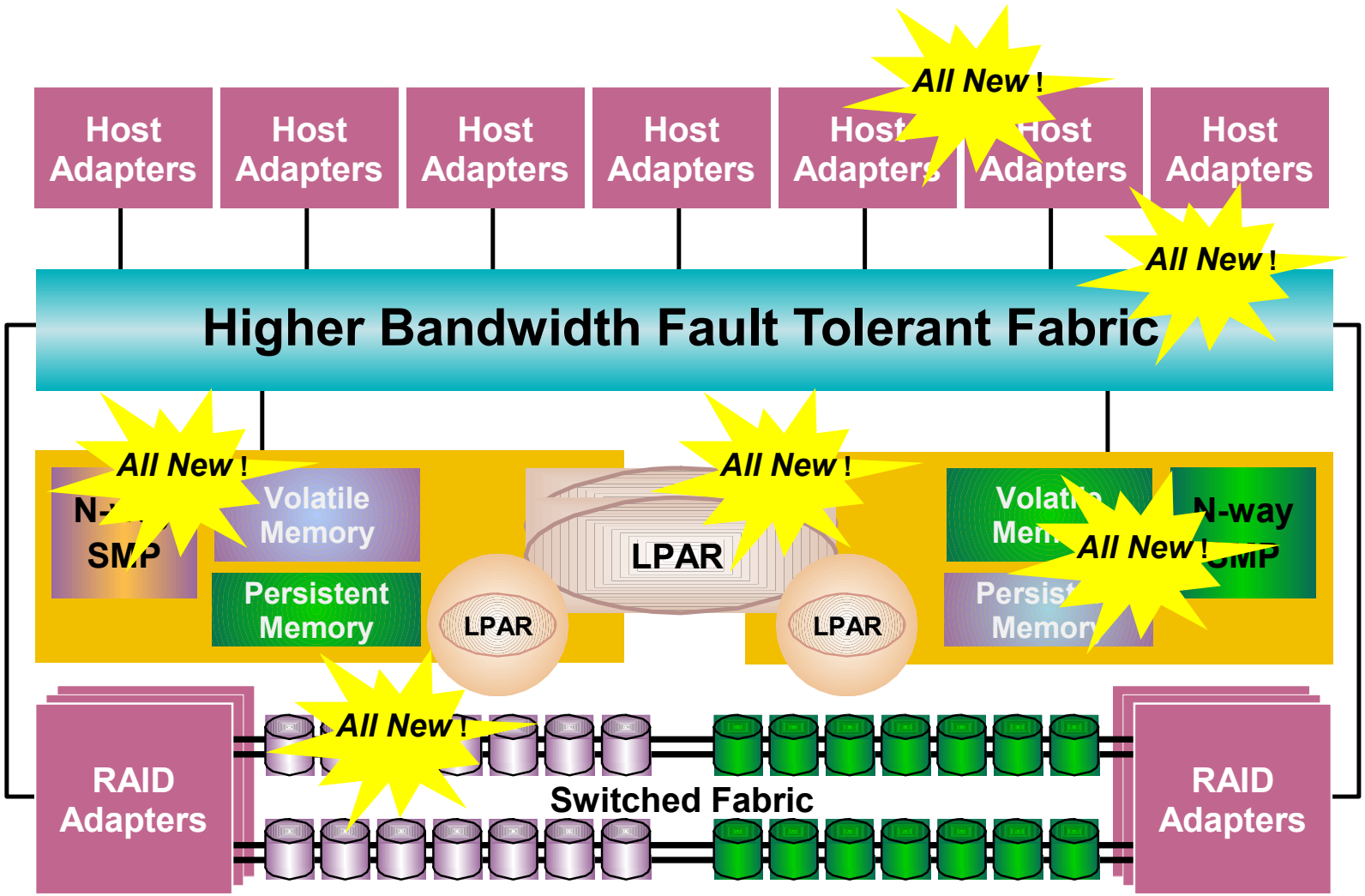
DS8300 (4-Way with two expansion frames)



