

Pulse

Comes to You



IBM

Managing the World's Infrastructure

Transforming Information Infrastructure for a Smarter Planet

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The Information Challenge

Enterprise data is exploding (57%CGR), businesses are under pressure to cost efficiently store, protect and manage it

*Cost Efficiencies
Globalization
Risk & Compliance
Mergers & Acquisitions*

- Many industries require data to be retained more than 50 years
- 80% of this data is now unstructured email, images, videos, documents
- Disruptions from downtime can cost up to 16% of a firm's total revenue

*Volume Explosion
Unstructured Data
Multiple Versions
Inaccessible, Untimely*

Data Volume

By 2010, the codified information base of the world is expected to double every 11 hours. Data is exploding, & its nature is changing to machine-generated – sensors, RFID, meters, GPS systems & more

Data Variety

With the expansion of information comes large variances in the complexion of the available data – 80% of data is now unstructured, contributed largely by documents, images and video



Data Risk

With more than 30 new compliance regulations worldwide, the amount of data that is subject to regulation is growing at 37% per year. More than 60% of IT executives now rate compliance with regulations a top challenge

Data Retention

Many industries require certain data to be stored for more than 50 years. But on average 37% of a firm's data is inactive or expired. Storing and archiving this data unnecessarily increases business risk, energy consumption and IT costs

IBM Information Infrastructure Solutions

Innovative, Integrated, Available Today

IBM and its business partners bring an innovative approach to enable clients to **manage information more effectively and mitigate information risks with a dynamic infrastructure** that efficiently and securely stores, protects and optimizes access to information

Our clients can protect, manage and gain insight from their information with our leading-edge storage and data management products, services and integrated solutions supported by world-class expertise and proven experience

Information Compliance



Mitigate information risks

Information Availability



Deliver continuous access to information

Information Retention



Support information retention policies

Information Security



Securely share information

What is IBM Information Infrastructure?

The Power of Integrated Solutions and Industry Expertise

IBM brings together a breadth of Information Infrastructure capability to address our client's information management needs, providing a foundation for firms of any size to **efficiently and effectively manage information** so they can unlock its business value, create new insights and confidently take action



Storage and Servers



Software



Services

- Efficiently store, archive and protect information
- Make information accessible and available to the business where and when its needed
- Support business compliance, energy policies and audit requirements

Information Infrastructures Must...

Reduce reputation risks



**Information
Compliance**

Deliver continuous information access



**Information
Availability**

Support information retention policies



**Information
Retention**

Enable secure sharing of information



**Information
Security**

What Differentiates IBM Information Infrastructure Solutions?

Security and Data Services

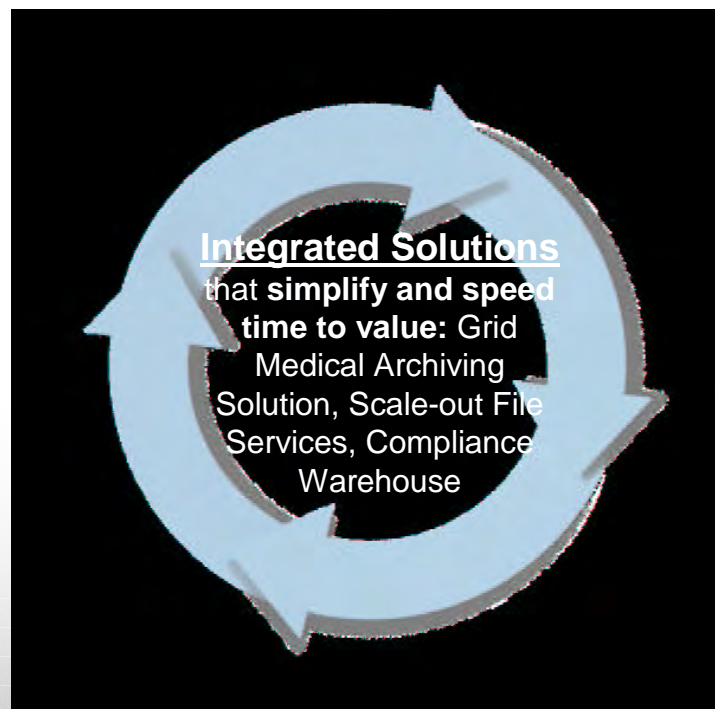
Enhanced Fidelis Security appliances prevent network data loss or leakage with **inspection speeds up to 4x faster than competition**

XIV Storage Systems

Next-gen disk storage simplifies capacity deployment, supports infinite snapshots and **reduces power, space and cooling costs up to 80%**

SVC Storage Virtualization

Virtualize storage across multi-vendor systems, **increase utilization by more than 30% and save up to 50%** in administration and management costs



DS8000 Enterprise Disk

First in market encrypted disk storage simplifies data security and now includes **solid state drives** and more than **1 Petabyte of capacity** per disk system

