



Technical Forum & Executive Briefing

17 al 21
Octubre
2011

Imagine **PODER** Imagine **CAPACIDAD**

Storage Trends and Directions



Smarter Planet Solutions Increase Demands On IT, Specifically Storage



Storage growing **69% per year**
Servers growing **6% per year**
Virtual machines growing **42% per year**



1.2 zettabytes (1.2 trillion gigabytes) exist in the “digital universe

- **50%** YTY growth
- **25%** of data is unique; **75%** is a copy



Variety of Information

- **80%** of new data growth is **unstructured content**
- Emails, images, audio, video, more ...



Data Proliferation

- One client’s internal analysis found **122 copies** of a given email, counting **duplication** plus **backups**



But IT budgets are growing less than 0.8% per year

How has Storage Changed in 20 years?

The **IBM 3380 Direct Access Storage Device** was introduced in June 1980.

It used new film head technology and had a capacity of **2.52 gigabytes** with a data transfer rate of 3 megabytes per second. Average access time was **16 ms**.

Purchase price at time of introduction ranged from **\$81,000 to \$142,200 !!!!!**



1980 : IBM 3380 20 GB



\$30

2010 : 32 GB

Disk Technology Has Not Kept Up With Business Needs

- Disk capacity growth 60% - 100% per year¹
- Disk performance growth 5% - 8% per year¹
- Disk proliferation
 - ▶ Use many disks at low utilization to compensate for performance
 - ▶ Disk congestion limits server performance

***Result: Disk Sprawl !
High Storage Costs !***



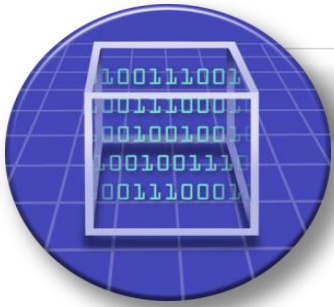
Meeting These Challenges

Leading clients
are already
addressing this
Storage
conundrum
through

SMARTER COMPUTING with Storage

**Strategies to Transform IT to
Deliver Breakthrough Storage
Economics and Value**

Strategies And Best Practices For Smarter Computing With Storage



Store More with What's On the Floor

- Virtualization
- Thin Provisioning
- Data Compression



Move Data to the Right Place

- Data Migration
- Automated Storage Tiers (HSM)
- Optimize Performance (Easy Tier)



Reduce The Cost Of Protecting Your Data

- Shorten Your Backup Window
- Archive Data

Store More With What Is On The Floor

Storage Virtualization

- Storage pools and extents
- Virtualization
- Thin Provisioning

Storage Efficiency – Capacity

- Eliminate stranded storage
- Improve utilization to get more value from storage investments
- Real Time Compression

Control
Disk
Sprawl

Store
52%
more data

Examples of IBM Solutions



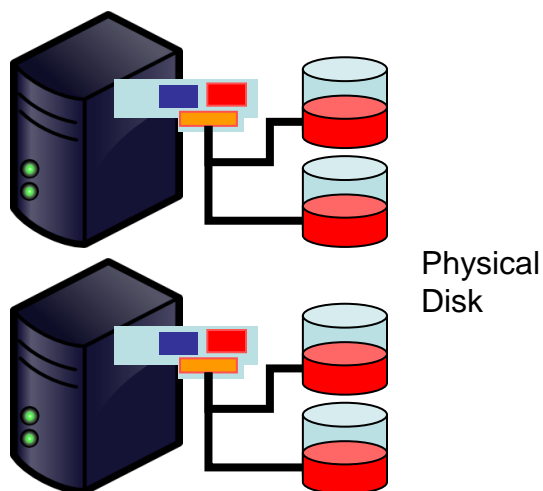
Storwize V7000
Enterprise class
storage for midrange



IBM XIV
Radical new approach
to disk storage
IBM DS8000
Enterprise class storage

IBM Storage Virtualization With Thin Provisioning Improves Storage Utilization

Embedded spare storage not available to other Servers

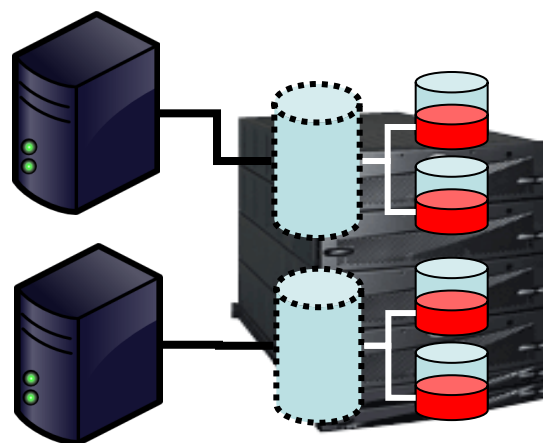


Embedded Storage

25%

Poor

Device Sharing, fully allocated Logical Volumes. Spare storage cannot be shared

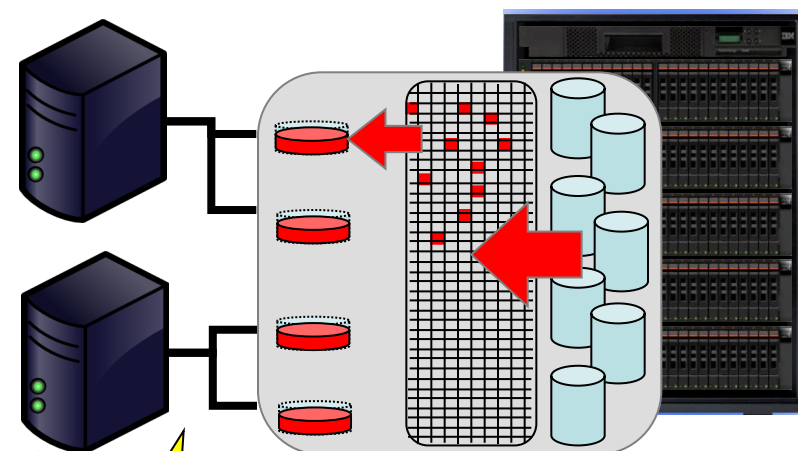


Shared Storage

44%

Better

Thin Provision virtualized storage volumes are the size you need. Volumes are from a pool of extents that is derived from many disk drives



Virtualized Storage

63%

Best

Storage Utilization

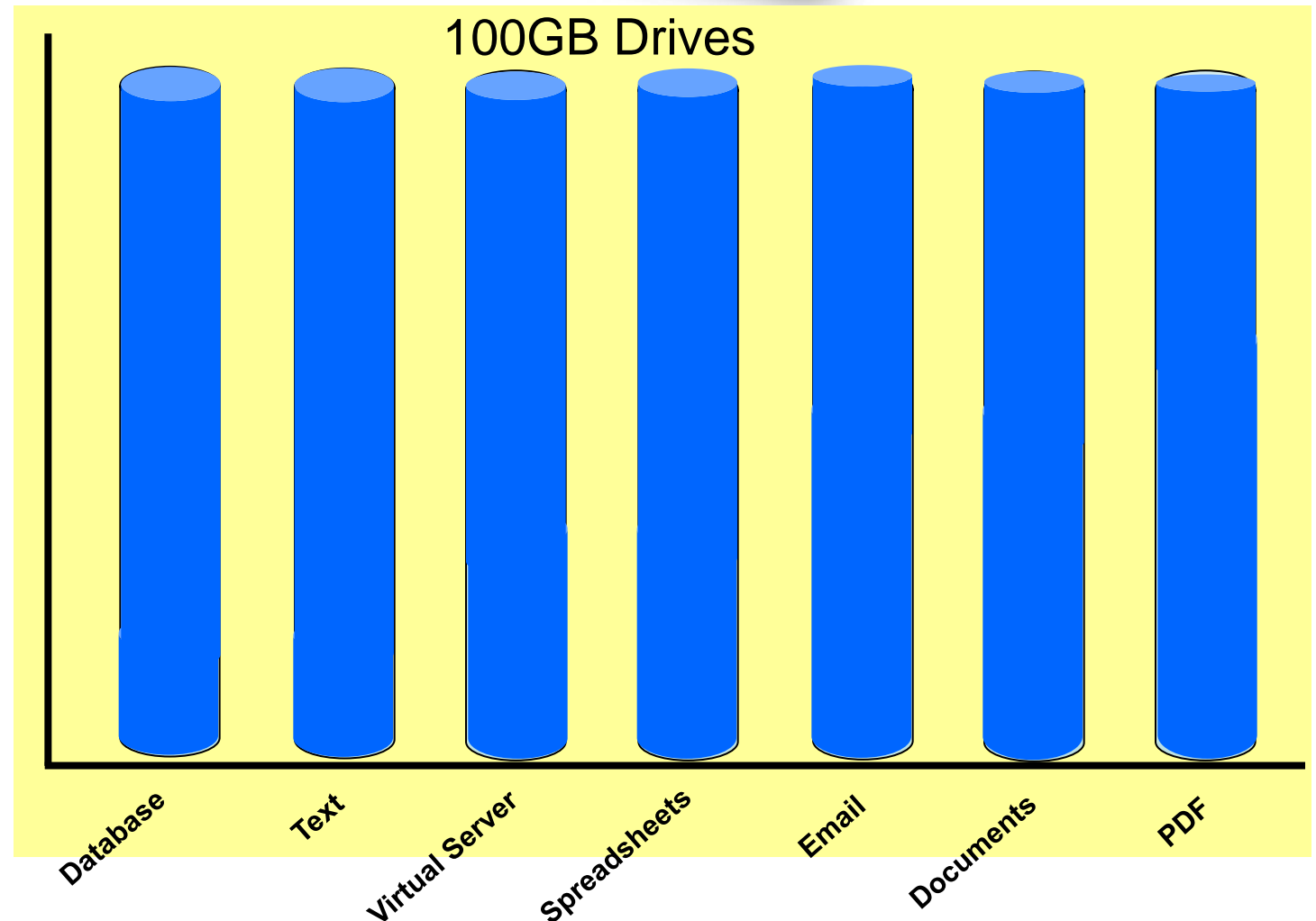
The Dramatic Effect Of IBM Real-time Compression By Data Type

- 7 Different Data Types
- Occupy 7 x 100GB Drives
- Install IBM Real-time Compression Device

STN 6800



IBM NAS



Move Data To The Right Place

Storage Tiers – Performance vs. Cost

- Move cold data to lower cost media
- Move hot data to solid state media
- Migrate data between storage devices simply
- Automatically compress data to save space

Automatic Storage Tier Management

- Simplify data migration
- Hierarchical Storage Management lowers storage costs
- Easy Tier improves application performance