ESS Architecture - Today



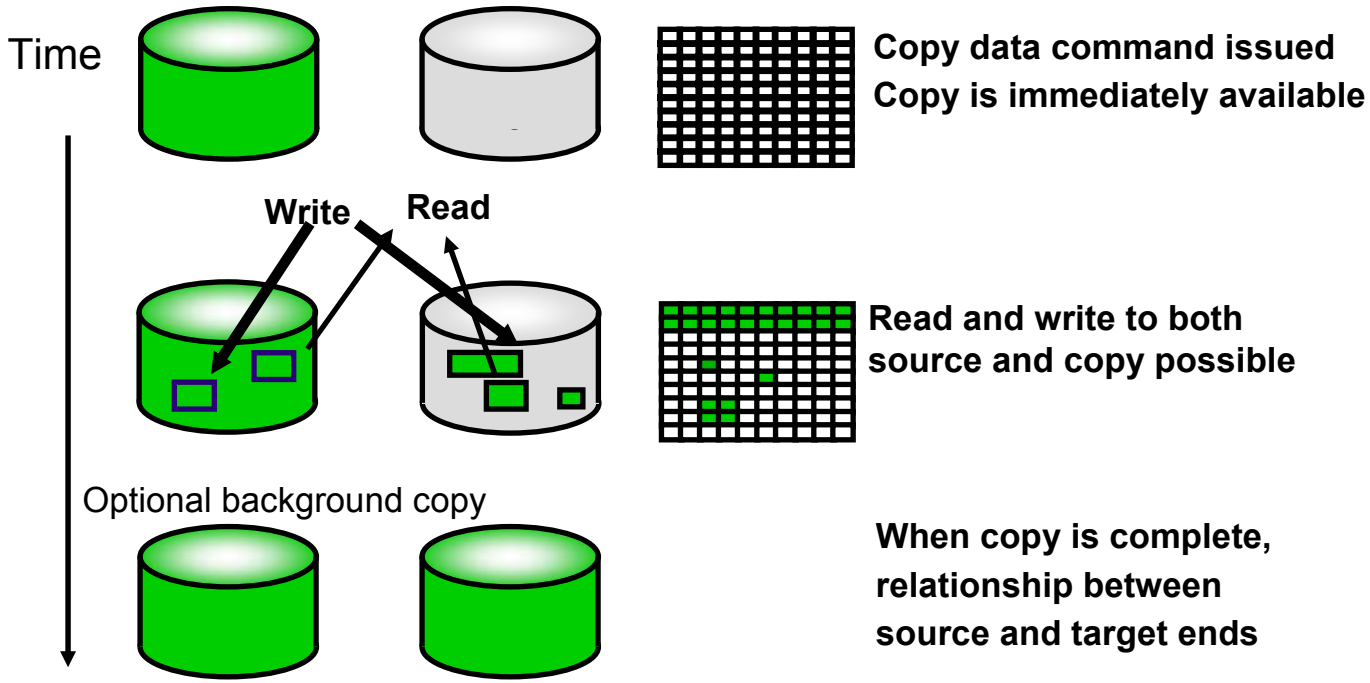
Leveraging and Extending IBM's Server-based Architecture



Generation-to-Generation Comparison

	ESS 800/800t	DS8100	DS8300
DDMs	16-384	16-384	16-640
DDM Interface	SSA	FC-AL	FC-AL
DDM Types	73,146 GB	73,146,300 GB	73,146,300 GB
RAID Types	RAID 5,10	RAID 5,10	RAID 5,10
Max Capacity w/73 GB DDM	28 TB	28 TB	46.7 TB
Max Capacity w/146 GB DDM	56 TB	56 TB	93.4 TB
Max Capacity w/300 GB DDM	-	115.2 TB	192.0 TB
Max Sequential Bandwidth	750 MB/s	2 GB/s	4 GB/s
LUNs/CKDs	4K+4K	64K Total	64K Total
Max N-Port Logins/Port	128	510	510
Max Process Logins	512	2K	2K
Max Logical Paths / CU	256	512	512
Max LUN	1 TB	2 TB	2 TB
Dynamic Provisioning	Add	Add/Del	Add/Del
Cache // NVS	8-64 GB // 2GB	16-128 GB // 1-4 GB	32-256 GB // 1-8GB
Processor	Condor M1+ 4Way / 6Way	DS8000 ML (SMT) 2 Way	DS8000 ML (SMT) 4 Way
Host Adapters	ESCON x2 FC(2 GB/s)x1	ESCON x2 FC(2 GB/s)x4	ESCON x2 FC(2 GB/s)x4
Host Adapter Slots	16	16	32
Max Host Adapter Ports	16	64	128
Interface Protocols	SCSI-2Gb FCP/FICON	SCSI-2 Gb FCP/FICON	SCSI- 2 Gb FCP/FICON
PPRC Fabric	ESCON/FCP	FCP	FCP
DA Slots	8	8	16
DA Throughput	160 MB	720 MB	720 MB

