

IBM Storage Solutions Efficient. Powerful. Easy.

Smarter Systems for a Smarter Planet

Introducing **IBM® Storwize® V7000**



A Smarter Planet Drives Inescapable Data Growth

IBM Smarter Planet Vision



The world is flatter and smaller. Now it's becoming smarter.



The world is generating 15 petabytes of data daily.



Information is doubling every 18 months. Storage capacity is growing 45% yr.

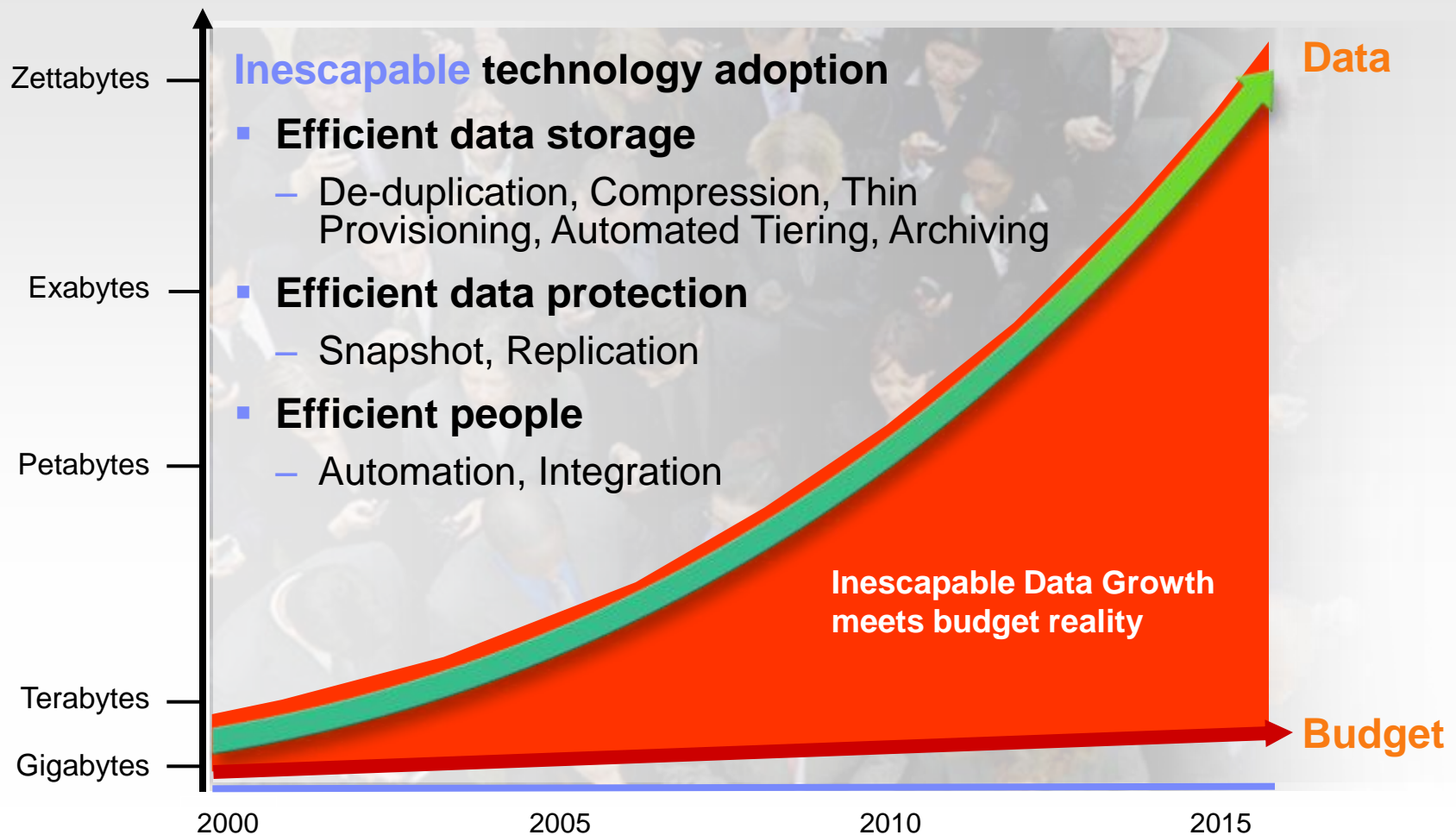


80% of new data growth is unstructured content.