Eliminate
Disk
Congestion

3x–9x
better
performance

Examples of IBM Solutions



Storwize V7000
Enterprise class
storage for midrange



IBM DS8000



SAN Volume Controller
Storage virtualization
across the datacenter

Storage Technologies Are Classified Into Tiers

- Tier 0 – Solid State Disk
 - ▶ Added to storage devices for maximum I/O performance
- Tier 1 – Enterprise Disk
 - ▶ Mission critical applications
 - ▶ Fastest performance
 - ▶ Advanced management and services
- Tier 2 – Midrange Disk
 - ▶ Lower cost storage for applications
- Tier 3 – Network Attached Storage/iSCSI
 - ▶ File-based storage for end-users
 - ▶ Non critical applications
- Tier 4 – Tape Systems
 - ▶ Backup, archival, long-term storage

Tier 0
Solid State Disk



IBM 300GB SFF SSD

Tier I
Enterprise Disk



IBM XIV



IBM DS8000

Tier II
Midrange Disk



Storwize V7000

Tier III
NAS or iSCSI



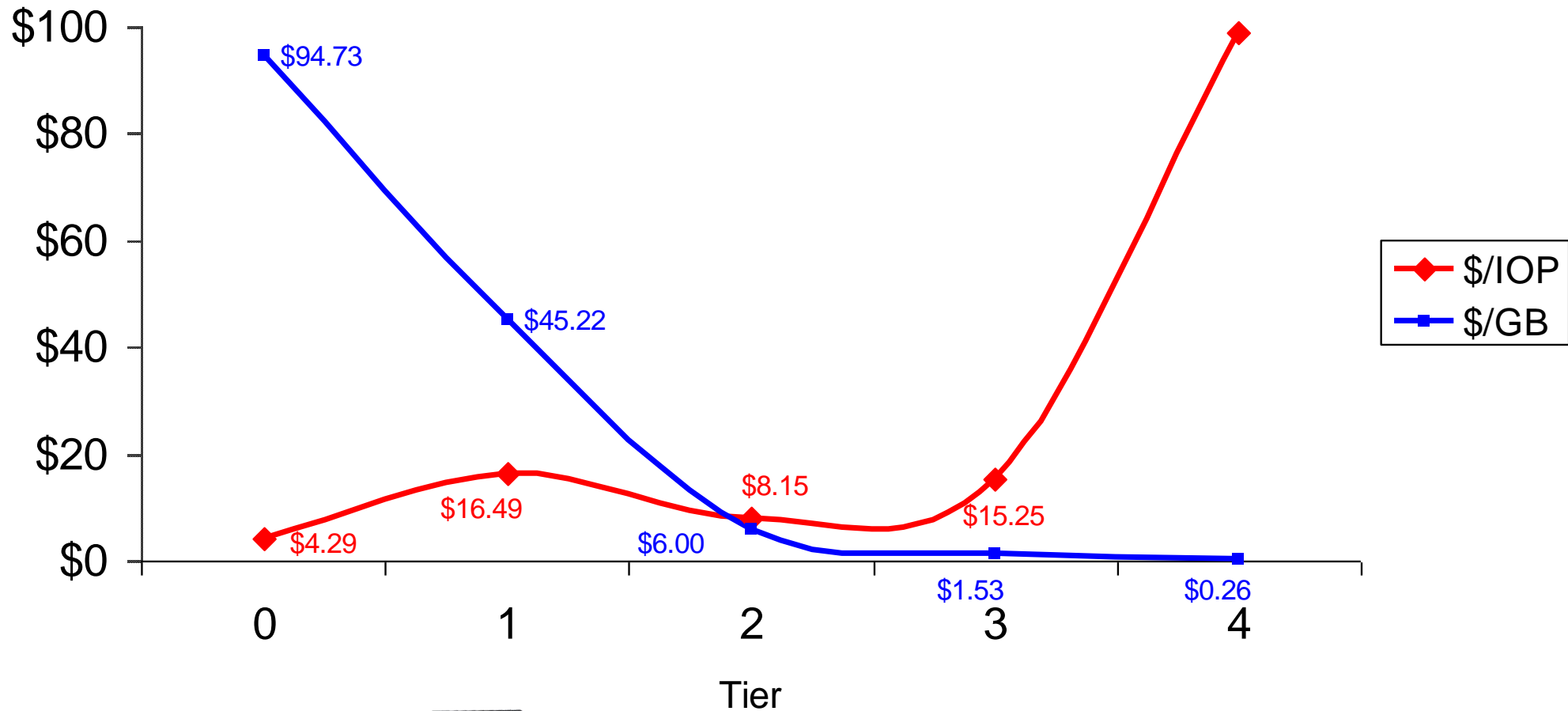
IBM N3000

Tier IV
Tape



IBM TS3100 Tape Library

Storage Tiers Have Different Capacity And Performance Cost Characteristics



Tier 0
Solid-State
Disk (SSD)



Tier 1 Enterprise
HDD Storage



Tier 2 Midrange
HDD Storage



Tier 3 NAS
HDD Storage

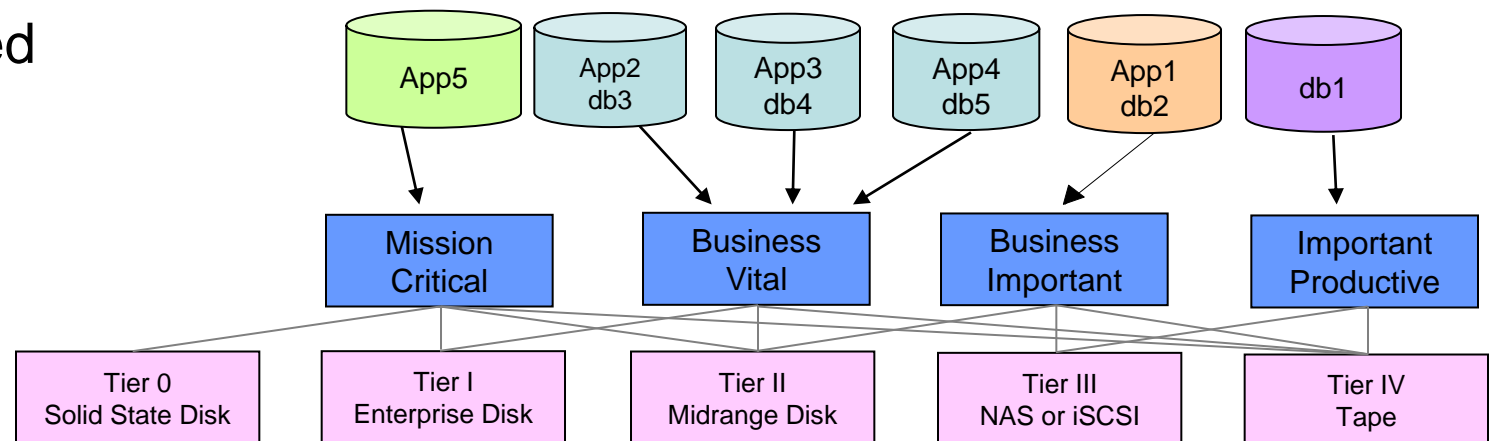


Tier 4
Tape

Put Data On The Storage That Meets Business Needs

A tiered information environment reduces storage costs by aligning IT resources with Business Value and Service Level requirements

- Align information with business requirements to determine 3-5 Information Classes
- Establish policies to map information to a Class of Service
- Initial placement
- Subsequent movement
- Backups, archives, mirroring
- Disposal, destruction, deletion
- Establish well differentiated tiers of information infrastructure associated with each service level

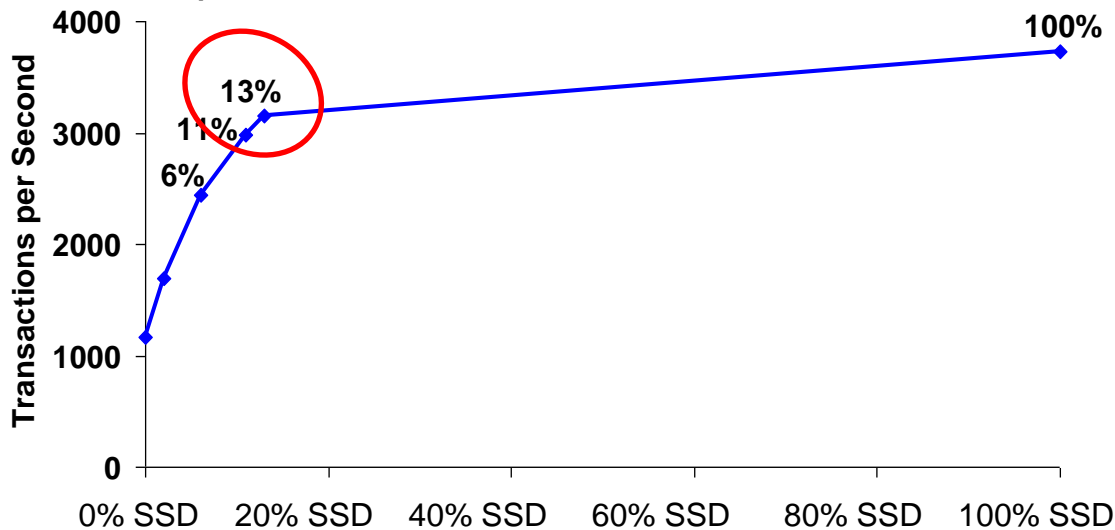


Easy Tier Can Improve Storage Price/Performance Also Makes SSD More Affordable In The Aggregate

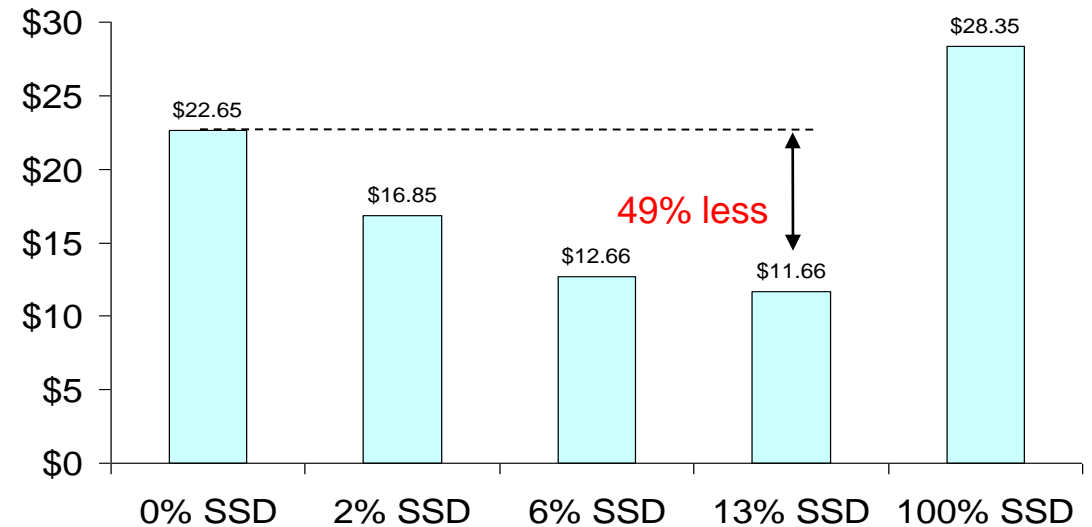
Just 13% blend of SSD to HDD achieves 171% performance gain