Tivoli Storage Management

Tivoli's storage suite includes capabilities such as **near instant recovery of Microsoft applications, onboard data deduplication** and integrated DB2 databases

ProtecTIER Appliances

Innovative data deduplication appliances can **reduce 25TB of data into 1TB of storage capacity, 9x faster** than other solutions in the market

IBM Information Infrastructure: Enterprise Disk Storage

For clients requiring:

- One solution for mainframe and distributed platforms
- Disaster Recovery
 - Across 3 sites
 - Across 2 sites > 60 miles apart
- Secure encryption

DS8000

- Supports mainframe and distributed platforms
- Global Mirroring
- RAID 6*
- Encryption*
- Optimized for Capacity > 50TB

For clients requiring:

- Distributed environment support
- Save power, cooling and space
- Future-proof capacity expansion
- Optimized capacity utilization
- OLTP and Databases (Oracle, etc.)
- Proven in Financial markets
- Exchange and Web 2.0 workloads
- Rapid storage provisioning

XIV

- Supports distributed platforms
- Simple management
- Virtually unlimited no overhead snapshots
- Thin provisioning
- Rapid capacity roll-out
- Optimized for capacity > 50TB

For clients requiring:

- IBM i support
- Distributed environment support with a focus on tier 2 cost-efficiency
- Optimized for Oracle and DB2 environments

DS5000*

- Supports IBM i and distributed platforms
- Oracle, DB2 environments
- Cost efficient storage for capacity < 50TBs

For clients requiring:

- Virtualization of multi-vendor storage infrastructure silos

SVC

- Virtualizes multiple vendor environments, including IBM, EMC, HP and others

For clients requiring:

- Support for mid-range mainframe platforms

DS6000

For clients requiring:

- Support for intensive computational applications
- High performance computing

DCS9900*

For clients requiring:

- NAS or File Storage support

N series

Scale Out File Storage (SOFS)

*Note: Products and capabilities described include current and future roadmap enhancements thru 1Q09

IBM XIV Storage: Hardware: 15 and 6 module systems



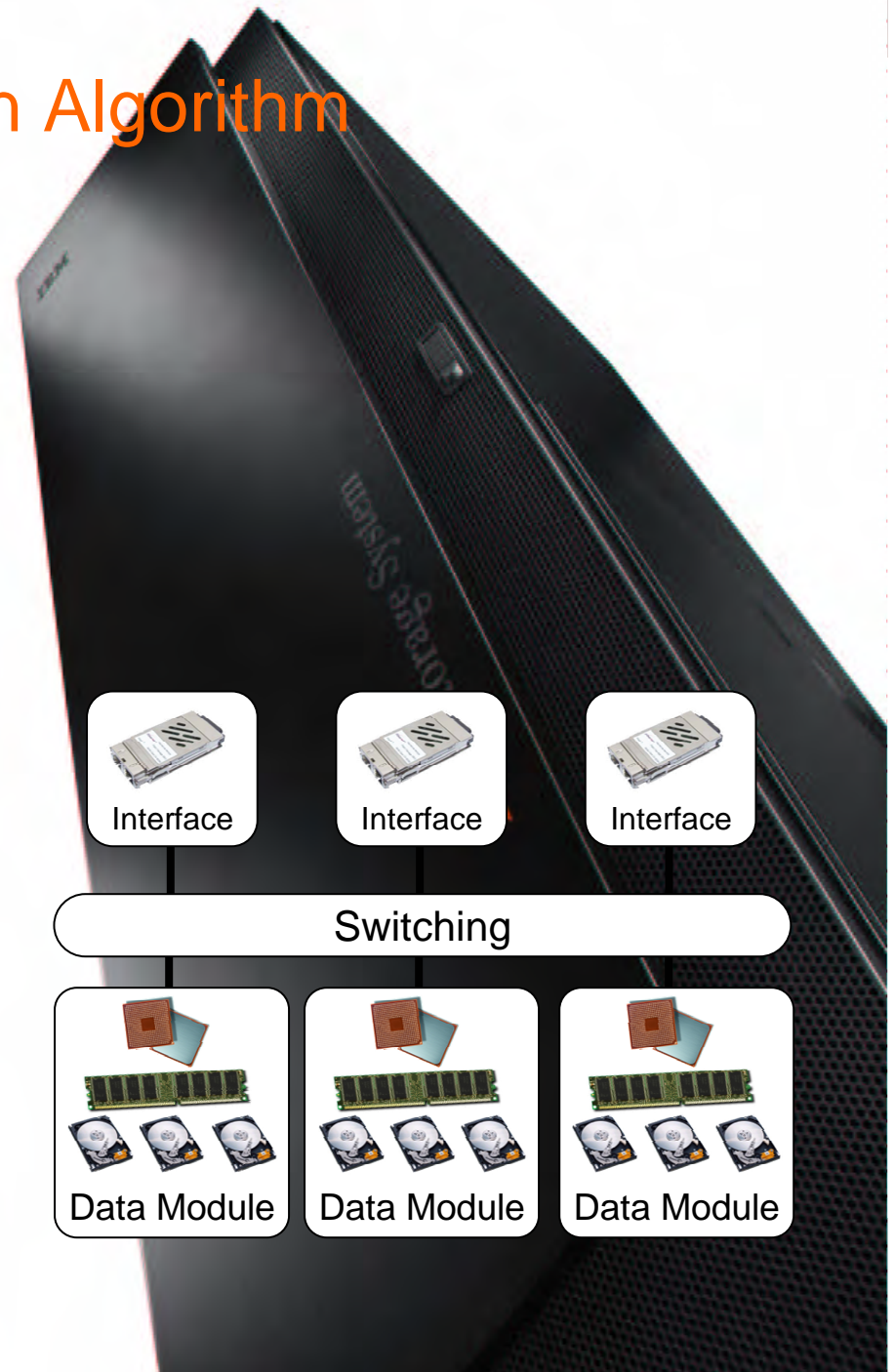
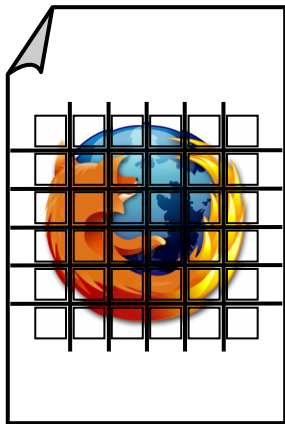
- 15 modules:
 - 12 disk drives in each module
 - 120GB of memory (15 * 8)
 - 6 of the modules with interface and data functionality
 - FC ports (4 per module)
 - 1 gig iSCSI networks (2 per module)
- 24 FC ports (4GB) and 6 external iSCSI ports
- 180TB raw in a single rack (1 TB Disks)
- 79TB useable space