How do I create an infrastructure that scales quickly and efficiently while driving down cost, protecting information, and saving on labor?

Inescapable Data Growth

Implications for IT Managers



Smart Storage Solutions ...

Scale quickly and efficiently to manage and analyze large amounts of information.

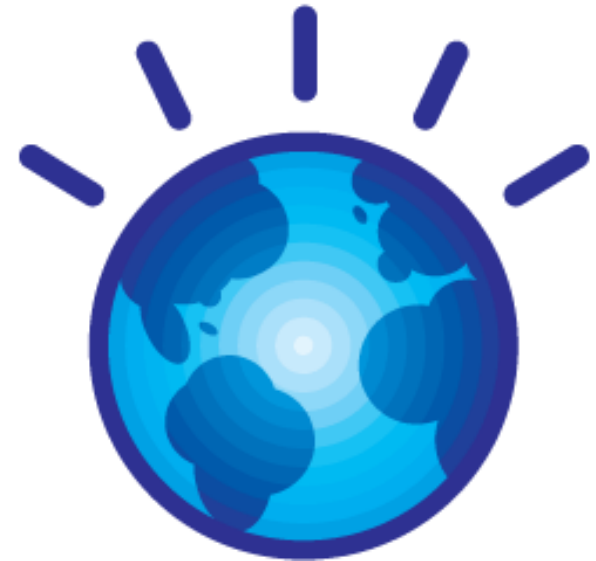
Intelligently balance performance to differing requirements across multiple workloads.

Flexibly flow resources to changing requirements and demands - flowing resources where needed instantly for high utilization and ROI.

Avoid downtime by being highly reliable, available and resilient.

Save energy by intelligently balancing performance needs with efficiency requirements.

Automate management tasks to save on labor and staffing in resource constrained environments.



Introducing the IBM Storwize V7000



- **Control enclosure:** dual controllers and up to twelve 3.5" or twenty-four 2.5" drives in just 2U
- **Eight 8Gb FC ports plus four 1Gb iSCSI ports per controller pair initially** (10Gb iSCSI and FCoE post-GA)
- **Expansion enclosure:** drives only
- **Up to nine expansion enclosures attach to one control enclosure**

Built-in Software inherited from SVC and DS8000 RAID

- **RAID 0, 1, 5, 6, 10**
- **Storage Virtualization**
(internal disks and external arrays)
- **Non-disruptive Data Migration**

Efficiency

- **Thin Provisioning**
- **Easy Tier**
(dynamic data movement across SSD/HDD)

Manageability

- **New User interface** (easy-to-use, web based)
- **Integrated SAN-wide Management**
(Tivoli Storage Productivity Center)
- **Integrated IBM server and storage mgmt**
(Systems Director Storage Control)

Replication

- **Application integrated**
(Oracle, DB2, SAP, Domino, Exchange, SQL Server)
- **Efficient use of space**
(thin provisioned, incremental, deduplicated)
- **DR automation** (failover/fail back, site switching)
- **IP or Fibre Channel**

Storwize V7000

Think BIG

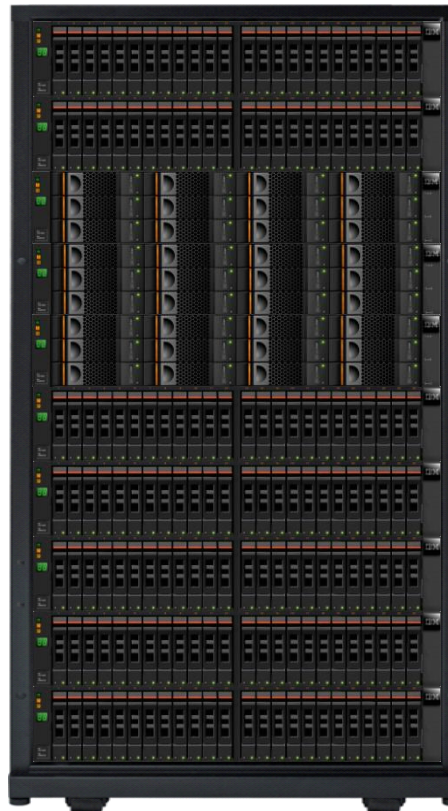
Easily add up to 9 expansion enclosures

Expand capacity up to 240TB



Start small

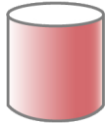
One 24-bay control enclosure



- **Intermix enclosures in the same system**
 - 12-bay and 24-bay
- **Intermix drives in the same enclosure**
 - Solid State (SSD)
 - SAS
 - Near-line SAS (NL-SAS)