13% blend of SSD to HDD achieves lowest cost of storage per transaction per second

Simple Transactional Database Workload performance as blend of SSD is increased



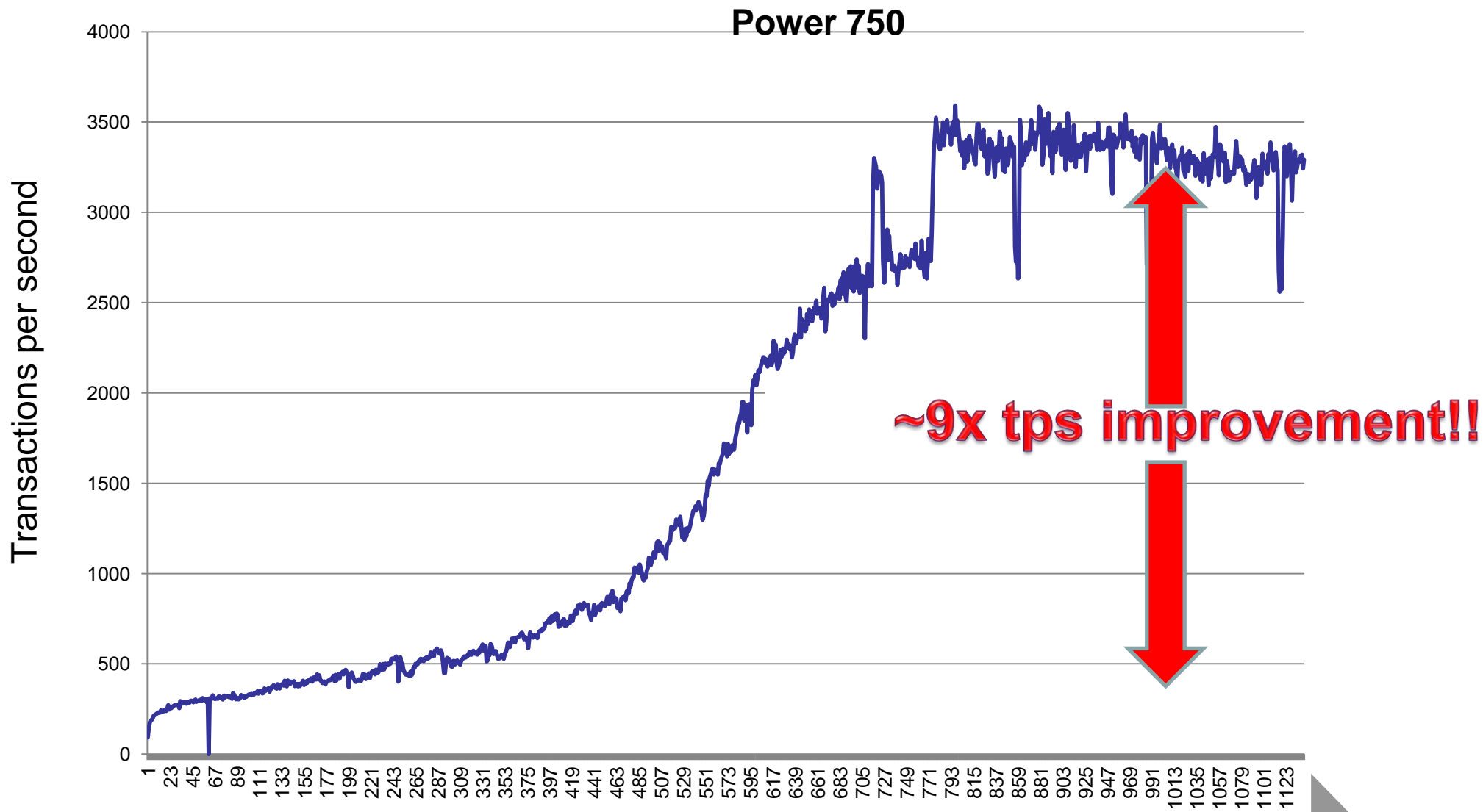
Cost of Storage Per Transactions Per Second as SSD Blend is Increased



Easy Tier achieves 78% of the maximum SSD performance potential with just 13% SSD

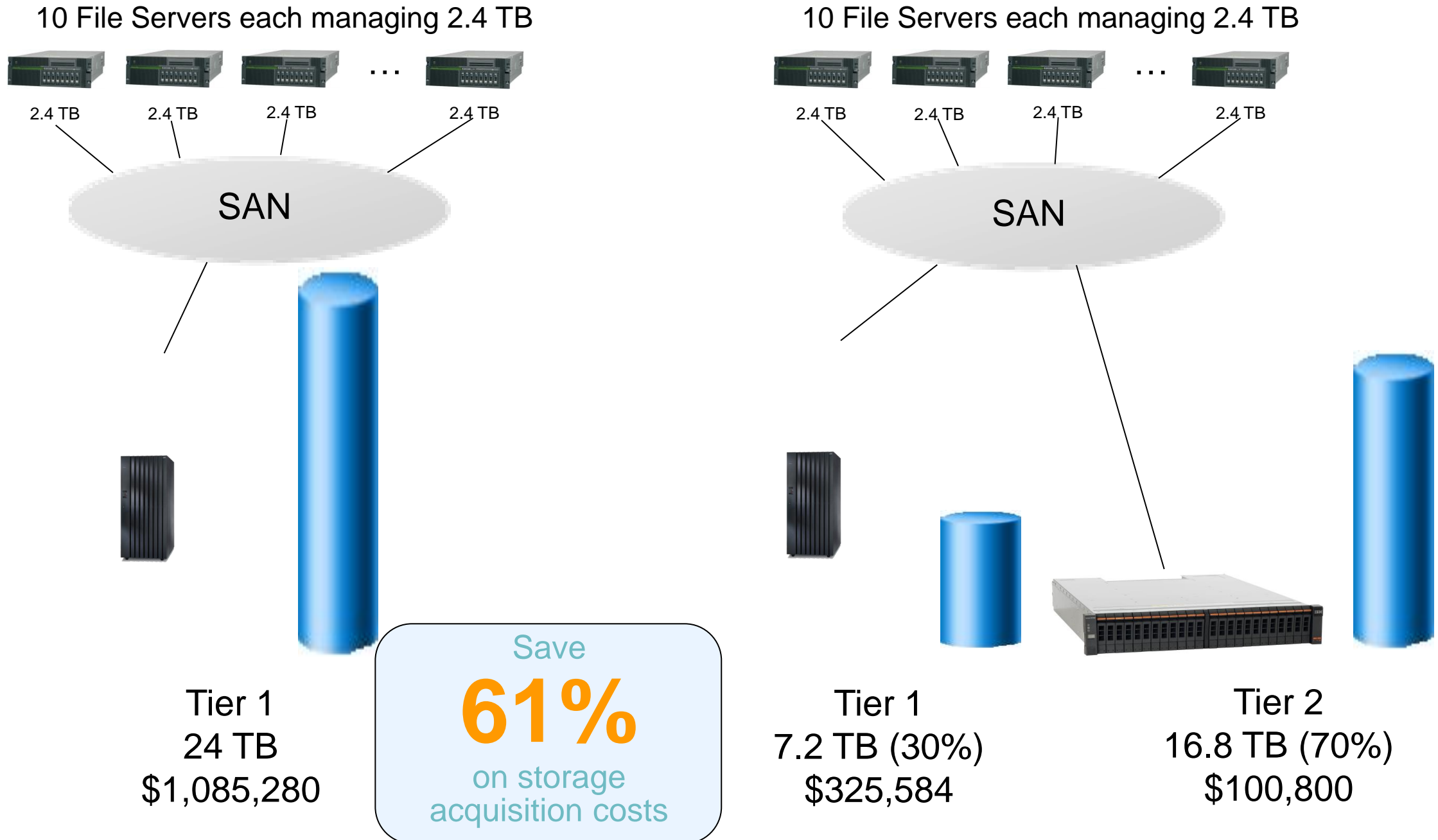
Source: IBM Internal Study of Benchmark Factory transactional database workload performance as Easy Tier migrates data to SSD. The performance data contained herein was obtained in a controlled, isolated environment. Actual results that may be obtained in other operating environments may vary.

Some Workloads Get A More Linear Performance Boost From Easy Tier



Complex OLTP workloads can achieve large performance improvements with SSD and Easy Tier

Hierarchical Storage Management Lowers Overall Storage Costs



Reduce The Cost Of Protecting Your Data

Reduce Backup Window and Labor

- Eliminate redundant data from backup repositories
- Disk-based backups for key systems reduce downtime and offer ultra-fast restores

Policy-based Data Archiving

- Reduce capacity requirements, improve performance
- Secure, audited vault maintains regulatory compliance