FlashCopy



Serverless Backup to Tape/Disk
Serverless Peer-to-Peer Backup
Checkpoint/Restart

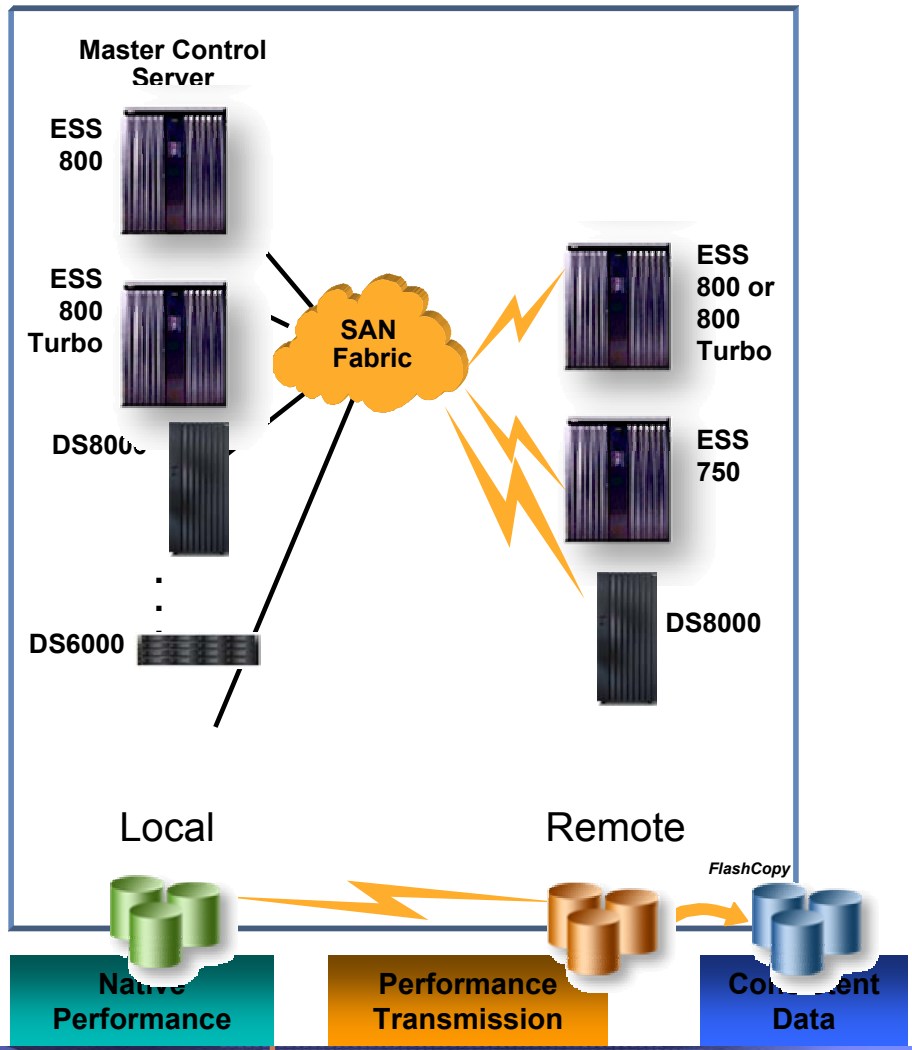
FlashCopy Features

- Data Set Level Copy
  - zSeries
- Multi-target Copy
  - Up to 12 copies
- Incremental Copy
  - Either direction
- Consistent Copy
  - Synchronized LUNs

System to System Copy Capabilities

- Synchronous – Metro Mirror
- Asynchronous – Global Copy
- Asynchronous with Synchronization – Global Mirror

Business Continuity with *Global Mirror*



Designed to Provide:

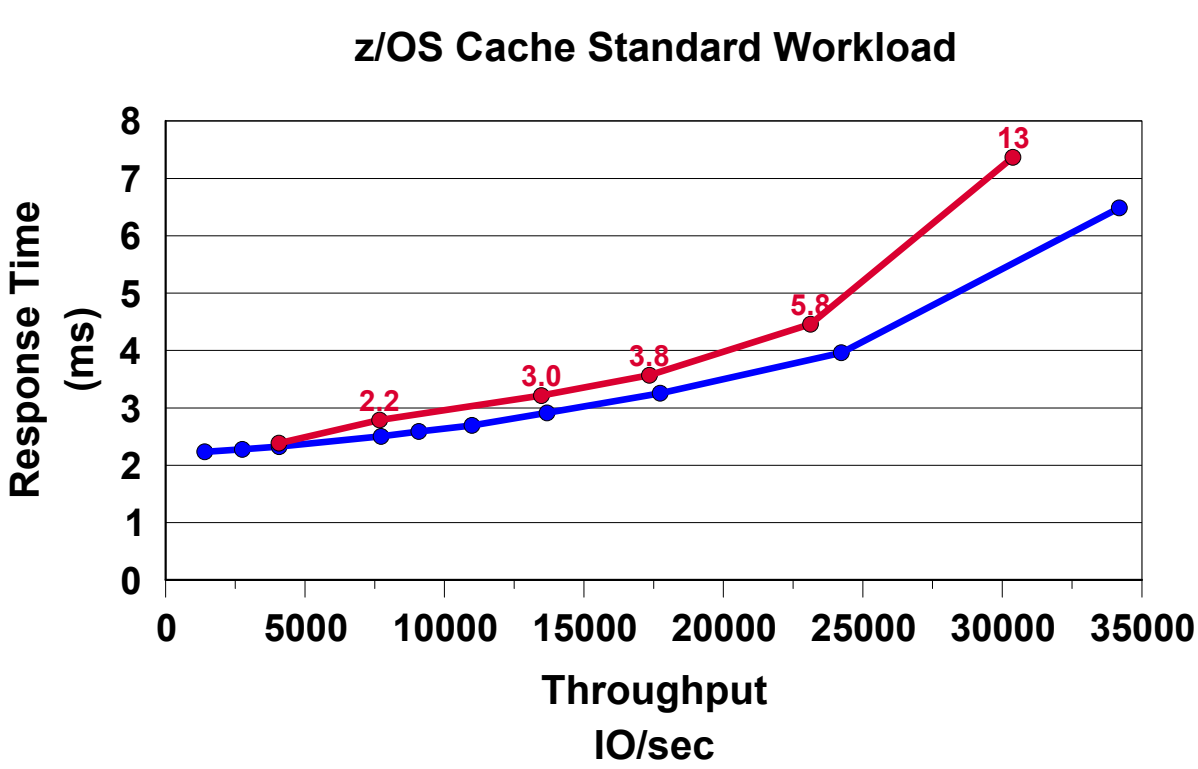
- **Global Distance:** Two-site consistent asynchronous disk mirroring functionality
- **Scalability:** Allows consistency groups to be created across multiple Storage Servers and to contain a mix of zSeries® and open systems data
- **Heterogeneous:** Data can span zSeries® and open systems data
- **Application Performance:** Near native
- **Mirroring Performance:** Two fibre channel disk mirroring links helps support large workloads

Intended Benefits

- **Autonomic:** Avoids the need for active external controlling software required to form consistency groups
- **Cost savings:** Avoids the need for server cycles to manage consistency groups
- **Low TCO**

Global Mirror Performance

Asynchronous PPRC - z/OS
(2) Primary, (1) Secondary ESS 800 and 2 FCP Paths



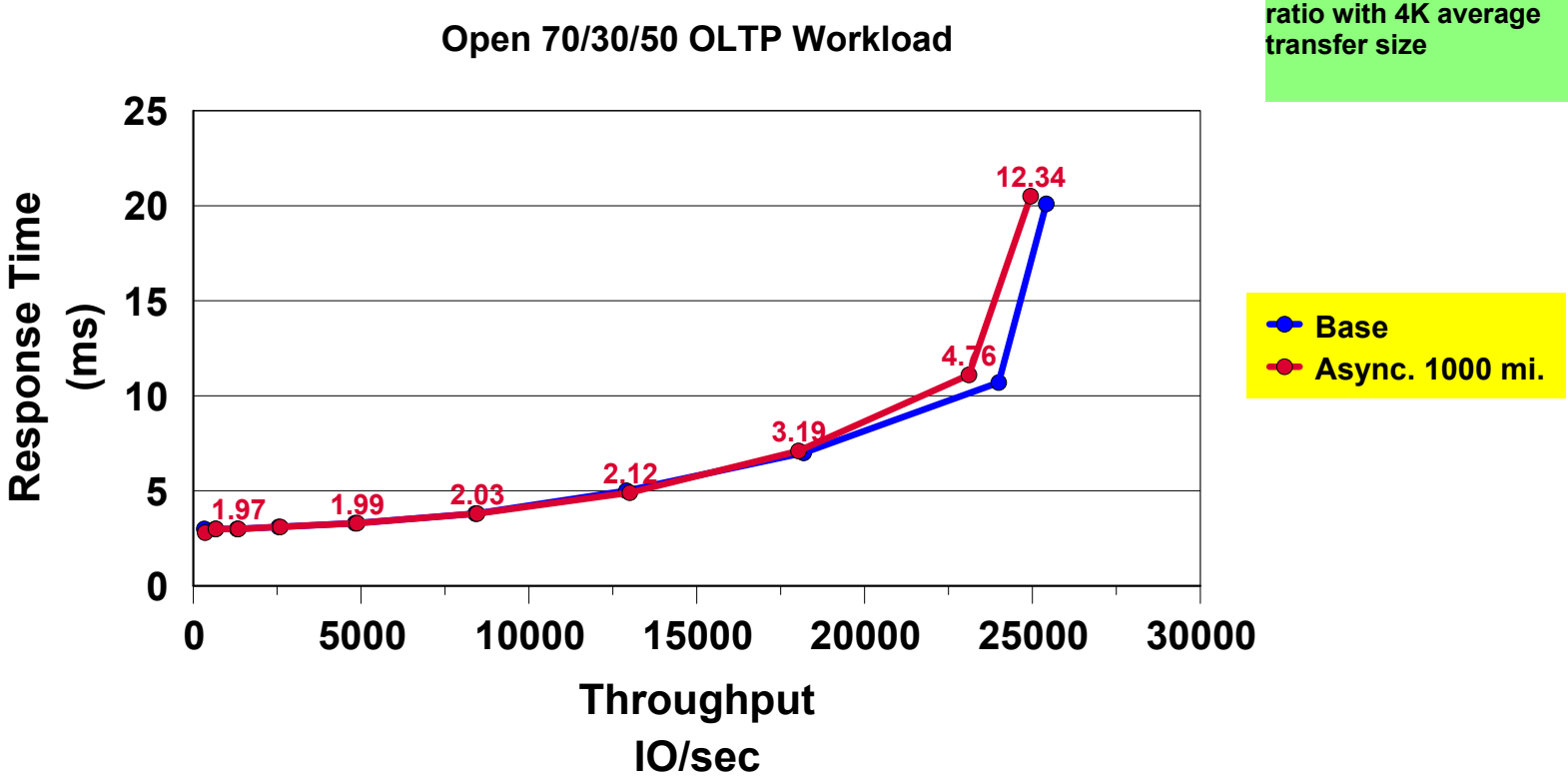
Workload has a 3:1 r/w ratio with 4K average transfer size