Efficiency Features

Thin provisioning



Without thin provisioning, pre-allocated space is reserved whether the application uses it or not.

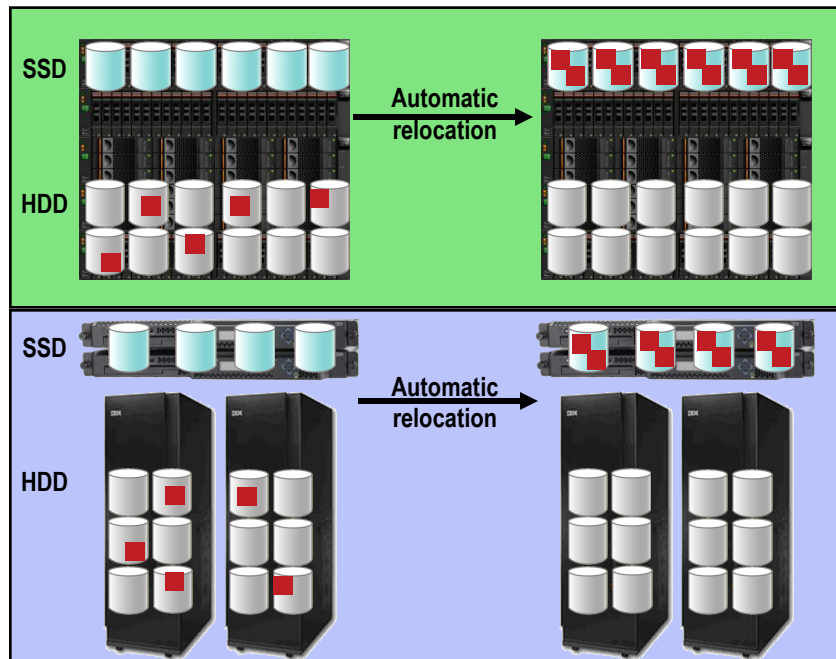


↑ Dynamic growth

With thin provisioning, applications can grow dynamically, but only consume space they are actually using.

- ✓ More productive use of available storage
- ✓ Across all supported host platforms