More
Efficient
Data Protection

42%
shorter
backups

Examples of IBM Solutions



IBM ProtecTIER
De-duplication

**Tivoli FlashCopy
Manager**
Fast backups
Ultra-fast restores

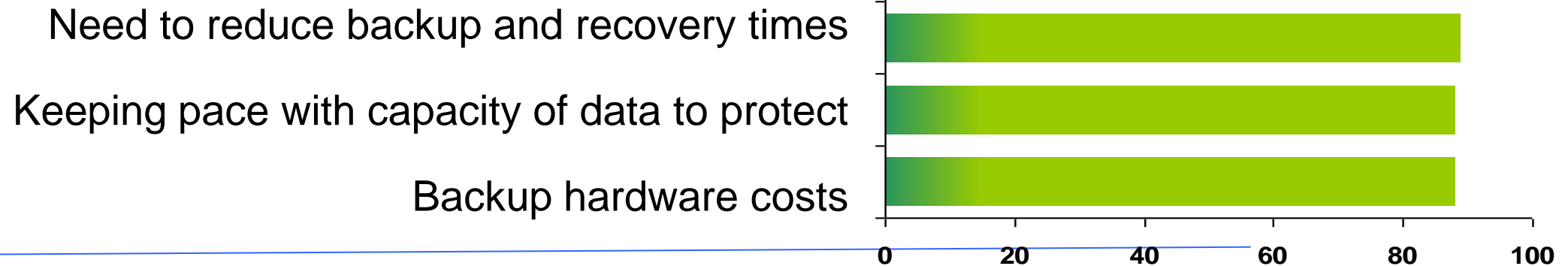


Information Archive
Data Archiving

Businesses Are Struggling With The Challenge Of Protecting Their Data

Top 3 Data Protection Challenges for IT Managers

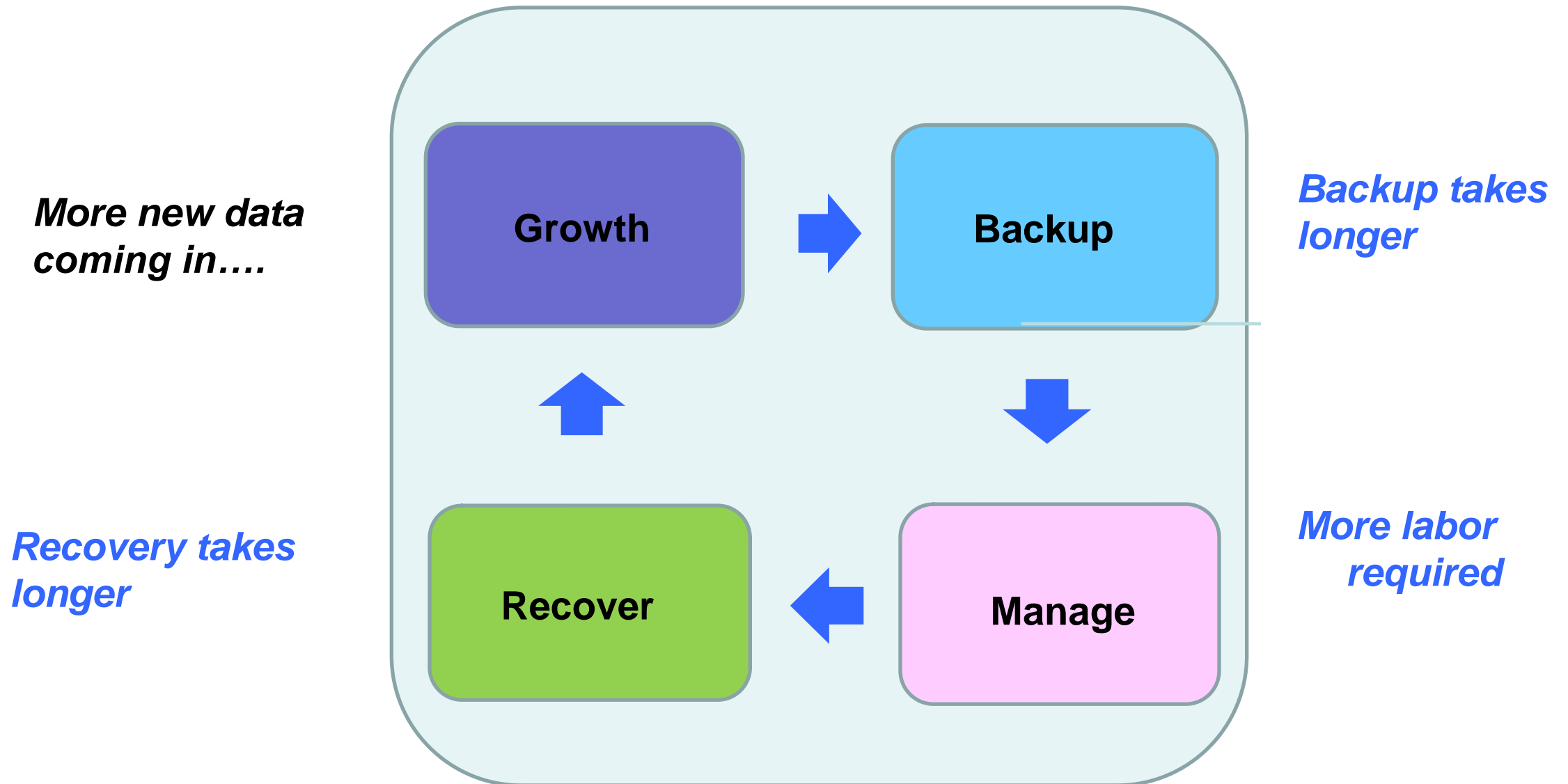
2010 Data Protection Trends - ESG 4/2010



Lack of “Smart “ Data protection solutions can cause severe consequences across all Lines of Business (LOB)

Businesses can't afford to lose important data!

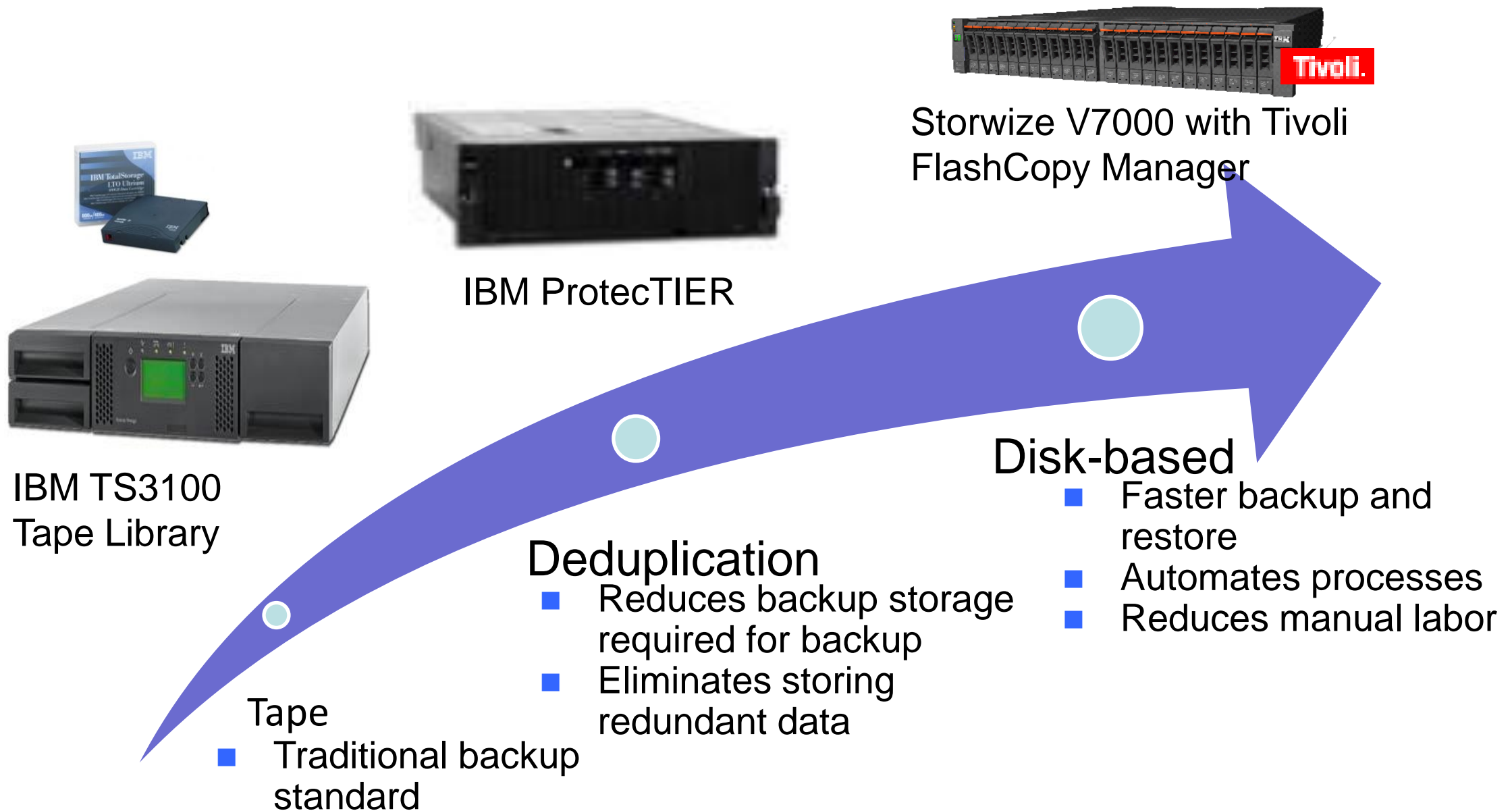
Data Growth Puts Backup Administrators Under Pressure



What Is The Difference Between Backup And Archive?

<u>Backup</u>		<u>Archive</u>
Copy the data to recover from data loss	Purpose	Protect the data from change
Restores files to a desired point in time to enable operations	Recovery Objective	Retrieves a file as it was saved for reference or legal reasons
Short term retention, 1-120 days	Longevity	File(s) archived have long term retention requirements
Data typically updated daily or weekly	Integrity	Data kept in its original form, can not be edited

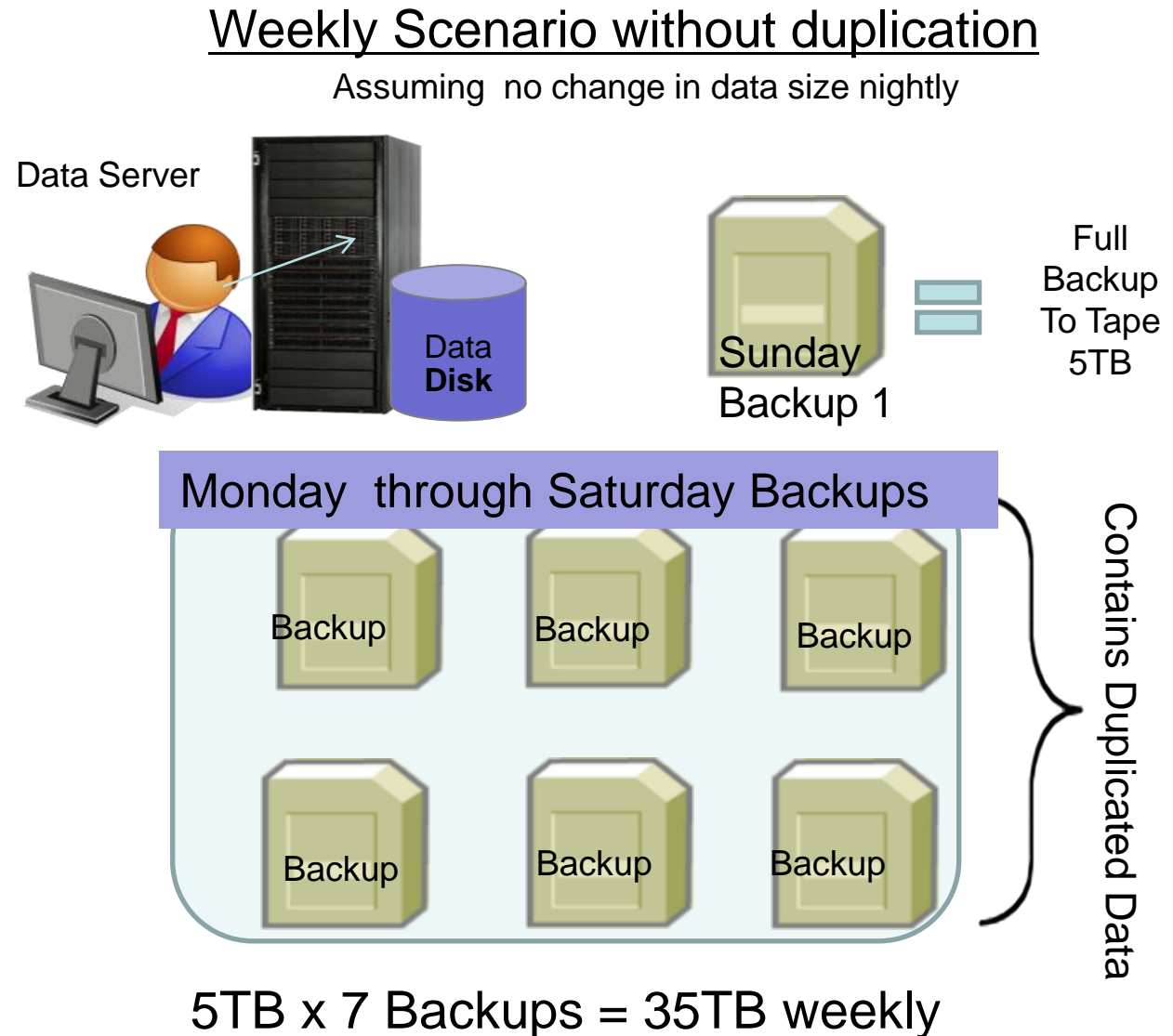
Advanced Backup Technologies Can Improve Backup Processes