- 6 modules:
 - 12 disk drives in each module
 - 48GB of memory (6 * 8)
 - 2 of the modules with interface and data functionality
 - FC ports (4 per module)
 - 1 gig iSCSI networks (2 per module)
- 8 FC ports (4GB)
- 72TB raw in a single rack (1 TB Disks)
- 27TB useable space
- Expansion ready

IBM XIV Storage Distribution Algorithm

- Each volume is spread across all drives
- Data is “cut” into 1MB “partitions” and stored on the disks
- XIV algorithm automatically distributes partitions across all disks in the system pseudo-randomly

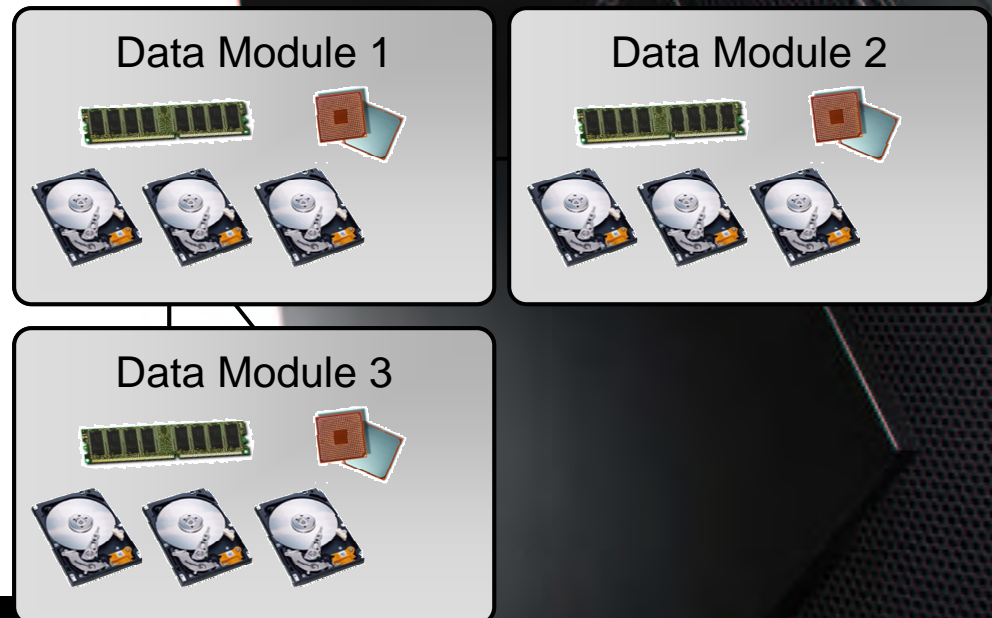
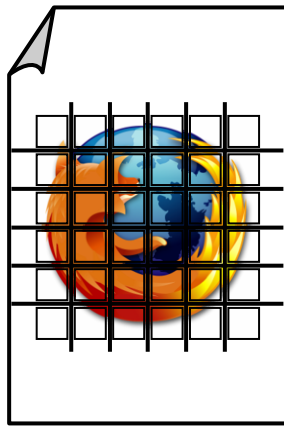