Average RPO time in seconds is indicated on chart in RED

Global Mirror Performance

Asynchronous PPRC - Open
(1) Primary, (1) Secondary ESS 800 and (2) FCP Paths

Workload has a 2.33:1 r/w ratio with 4K average transfer size



Average RPO time in seconds is indicated on chart in RED

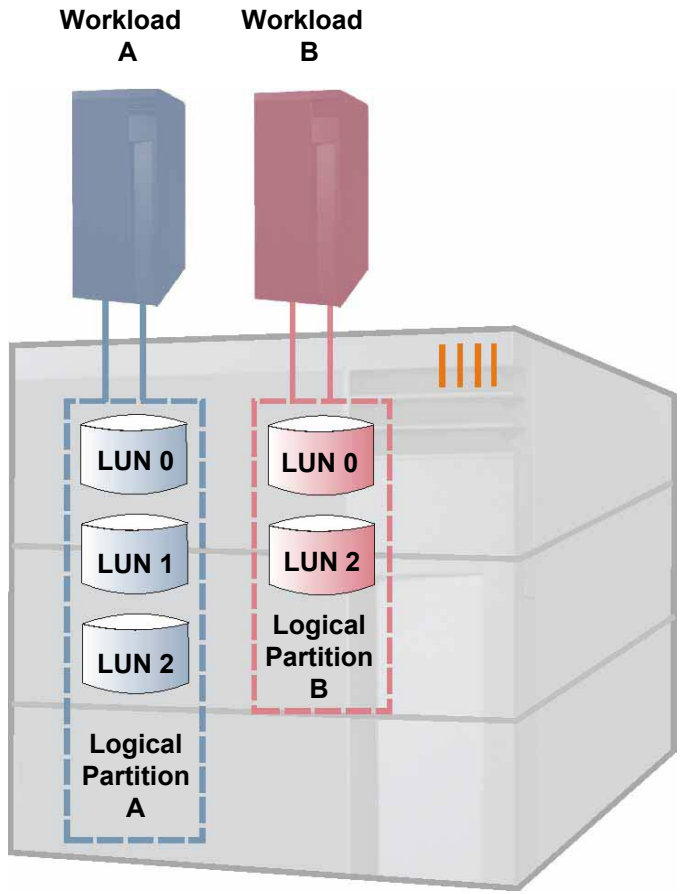
DS8000 Storage System LPAR Advantages

- **Improved cost of ownership**
- **Improved management efficiency**
- **Reduced “real estate”**
- **Dynamic allocation of resources**
- **Efficient workload balancing**
- **High availability – Storage Image Independence**

**Lower Long Term Cost –
Improved ROI**

Benefits of Storage System LPARs

- **Create virtual storage subsystems**
  - Scalability/performance leverage
  - Improved TCO over “singular” sub systems
- **Heterogeneous workload support**
- **System (hardware) based implementation ensures data integrity**
- **Added flexibility/performance optimization**
  - Performance optimization/tailoring
  - Reduced manual tuning