Much Of The Data You Back Up Is Duplicated

- Backups are inefficient processes
 - ▶ Repetitively stores same data
 - ▶ Drains network bandwidth
 - ▶ Stores redundant data
 - ▶ Increases backup window

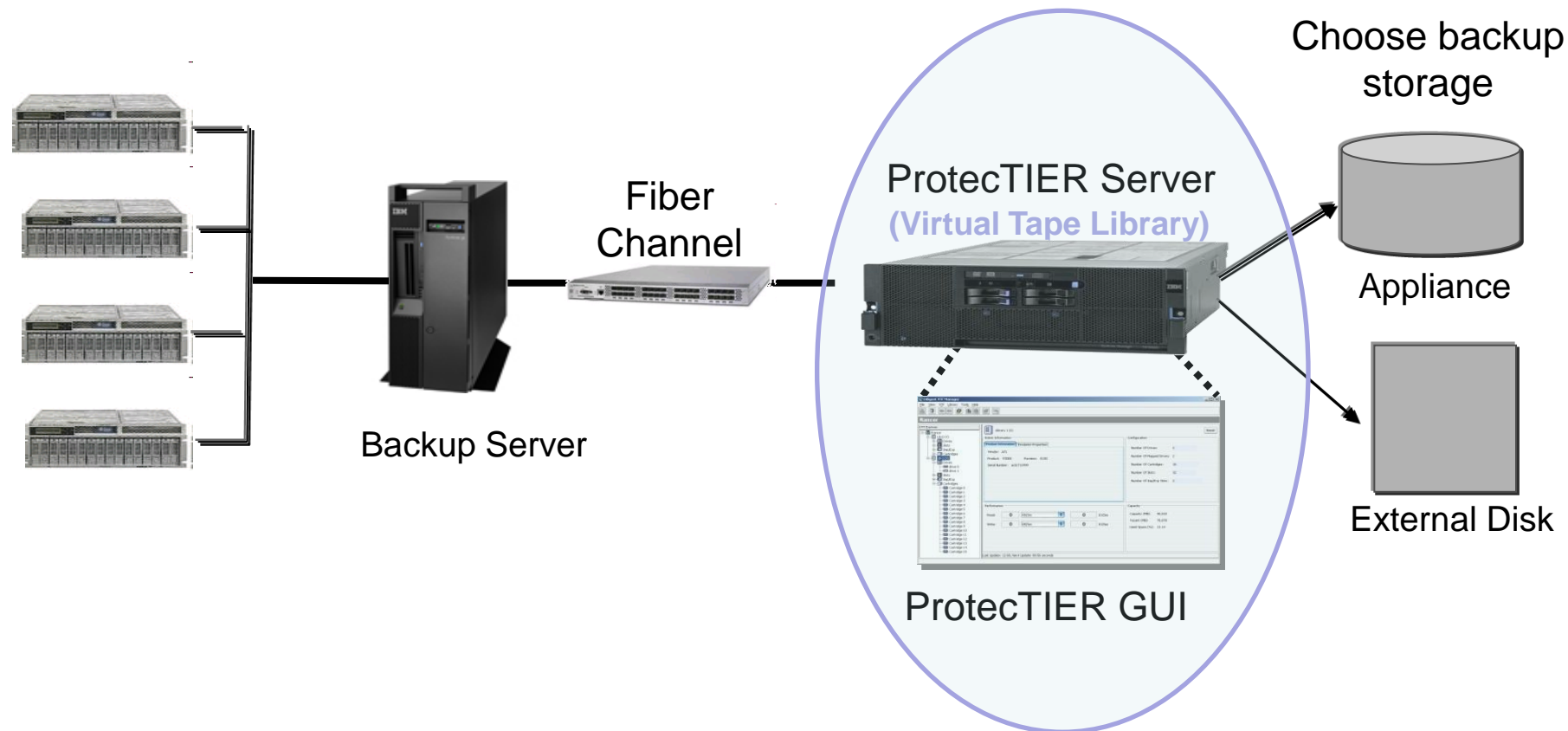
Total storage = Backup size X number of backups



150TB per Month!

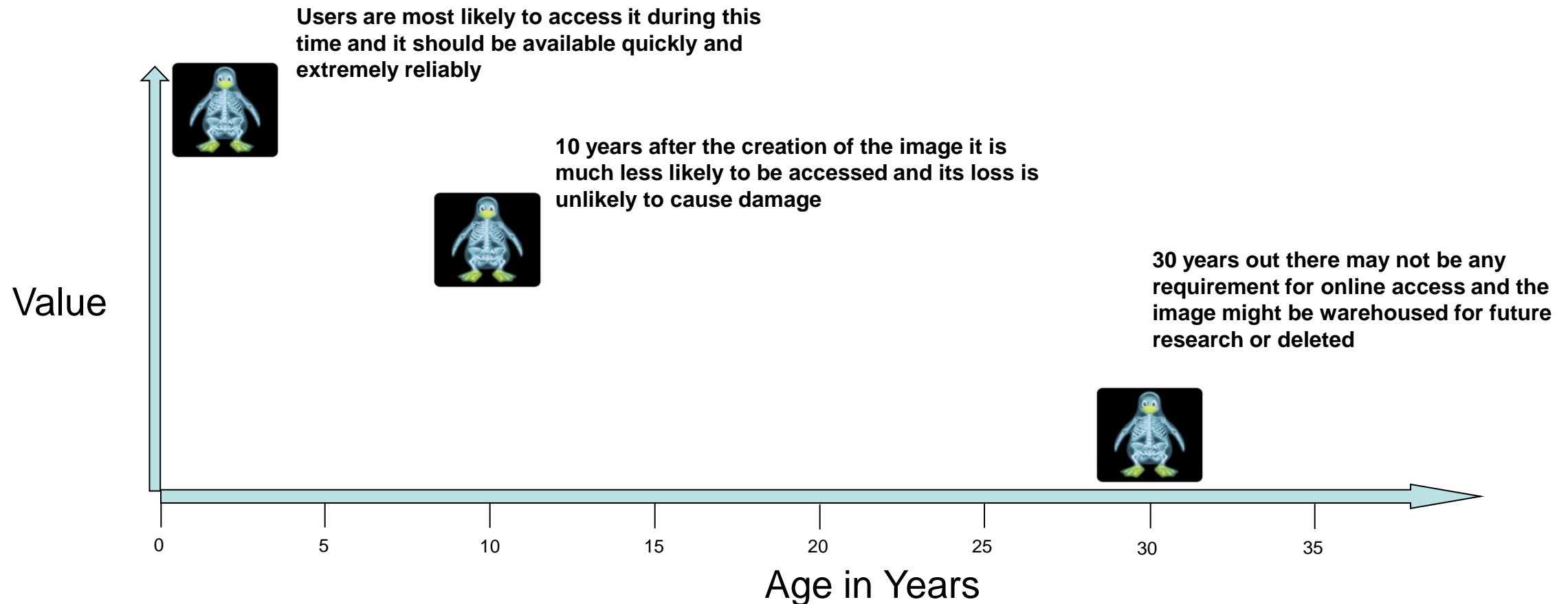
ProtecTIER Integrates Easily Into Existing Environments

- Appears on the SAN as a tape library
- Removes duplicate data from each dataset sent to device
- Stores data on internal disk or optional external storage
 - ▶ Quickly writes physical tape media when required



Not All Data Has The Same Value And It Changes Over Time – But Must Be Protected

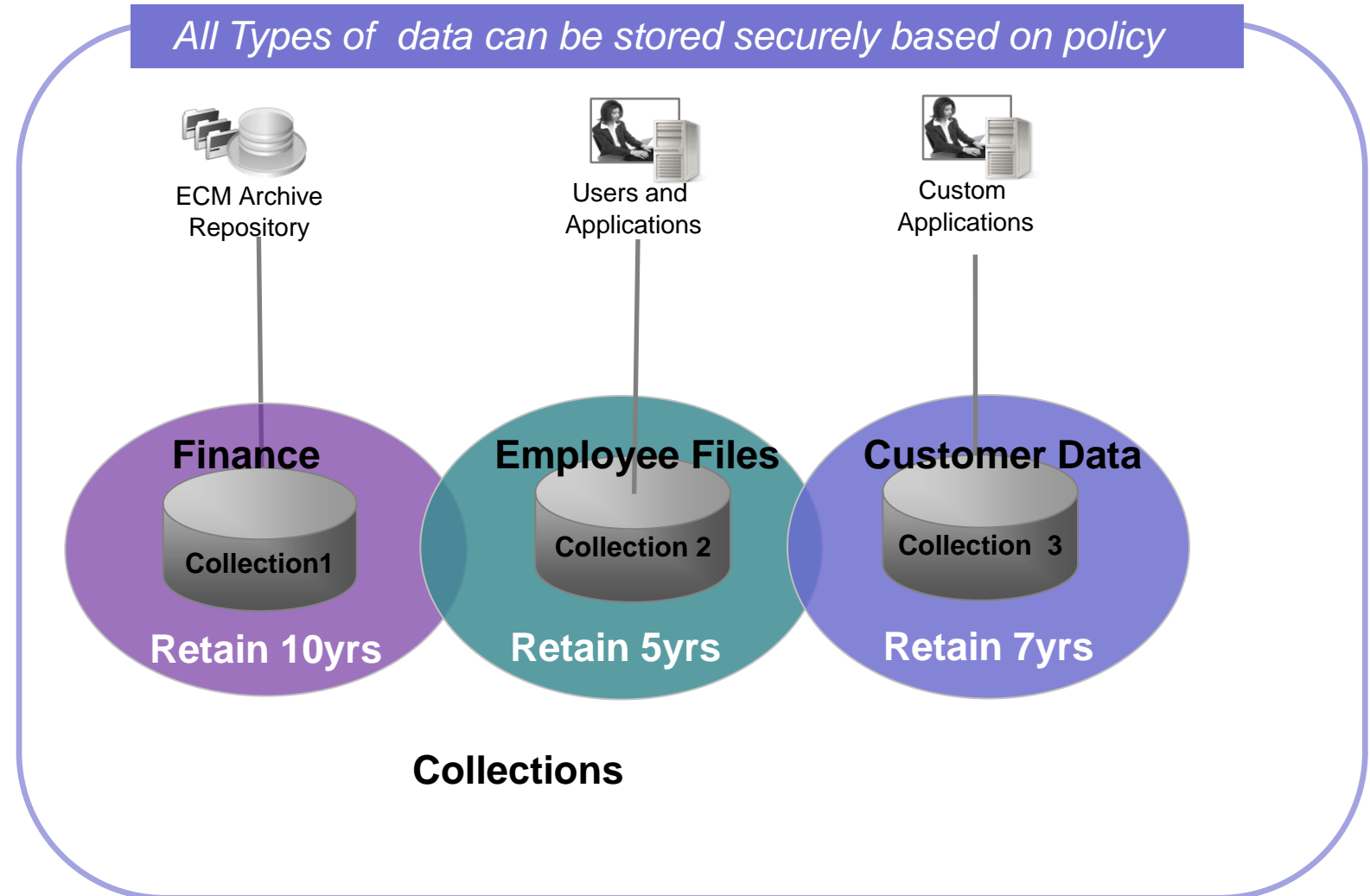
- Information changes in business value and in service level requirements over time
- For example, a medical image file is most valued in the first few months after its creation
- Information must be managed throughout its entire lifespan ... *data outlives media*



IBM Information Archive Organizes Data Into Collections To Protect Data Based On Policies

IBM Information Archive provides data protection and retention based on “collections” .