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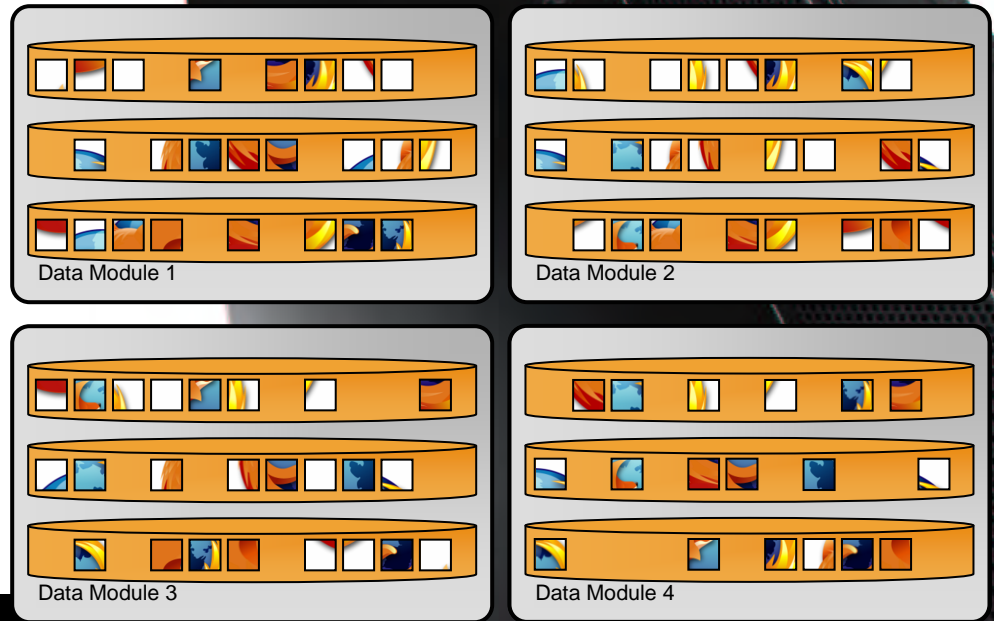
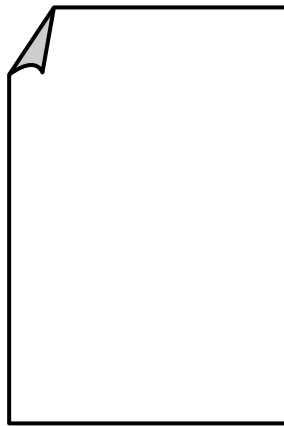
XIV Distribution Algorithm on System Changes

- Data distribution only changes when the system changes
 - Equilibrium is kept when new hardware is added
 - Equilibrium is kept when old hardware is removed
 - Equilibrium is kept after a hardware failure



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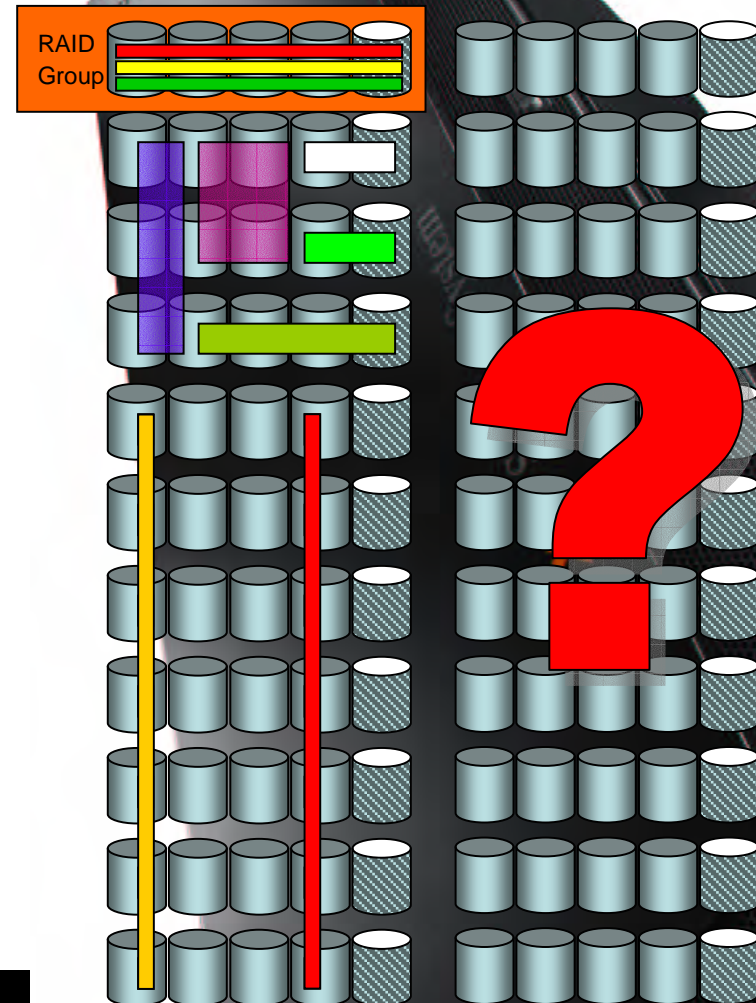