DS8000

Dual Partition Customer Exploitation

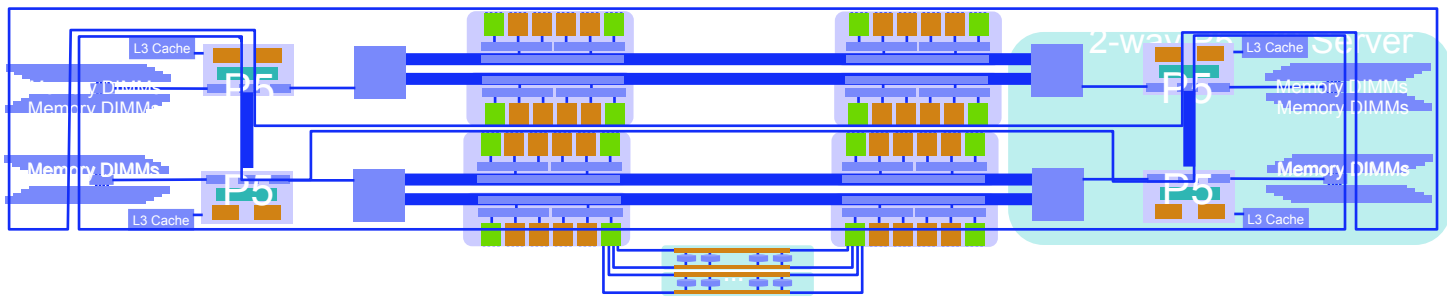
- Two production workloads
  - Production splits by OS, application, organizational boundaries
- Production and development partitions
  - Application development
  - Change control, test, education
- Dedicated partition resources to meet Service Level Agreements
- Production and data mining
- Business continuance (secondary) within the same physical box
  - Test environment
  - Production for multiple copy scenarios
- ILM partition with fewer resources, slower drives . . .
- Other special purpose

Future Directions of Storage System LPARs

- More granular I/O allocation
  - Physical array level
- CPU resource allocation between LPARs
  - 50/50 moving to 25/75, 0/100, 10/90, 20/80 etc.
- Dynamic memory movement between LPARs
- Application LPARs
  - Tight integration of storage centric applications
- Virtual I/O between application LPARs and virtual array images
- Virtualized External Application I/O
  - Virtualization of Ethernet and Fiber Channel Ports for application LPARs

Potential “Applications” in Storage System LPARs

- **Integrated File Systems**
  - SFS
  - NAS
  - Others
- **Additional Storage Protocols / Interfaces**
  - iSCSI gateway
  - Object Server
- **Database Acceleration/Offload**
  - DB2
    - Health check, multi level security, DB reorgs, image copies, HSM
  - Oracle
- **Backup / Recovery**
  - TSM, Legato, Veritas, others
  - Disk to Tape offload
  - VTS Integration
- **Integrated Domain-Specific Apps**
  - Reference Data
  - Medical Imaging
- **Integrated Functions**
  - ESSNet
  - SVC
  - Delayed RPO



DS8000 . . . Approaching Infinity

System growth designed for an on demand world

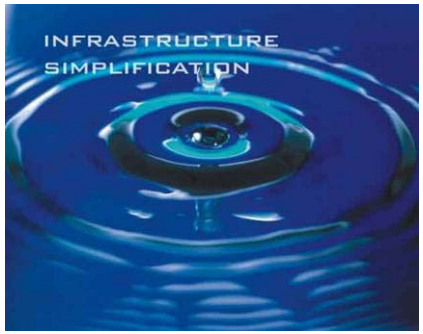
	ESS 800	DS8000	DS8000 with LPAR
Max Logical Subsystems	32	256	512
Max Logical Devices	8K	64K	128K
Max Logical CKD Devices	4K	64K	128K
Max FB Logical Devices	4K	64K	128K
Max N-Port Logins/Port	128	510	510
Max N-Port Logins	512	8K	16K
ITL Nexi	2M	64M	128M
Max Logical Path/FC Port	256	2K	2K
Max Logical Paths/CU Image	256	512K	512K
Max Path Groups/CU Image	128	256K	256K

Balanced Performance for the Most Demanding Environments

- **All New System components designed for "harmonious" throughput**
  - New 4 Port Attachments
  - New internal "fabric" for greatly enhanced bandwidth
  - POWER5 Servers
  - Up to 256GB Cache
  - IBM exclusive "ARC" cache optimization
  - Flexible disk capacities/speeds
  - Fibre channel attached disk