- A collection is a container of archived documents with the same security level and access method
- Customize collections by value of the information, department, degree of protection, etc.





October 2011 Storage Announcements

Storwize V7000 Significant Milestones in it's First Year

- Over **4,500** systems purchased world-wide since Nov 2010 GA
 - Over **10,000** total enclosures deployed WW
 - Over **100 PB** of capacity
- Over **2,500** happy customers world-wide
 - Presence in every major country and industry
 - Delivering five nines data availability
 - Over 1,000 net new storage customers
- One of the fastest product deployments in IBM storage history



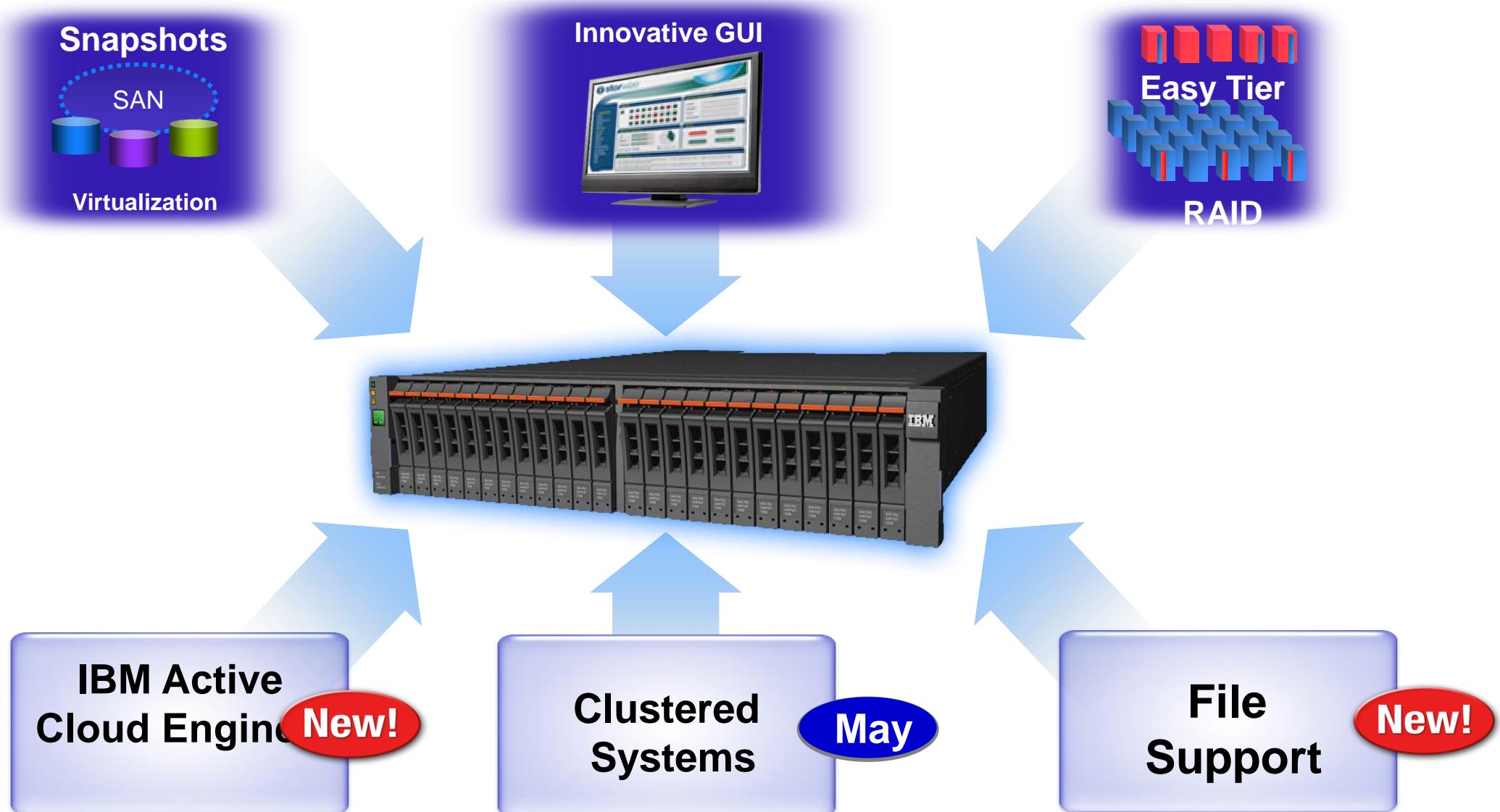
Customer References



One Year Later: Technology Integration Continues

Storwize V7000 Delivers Unified Storage

Leveraging the best of IBM storage technologies in a midrange disk system



October 2011 Storwize V7000 Enhancements

■ New Storwize V7000 Unified

- ▶ Unified block and file (SAN and NAS) storage
- ▶ Upgradable from existing Storwize V7000 systems
- ▶ IBM Active Cloud Engine policy-based management

■ Greater flexibility for block data remote mirror

- ▶ Replicate between Storwize V7000 and almost any storage systems

■ Additional drive options

- ▶ 200GB and 400GB SFF SSDs
 - More SSD options at lower cost
- ▶ 3TB 7.2K RPM LFF HDD
 - 50% greater maximum system capacity

■ Enhanced Tivoli Storage FlashCopy Manager support

- ▶ VMware vSphere 4 and vSphere 5
- ▶ DB2, Oracle, and SAP on HP-UX

■ Announce October 12; GA November 18 (November 30 for Storwize V7000 Unified)

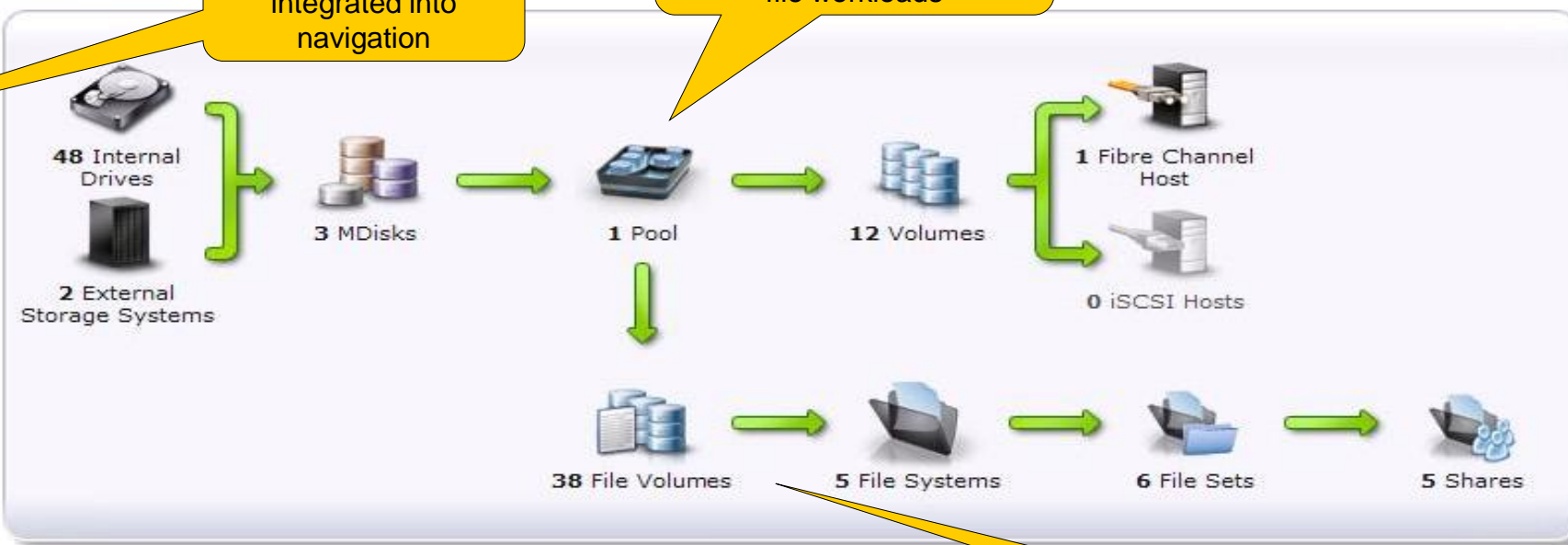


Storwize V7000 Unified User Interface

IBM Storwize V7000 Unified Welcome, admin (8 users online) [Legal](#) | [Logout](#) | [Help](#) 

kq458vb.ibm > Home > Overview ▾

Suggested Tasks ▾



48 Internal Drives
2 External Storage Systems

3 MDisks

1 Pool

12 Volumes

1 Fibre Channel Host
0 iSCSI Hosts

38 File Volumes

5 File Systems

6 File Sets


5 Shares

File management integrated into navigation

Storage pools may be shared between block and file workloads

File storage management completely integrated

Overview

 [Watch e-Learning: Overview](#)

Welcome!

The diagram represents all of the objects that need to be configured. To learn more about each object, click the icon in the diagram. For some objects, e-Learning modules include a tutorial of the steps that are required to complete the task. To configure these objects, either select the associated task from Suggested Tasks or use the icons in the left navigation.