[hardware upgrade]

Traditional LUN Allocation ...

- is hardware bound
 - to specific disks
 - or RAID sets
- makes it difficult to leverage expansion
- can result in inefficiency
- makes performance tuning necessary & difficult
- can result in poor system utilization
 - performance
 - capacity

must be manually managed & tuned at all times



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Automatic Healing

- Nextra mirrors 1MB chunks throughout the grid
 - No drive-based RAID
- Every drive in the grid regenerates a fraction of the missing mirrors
 - Minutes, not hours or days
 - The larger the grid, the shorter the process
- No “temporary” state
- No human element
- Contributes to scheduled hardware maintenance program

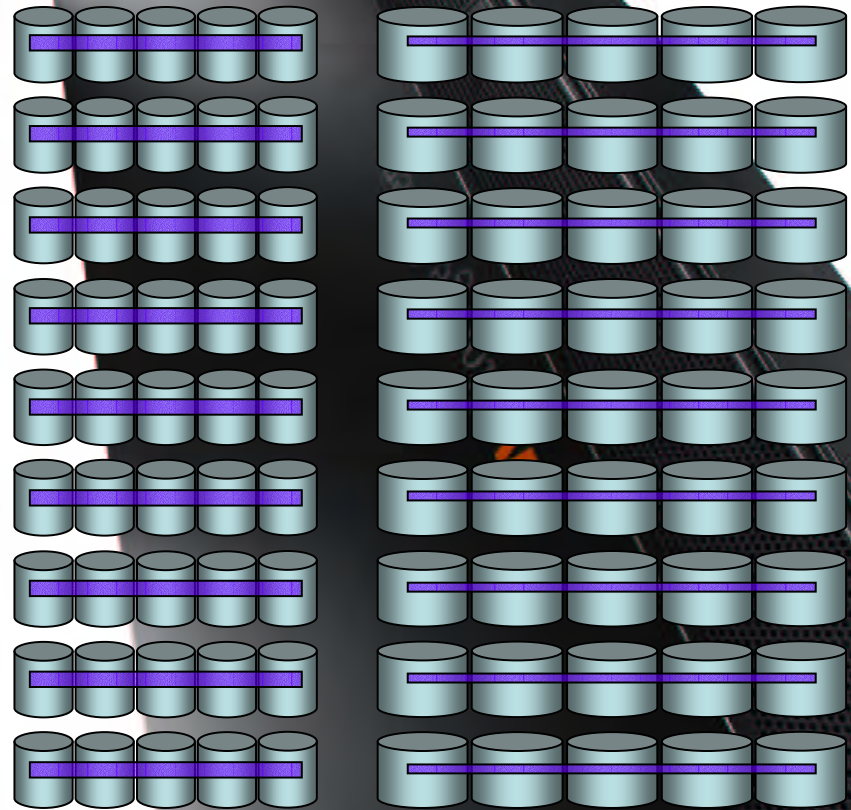


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Replacing Outdated Hardware

- New hardware can be added to the system
 - Better performance, less power, more density
- Data can be migrated seamlessly
- Outdated hardware can be phased out and removed
- All system components are replaced, with:
 - No down time
 - No host configuration
 - No administration effort



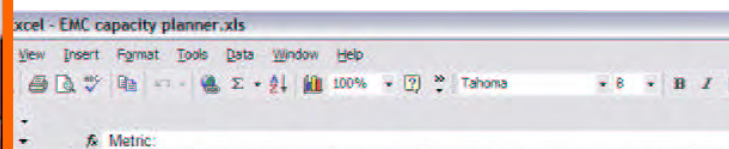
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Capacity planning and chargeback simplified...