DB2 Information Management Software
Informix
Lotus. software
WebSphere. software
z/VM
SAP
SYBASE
AIX L
ORACLE
IBM @server iSeries
Linux for IBM @server pSeries
Linux for IBM @server xSeries
Linux for IBM @server zSeries
Microsoft SQL Server™
Microsoft Exchange Server
z/OS
Microsoft Windows Server 2003
Novell.
SOLARIS™

DS8000 – *The Power to Break Through*



Exceptional price/performance *and scale through POWER5 technology*

New levels of simplification *made possible by storage system LPARs*

Vertical and Horizontal scalability *for flexible growth*

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

Integrated, automated comprehensive set of solutions designed to address customer's ***business continuity*** *needs*

Ideal ***first choice*** *of storage in the tiered storage hierarchy*

Investment protection *through model to model upgrades*

Foundation *for future integrated solutions*

Enterprise Continuum of Storage Products

- **97% shared operational code**
- **Compatible copy services**
  - With each other and ESS 750 and ESS 800
- **Common CLI**
- **User written 'scripts' run identically on both machines**
- **Common management interfaces**

DS6000 series

DS8000 series

TotalStorage DS6000 … Technology leverage enables dramatic breakthroughs in a *small,* modular package

- Almost **2X** the scalability of the competitive products at **half** the price, and with far greater capability
- More than **50%** better performance than competitive products
- **4%** of the space and **1/10th** the weight of competitive offerings at 5TB
- **One** common set of management and administrative tools

Changing the economics

Enterprise Class Storage for clients of all sizes

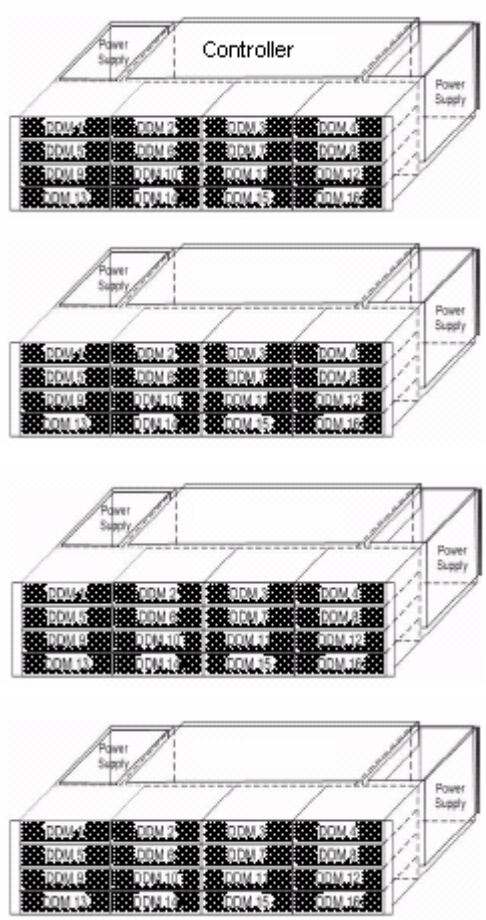
DS6000

- **Redefining the continuum of enterprise storage**
  - Half the price with all the capability of traditional enterprise products
  - Compatible copy services across a broad range of products
  - Support for mainframes and open systems
  - Common user interface
  - Easy to install and easy to service
- **Support for 24x7 operation**
  - Enterprise class resiliency in a modular package
  - World class advanced software features
  - Built in autonomic features
- **Modular package**
  - Calibrated vectored cooling
  - Light Path Diagnostics

Video

Modular Scalability

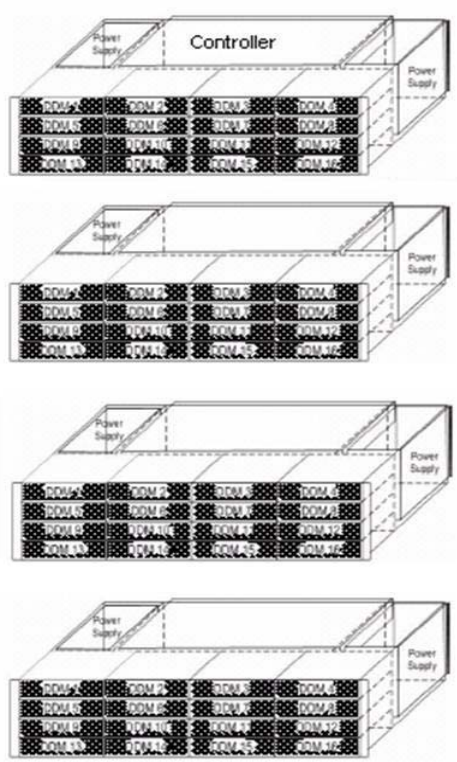
- **Flexible design to accommodate on Demand business environments**
- **Designed for dynamic configuration changes**
  - Add disk drives in increments of 4
  - Add storage expansion units
- **Scale capacity to over 67TB**



Note: At GA the minimum configuration is 8 HDDs and upgrades can be ordered in 8 drive increments. 4 HDD minimum configuration and increments are targeted to be available in 1Q05.