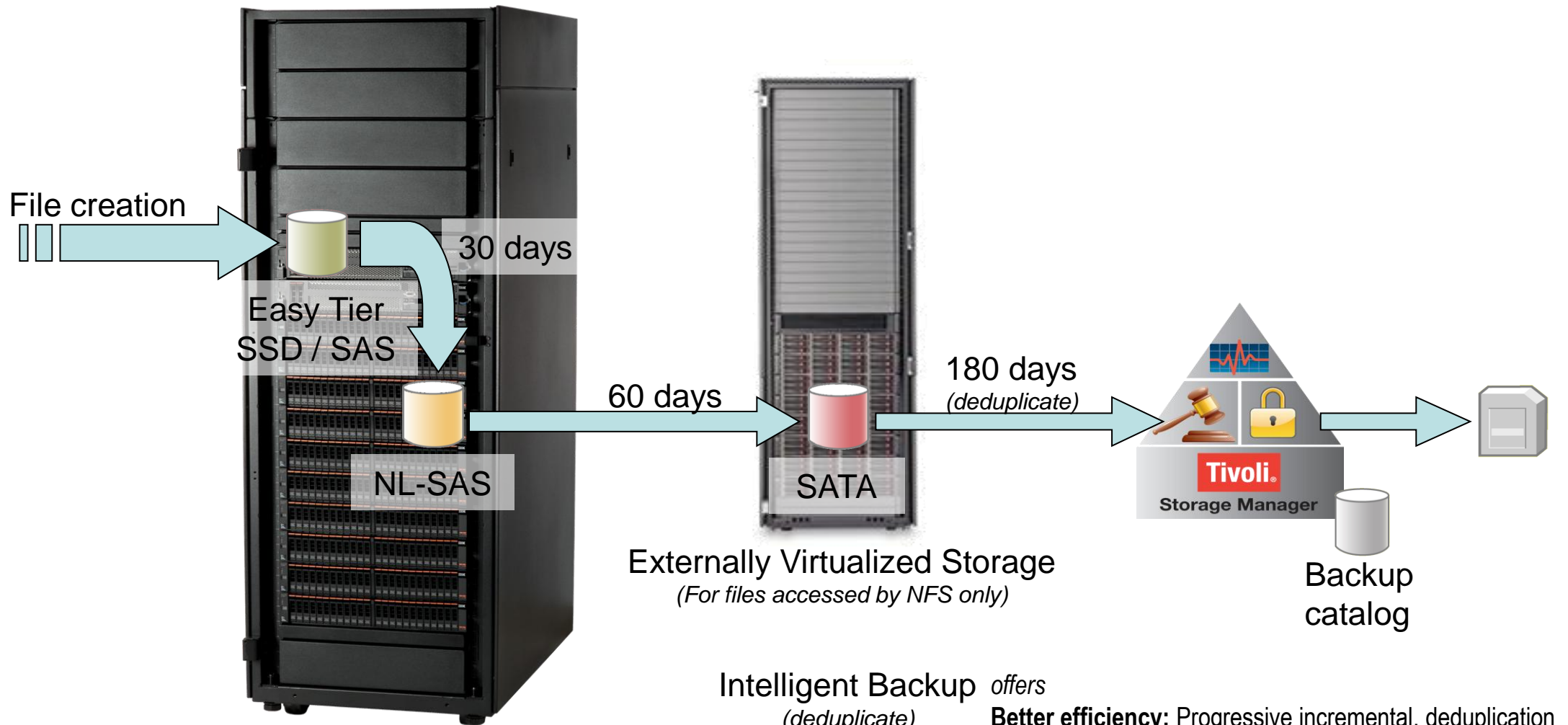
▶ [Visit the Information Center](#)

What's Different About Storwize V7000 Unified?

- ***Based on highly successful Storwize V7000 block storage system***
- Fully integrated user interface for block and file data simplifies management
 - ▶ Not a “unified” launcher for two different interfaces
- Simple USB key based initial setup: extends successful Storwize V7000 approach
- IBM Active Cloud Engine™ technology delivers automated storage efficiency capabilities
 - ▶ True policy-based management of files
 - ▶ With user-defined policies!
- Built-in IBM Tivoli Storage Manager client simplifies backup to TSM server
 - ▶ System also supports NDMP for third-party backup clients



File Example Using Active Cloud Engine



Better efficiency: Progressive incremental, deduplication
Tighter control: File-level policy control
Faster recovery: Backup catalog vs NDMP

Define Active Cloud Engine ILM Policies in the GUI

New File System

Single File System Pool Migration - ILM Custom

Name and File System Pool

Migration Policy

Enable file migration

Migration Thresholds:

Start threshold: 95 %

Stop threshold: 85 %

Migration Start Time:

As soon as threshold is reached

Specify: HH:MM

Exclusion list (files not to migrate)

File Attribute	Operator	Value		
Size	<	11 MB	+	-
Last accessed	<	2 Days	+	-

OK Cancel

This dialog is modeled on the Storwize V7000 volume creation dialog

When to run this policy

Which files do *not* get migrated under this policy

The Enterprise DS8800 Solution For The Ultimate In Smarter Storage

- Enterprise class reliability and efficiency
- Uses the same GUI as XIV, Storwize V7000 and SVC
- IBM's 4th generation storage system built on Power Systems technology
- Easy Tier at no charge
 - ▶ Effectively optimize performance and capacity management
- I/O Priority Manager feature
 - ▶ Improve application service levels



One system to manage your diverse enterprise workloads

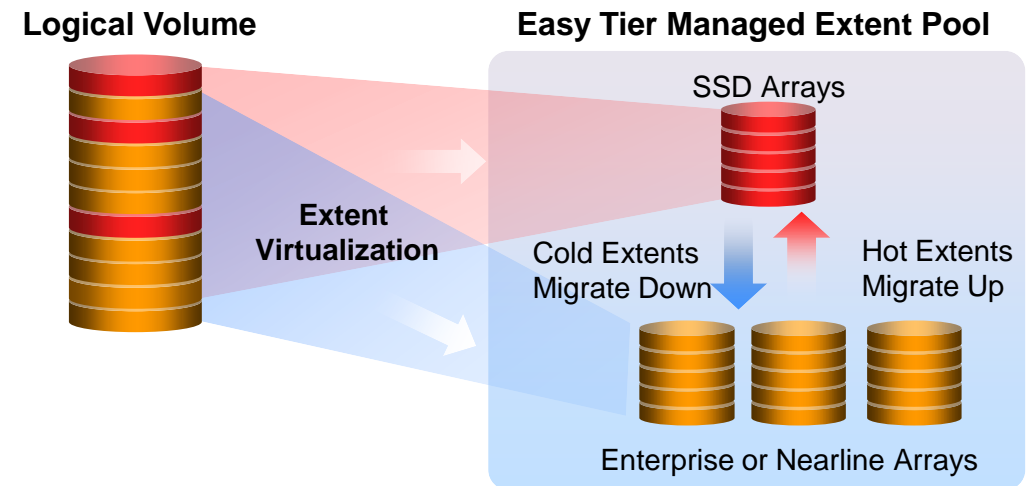
DS8000 R6.2 enables clients to efficiently manage *more* storage for *more* types of applications with *less* effort and *less* cost

■ *What's new...*

- ▶ **Easy Tier** automatically balances data across 3 tiers so there is no tradeoff between cost and performance
- ▶ **Enhanced QoS management** for z/OS workloads in addition to distributed platforms
- ▶ **Higher scalability** supports up to 45% more drives in only 33% more floor space
- ▶ **Large capacity 3 TB drives** almost quadruples overall capacity and supports data with moderate or varying performance requirements
- ▶ **System z functional synergy** simplifies volume management, increases performance for DB2 workloads and improves our HA solution

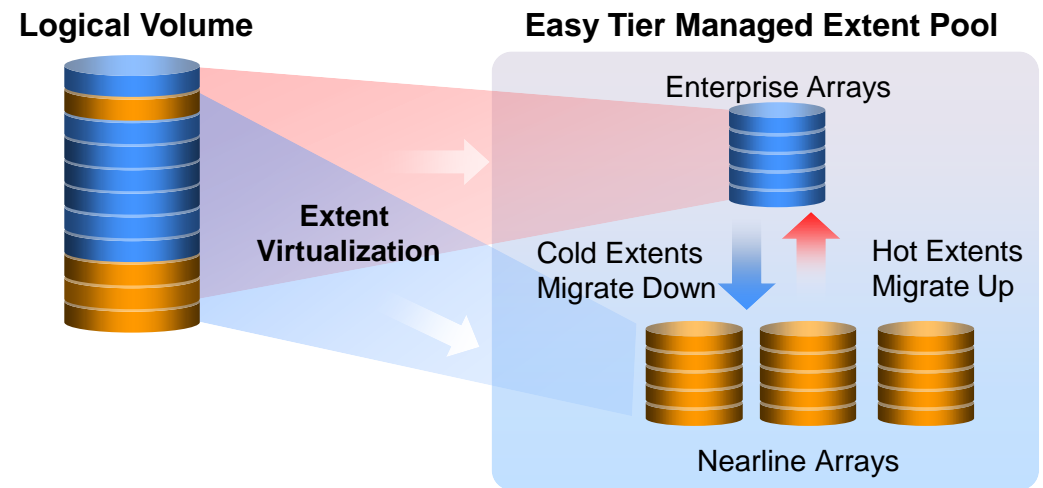
Easy Tier 1st generation benefits

- Relocating just 5-10% of the data from HDDs to SSDs, reduced average I/O response time from 9ms to 2ms!



Easy Tier 2nd generation benefits

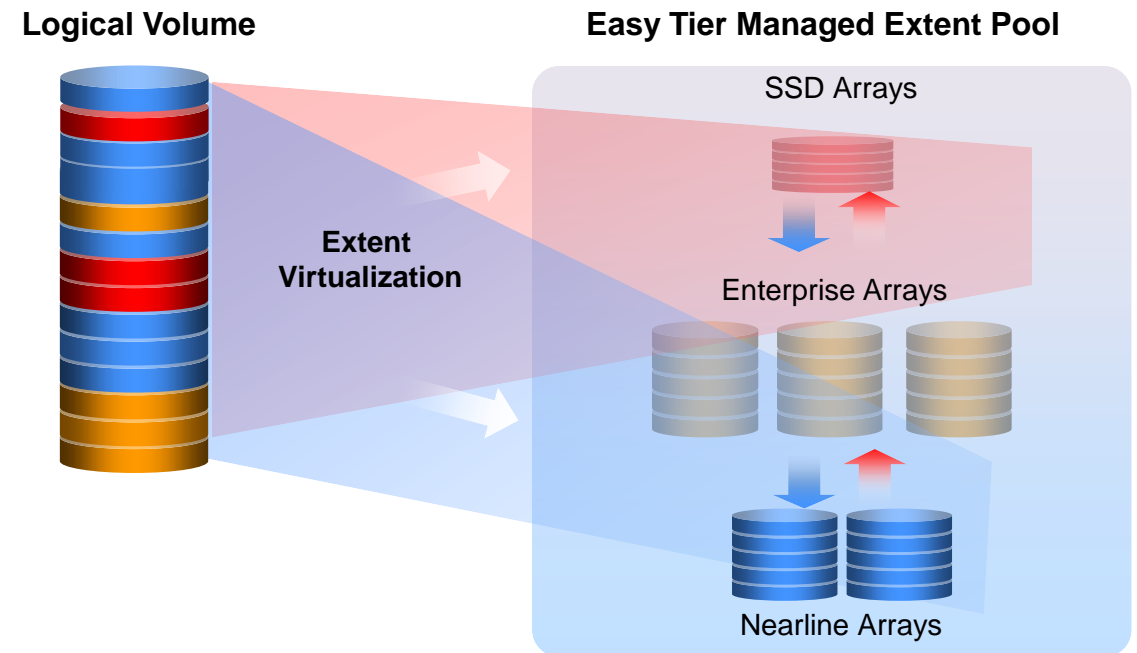
- “Any two tier” offered support for combining enterprise class and SATA class to maintain performance with lower cost/GB as data grows