Host Storage Report

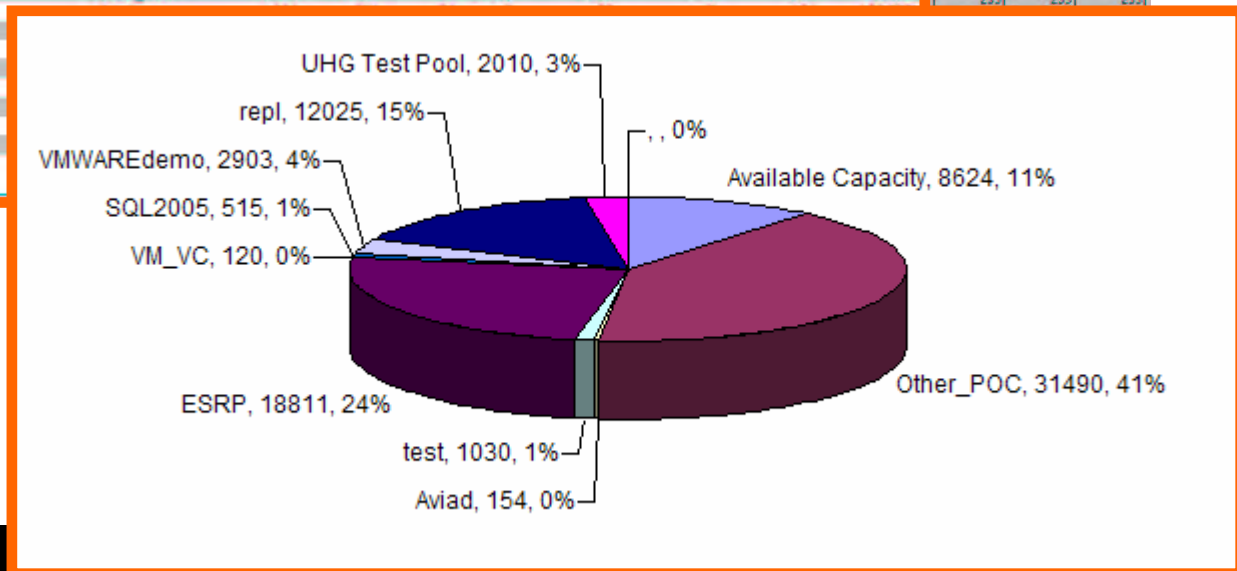
Host Name	Volume Name	Volume Type	Allocated	Usage	Free	Free %
HOST_143						
HOST_142						
HOST_148						
HOST_140						
HOST_146						
HOST_144						
HOST_145						
VMWARE_Cluster						
HOST_147						
HOST_141						
HOST_CONTROL_168						
HOST_CONTROL_169						
new_178						



Storage Pool Report

Pool Name	Total Size (GB)	Used Size (GB)	Available Space (GB)	Capacity %	Used by VMware (GB)	Used by Other (GB)	Allocated Capacity (GB)	% Allocated
System Capacity	7970	1970						
Available Capacity	8624	5620						
Other_POC	31490	31490	34	27539	3436	0	3951	12.56%

	% reads	% writes	% sequential io
	34	11	1
	46	21	2
	61	30	4
	79	54	8
	89	66	12
	61	39	5
	14	14	4
	253	253	253



Sophisticated EMC capacity tool

Customer spent 5 days a month doing department charge backs XIV listened...
New XIV process 10 Minutes!

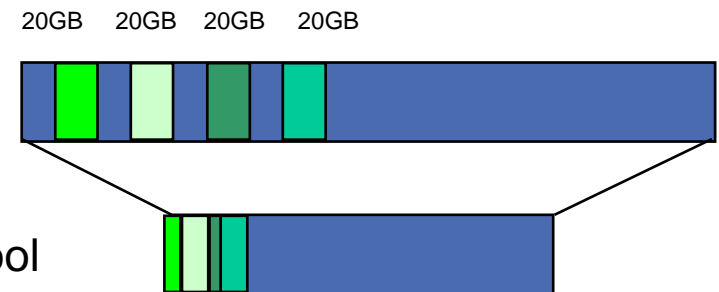
IBM XIV Storage - Data Migration and Tech Refreshes

- Automatic data migration
 - XIV is placed between the Servers and the legacy storage array
 - Migrating thick volumes to thin provisioned volumes
 - Online data migration from other Storage arrays
 - Fallback to donor supported
- New hardware can be added to the system
 - Better performance, less power, more density
- Outdated hardware can be phased out and removed
- All system components are replaced, with:
 - No down time
 - No host configuration
 - No administration effort
- Traditional migration options also supported