Modular Scalability Potential Benefits

- **Lower acquisition costs**
  - Avoid having to buy for the future
  - Add capacity and function as needed
- **“Pay as you grow” design**
  - Grow capacity with storage needs
- **Flexible storage capacity**
  - Add capacity without disrupting data availability
  - Optimize storage to information needs by using appropriate drive sizes and speeds



High Availability/Resiliency Features

- **Redundant and hot-swappable components**
- **Designed to reduce/avoid single points of failure**
- **Non-disruptive upgrades and configuration changes**
- **Switch fabric in disk expansion units**
- **4 data paths to each drive**
- **Preferred path I/O**
- **End to end data checking**
- **Predictive failure analysis for HDDs**

Installability and Serviceability

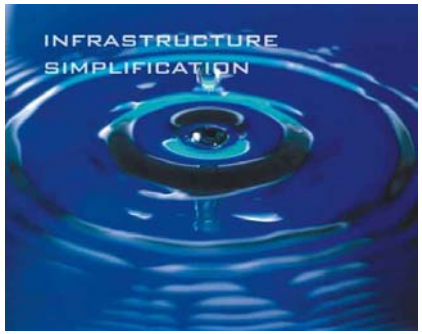
- **Installability**
  - Designed for customer install
  - Simplified GUI
  - Remote configuration
  - Easy installation wizards

- **Serviceability**
  - Intuitive status indicators on front and rear panels
  - Light Path Diagnostics
  - Call home
  - Remote management
  - Customer replaceable components
  - Open standards S-MIS interface
  - Manage multiple IBM TotalStorage products through IBM TotalStorage Productivity Center (TPC)

New 4 Year Warranty

- **4 year warranty for hardware and operational code**
  - 9x5 NBD
  - Limited on-site repair
  - Most parts are customer replaceable units
  - Service upgrades are available
  - Business partners can provide additional services

DS6000 – *"The Power to Break Through"*



- ***Compatible software with DS8000 to allow customers to leverage existing skills***
- ***Low cost product supports all types of servers, not just open or mainframe***

- ***Enterprise class resiliency and autonomic features***
- ***Industry leading advanced functions supporting resiliency, continuous operations, data availability, and recoverability***
- ***DS6000 can be used to mirror DS8000 based data***

- ***Availability, Performance, and Capacity needed to support mission critical, on demand workloads***
- ***Cost effective solution for mission critical and reference data applications***

Server technology leverage

- **POWER architecture for exceptional price/ performance and scale**
- **Virtualization Engine based logical partitioning driving new levels of simplification**
- **Calibrated vectored cooling for greater density and smaller footprint**
- **Simplicity and ease of use**
- **Mainframe-inspired levels of reliability, security and function to midrange products**

IBM eServer

IBM TotalStorage DS8000

IBM TotalStorage DS6000

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		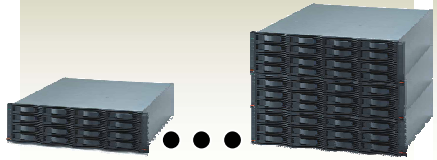		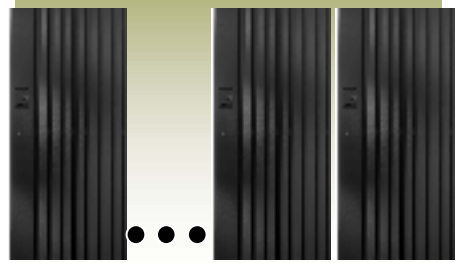
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Common management platform

Common suite of copy services

Virtualization

Compelling price points

Industry leading service and support

Enterprise Storage Continuum

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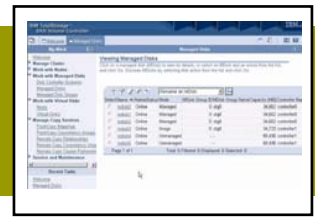
- **Simplify** the underlying IT infrastructure of storage and its management to lower cost and complexity while increasing the ability to respond to changing needs.
- Assure **business continuity**, security and data durability.
- Efficiently manage information **throughout its lifecycle**, relative to its business value.

IBM TotalStorage system … a total solution

IBM TotalStorage technology represents a holistic approach to managing information assets that includes hardware, software and archive offerings.

TotalStorage Open Software Family



TotalStorage DS Family

TotalStorage Resiliency Family

TotalStorage Tape Family