Putting it all together with Release 6.2 for DS8000 systems

Combining the benefits across tiers and within a tier

- **New** full 3-tier support combines the benefits
 - ▶ Faster performance when and where it's needed with SSDs
 - ▶ Cost savings (reduced footprint and cost/GB) for cold data
- **Plus**, we're enhancing auto rebalancing to support homogeneous (single-tier) pools
 - ▶ Now supports both mixed-tier pools and single-tier pools
- **Plus**, Easy Tier now supports thin provisioned volumes



Additional DS8800 expansion frame

Higher scalability to support more applications and more data

- Additional expansion frame for DS8800 model
 - ▶ Increases drive count by 45%
 - ▶ New frame can hold up to 512 small form factor (2.5") and 256 large form factor drives
 - ▶ Total drive count is now 1,536 with SFF drives and 768 LFF nearline drives
 - ▶ Maximum physical capacity is over 2.3 PB with 3TB nearline drives



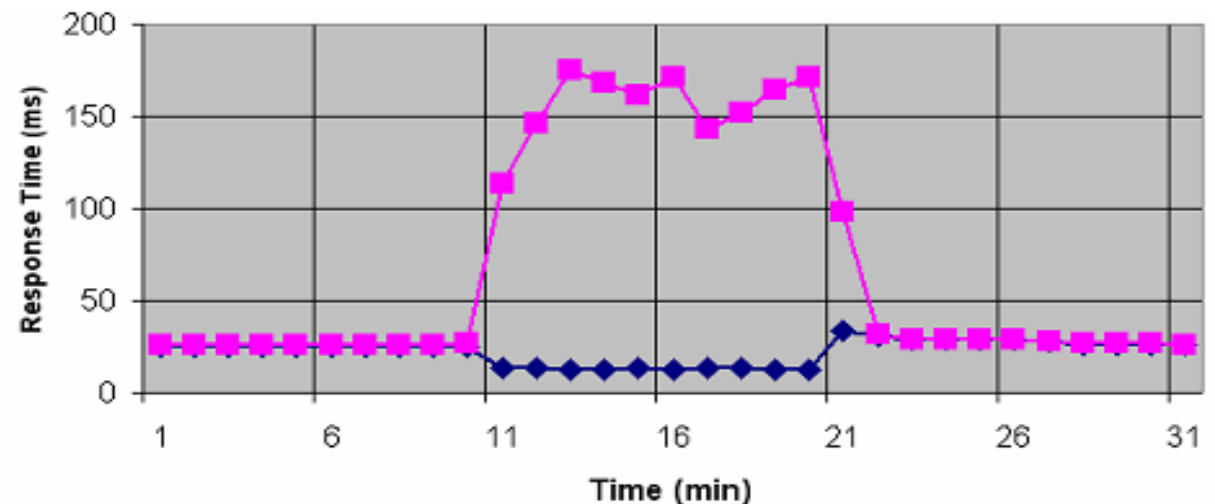
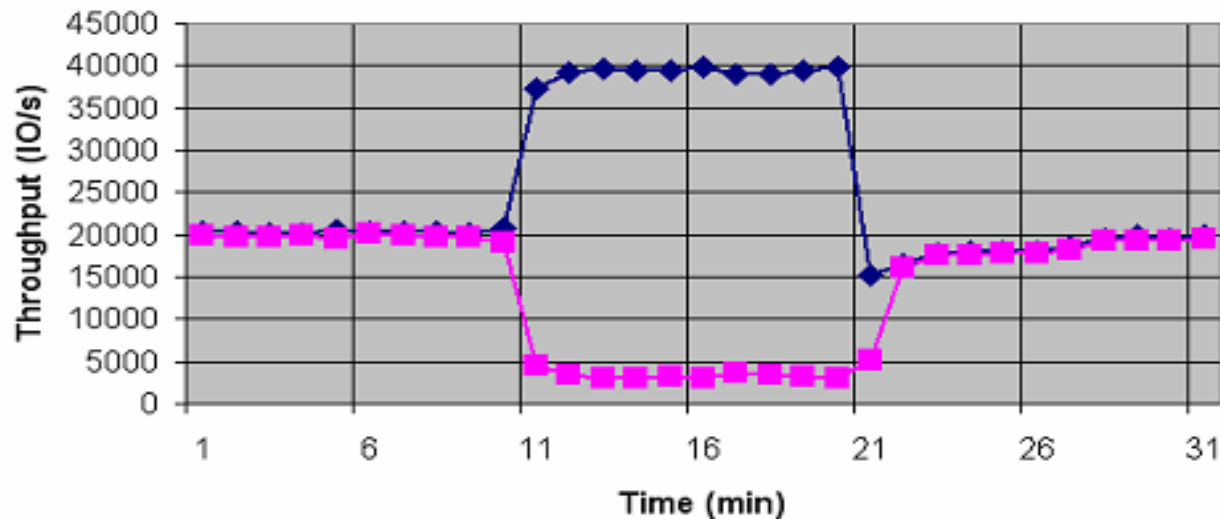
Can reduce operating costs by enabling administrators to manage more data and applications in a smaller footprint with a single, highly-scalable, tiered system

I/O Priority Manager update (QoS Manager)

Automated quality of service management delivers performance when and where it's needed and enables greater storage efficiency and consolidation

Database workload

—◆— favored - PG3 —■— non-favored - PG7



User interface enhancements

IBM System Storage DS

Welcome, admin Help Logout

Overview

Drives → Extent Pools → FB Volumes → Volume Groups → Hosts

CKD LCUs and Volumes

Overview (Version 5.6.1.1375)
Watch e-Learning: [Overview](#)

The diagram above represents all of the objects that need to be configured. To learn more about each object, click the icon in the diagram. For some objects, e-Learning modules include a tutorial of the steps that are required to complete the task. To configure these objects, use the icons in the left navigation.

Before you begin storage configuration, please

Initial Setup Tasks

- * **Activate your licenses**
Go to [System Status](#) and select Apply Activation Codes in the action menu.
- * **Create users and groups**
Go to [Users](#) to set access.
- * **Set up LDAP authentication**
Go to [Remote Authentication](#) to set the authentication policy for LDAP user

Icon View
Legacy View

Parallel volume create/delete

- Can request multi-volumes in create request from CLI or GUI
- All volumes on each LSS in requested range are processed in *single* request
- Up to 5x performance improvement with new function

GUI support for Resource Groups function introduced in R6.1

- Can now configure resource groups from GUI
- Can associate volumes/LSS with resource groups
- Can assign user resource scope (URS) to user IDs

GUI can launch directly from browser

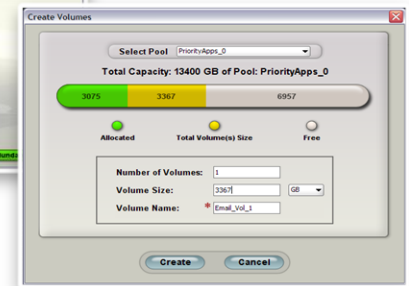
- No longer need to login to TPC to use DS-GUI

CIM enhancements for Microsoft VMM

- CIM upgrades to comply with Microsoft's Virtual Machine Manager (VMM) in Microsoft Hyper-V

XIV Is A Radical New Approach To Storage Simplicity

- Built from off-the-shelf components
 - ▶ Latest technology, low costs
- Grid-based storage
 - ▶ Automatic distribution of data across all disks
 - ▶ No hot-spots on disks or modules
 - ▶ Even, predictable performance
 - ▶ Automatic redistribution after failures or capacity increases
- Simple administration
- Perfect for cloud storage



Kicking Off a Second Century of IBM Storage Innovation



Gen3 – Evolution of the Revolution



Gen2 Profile

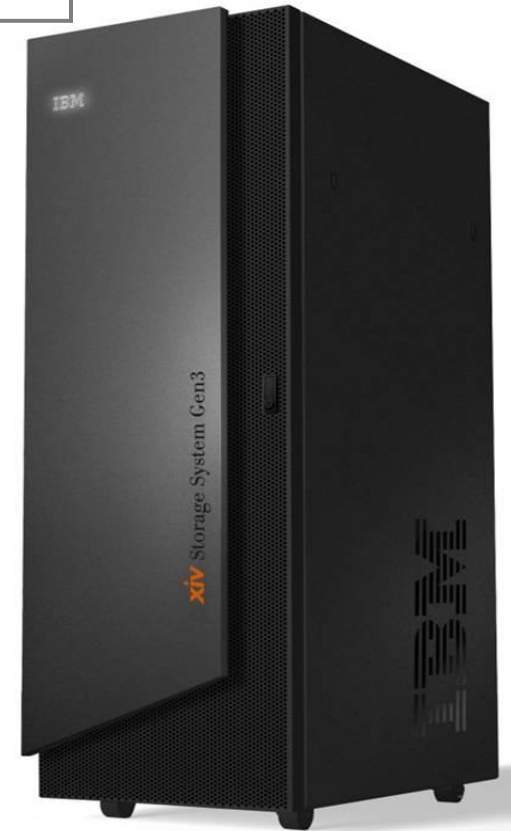
- High performance
- Lower cost/TB
- Lower entry point
 - 27 TB usable

Gen3 Profile

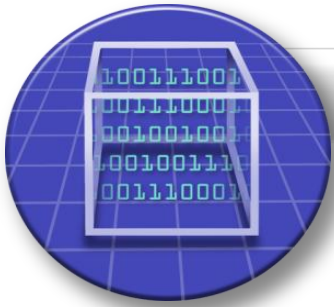
- Ultra-High Performance
 - Up to 4X increase
 - SSD cache upgradeable
- Higher entry point capacity
 - 55 TB usable
- 20% less power consumption
- 20% less heat output
- 33% less noise reduction

Both deliver...

- 60% lower TCO than competition
- Broad workload affinity
- Radical Simplicity
- Fully autonomic data placement, self-healing
- Advanced features out-of-the-box



Strategies And Best Practices For Smarter Computing With Storage



Store More with What's On the Floor

- Virtualization
- Thin Provisioning
- Data Compression



Move Data to the Right Place

- Data Migration
- Automated Storage Tiers (HSM)
- Optimize Performance (Easy Tier)



Reduce The Cost Of Protecting Your Data

- Shorten Your Backup Window
- Archive Data

Gracias