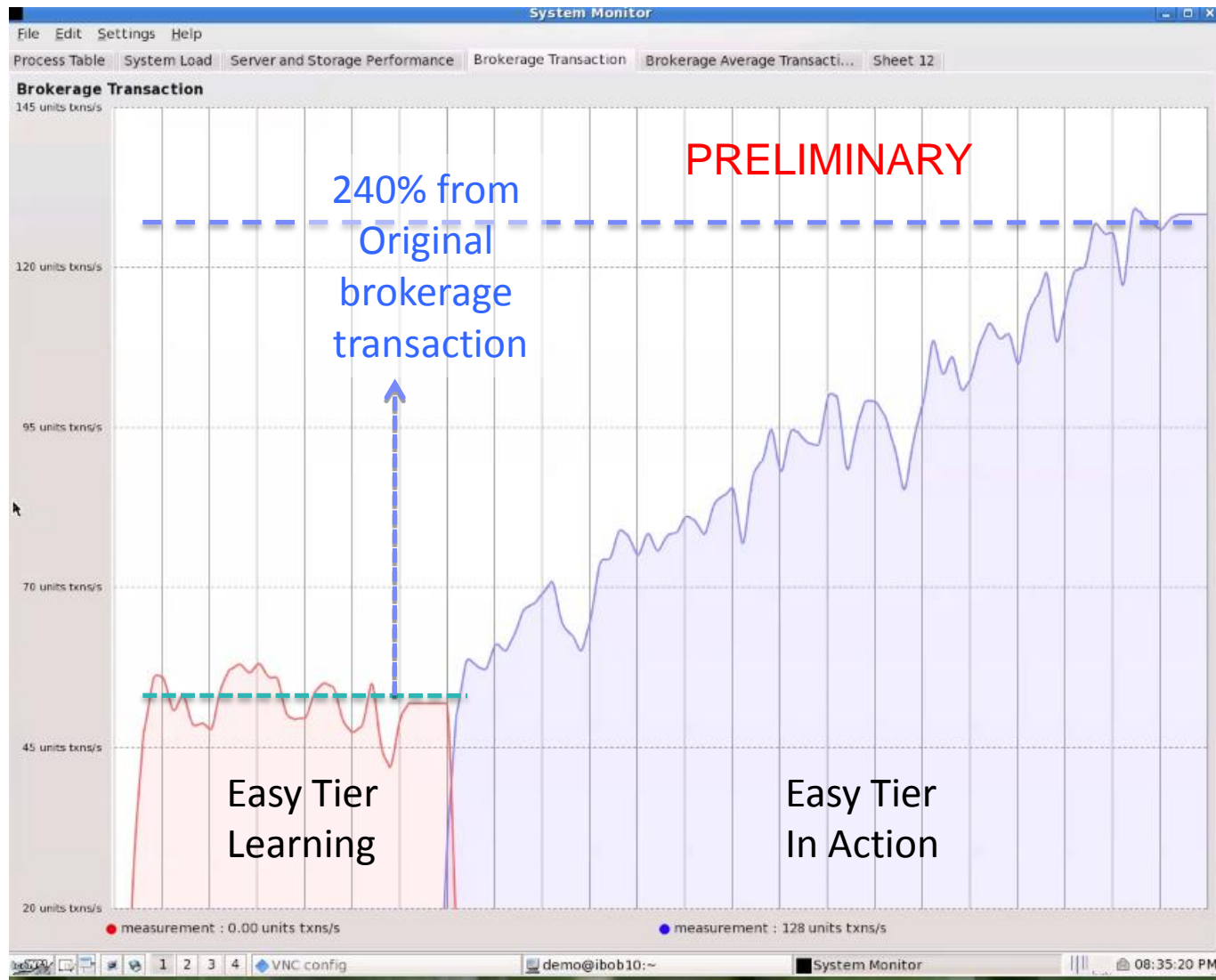
Easy Tier



- ✓ “Easy Tier” pools identify the busiest data extents and automatically relocate them to highest performing Solid-state Disks
- ✓ Remaining data extents can take advantage of higher capacity, price optimized disks