Thin Provisioning implementation

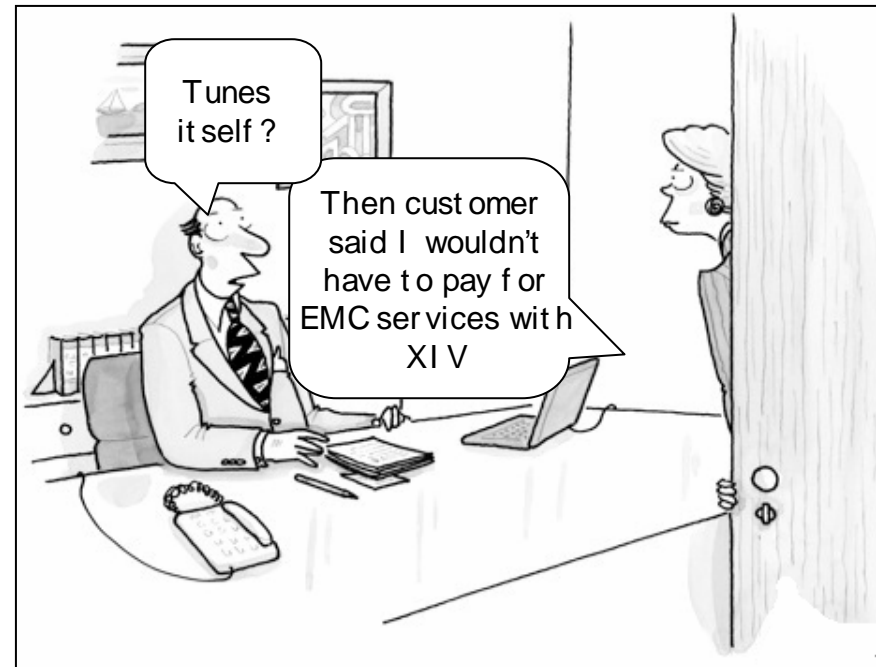
- Thin Provisioned Storage Pools
 - **Soft Size** – limit of total volume size for the pool
 - **Hard Size** – limit of the physical storage available to volumes
 - Snapshot / Clones not included in the Soft size
 - Each Pool is independent
- Thin Provisioned Volumes
 - **Soft size** – volume size seen by the host
 - **Hard size** – actual data written
 - Allocations come from the associated Storage Pool
- Per storage pool basis (full or thin)



Radical Simplification of Storage Management

- “Drag and click” management
- No learning curve
- Java-based GUI with script generator
- No dedicated management station
- Complete event logging

Actual EMC Sales meeting



Customer paid EMC for tuning and than was getting poor response time

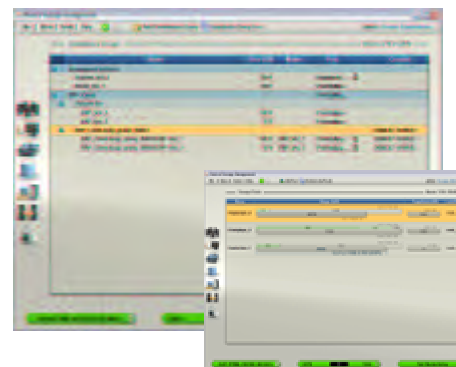
In demonstrating the ease of provisioning, we asked the President to come up and provision the box, he got up and a matter of a few clicks did just that.



XIV GUI – An Industry Breakthrough



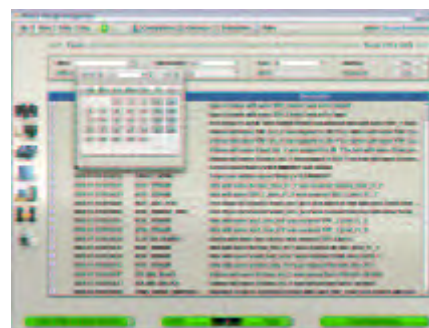
“Actually used” capacity always known



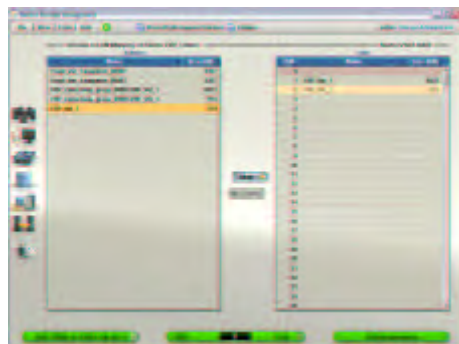
Easy to manage consistency groups and storage pools



Add and resize volumes in seconds



At your fingertips events log



Volume to LUN Mapping



At a glance monitoring

Stretch the Terabyte to the max - summary

50 to 70% lower total cost of storage (no added charge for XIV software features – mirroring, snapshot, data migration, management)



Lower Capital Cost

80 TB useable on one floor tile



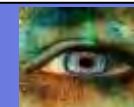
Space

Trained in a hour



Easy

Take advantage of Moore's Law



Future Shop

XIV uses 4 to 9 times less power for the same (or better for same capacity) performance and reliability levels



Energy

10-20% of traditional systems space is orphaned and will never be reclaimed. With XIV space is never lost