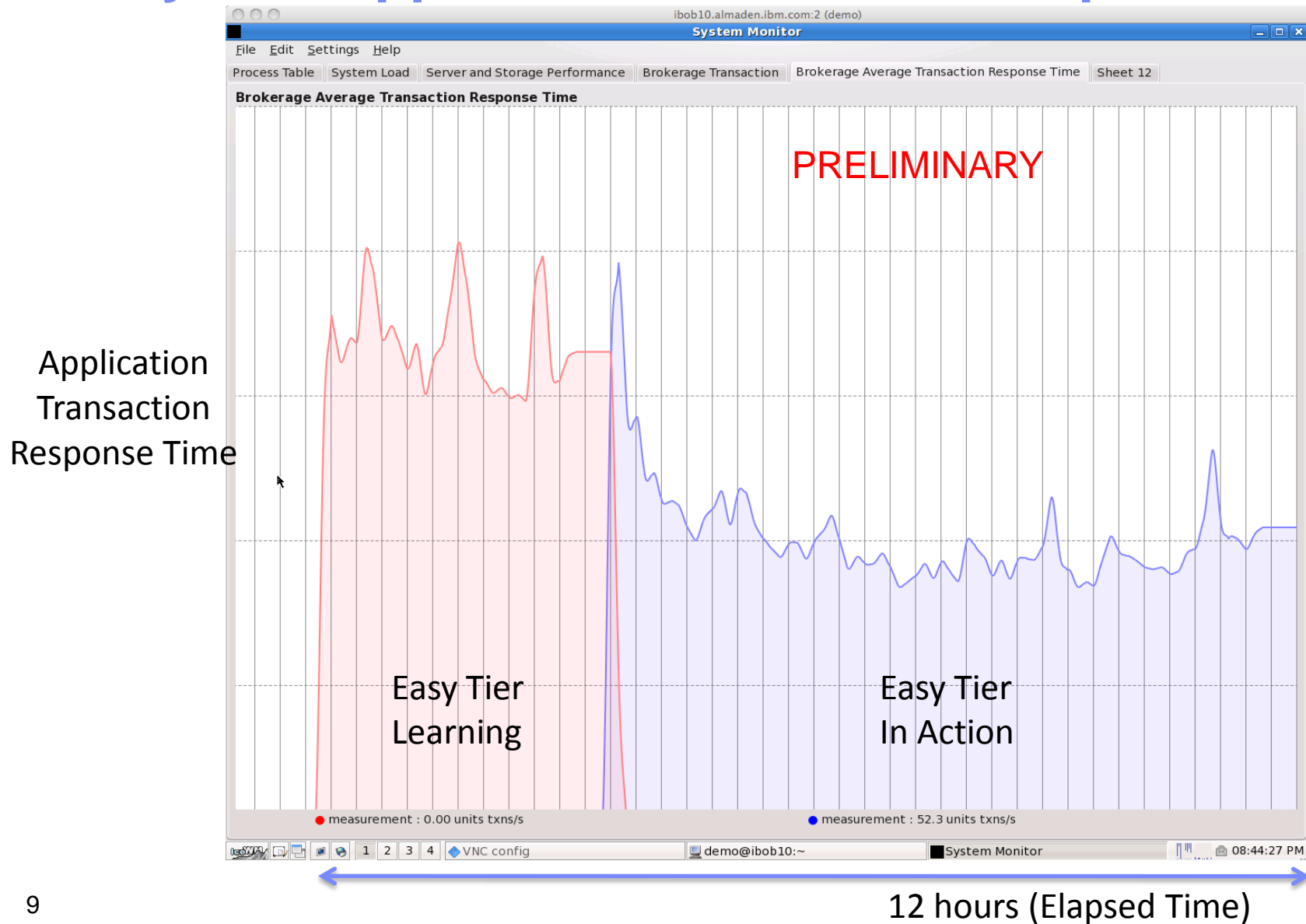
Easy Tier Application Transaction Improvement

Application
Transaction
Throughput



12 hours (Elapsed Time)

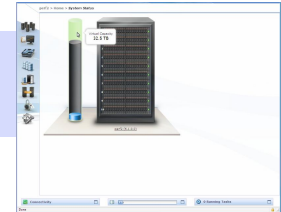
Easy Tier Application Transaction Improvement



Manageability Features Overview

■ User Interface

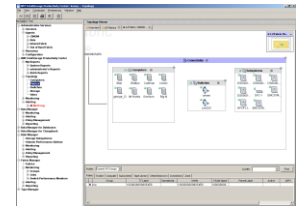
- Adopted from the easy-to-use XIV GUI
- For clients where the Storwize V7000 “is” the infrastructure



Easy-to-use management GUI

■ Enterprise Management

- Integrated management with a SAN-wide perspective
- For clients where the Storwize V7000 is connected to a SAN with other, perhaps heterogeneous storage