Waste

Using differential backups yields 15-30% saving in infrastructure cost



Backups

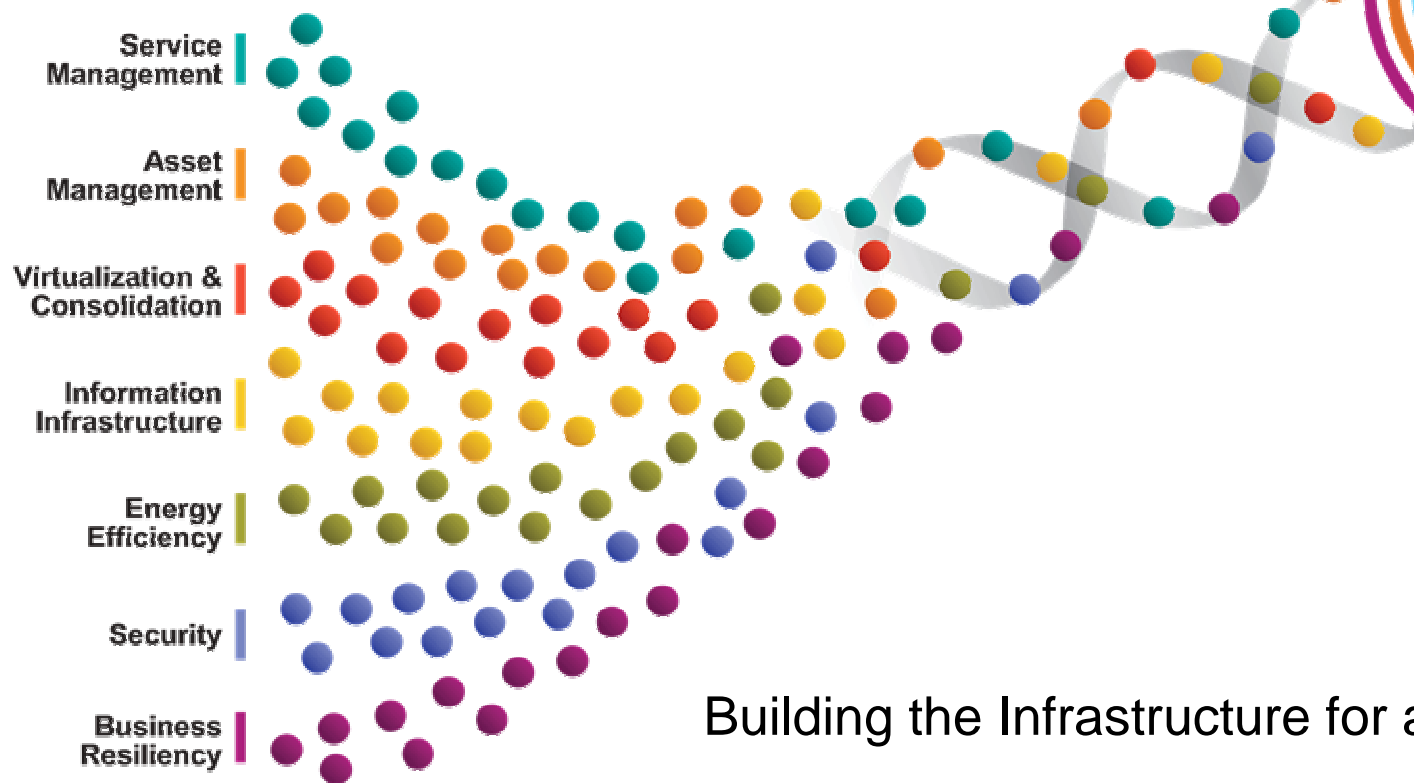
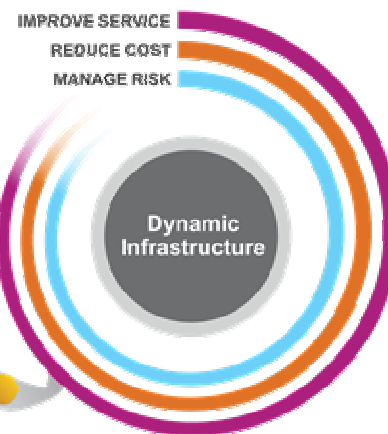
Thin provisioning yields 20-50% saving in infrastructure cost over a period of time



Stretch Your TB

Leverage IBM Information Infrastructure

To Create the Foundation for More Dynamic Infrastructure



Building the Infrastructure for a Smarter Planet

IBM Information Infrastructure

Complete, Integrated, Available Today

- Global reach
- Integrated solutions
- Breadth of capability
- Deep consulting expertise and proven best practices
- Expanded ecosystem and business partner community
- Flexible financing



“We can build an IT infrastructure with which we will be able to deliver **improved service levels, reduce business risks, and manage the information explosion** effectively.”

Joffrey Foronda, Manager for Infrastructure and Storage Management,
Philippine Airlines, Nov. 2008



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Thank You

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