Tivoli Storage Productivity Center
Integrated SAN-wide management

■ Server / Storage Management

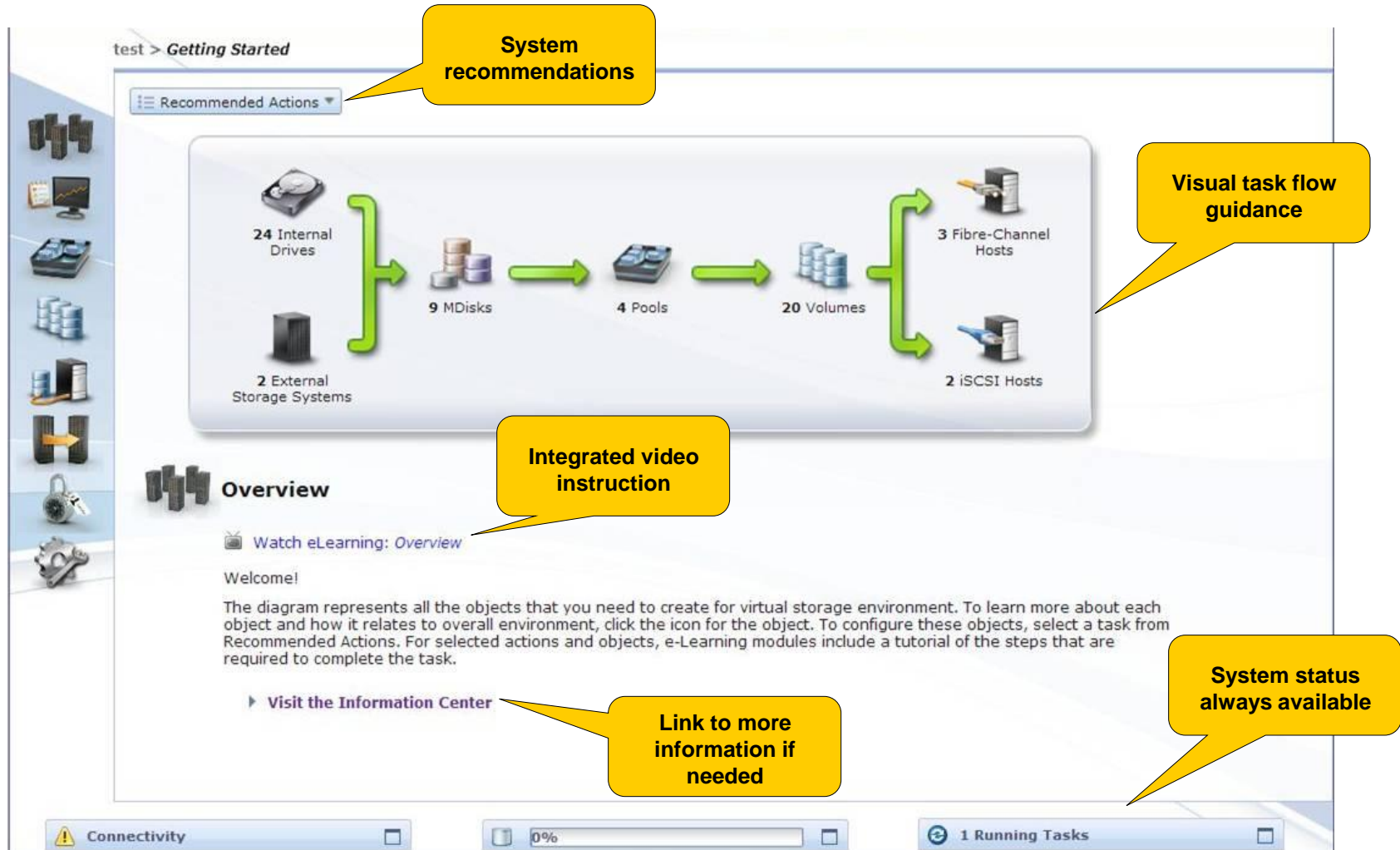
- Integrated management with a Systems and Storage perspective
- For clients with IBM servers and storage



Systems Director Storage Control
Integrated IBM server and storage mgmt

Fresh New User Interface

Based on the well-received XIV interface



perf2 > Volumes > Volumes by Pool

Pool Filter

SAS_Tier1
0 Volume copies
0 bytes Used / 11.3 TB

SAS_Tier1
Online
14 MDisks, 0 Volume copies
Easy Tier Disabled

Volume Allocation: 0 bytes / 11.3 TB Capacity
0%

New Volume

Select a Preset

Generic Thin Provision Mirror Thin Mirror

Select a Pool

Name	Status	Free Capacity	Capacity
Nearline_Tier2	Online	10.4 TB	10.4 TB
SAS_Tier1	Online	11.3 TB	11.3 TB
SSD_Tier0	Online	1.4 TB	1.4 TB
Scratch_Tier2	Online	3.0 TB	3.0 TB

Advanced... Create Create and Map to Host Cancel

Showing 0 volumes | Selecting 0 volumes

Connectivity 0% 0 Running Tasks

Read perf2

Preset provisioning templates

New Volume

Select a Preset

Generic **Thin Provision** Mirror Thin Mirror

Select a Pool

Primary Pool: Nearline_Tier2 Edit

Select Names and Sizes

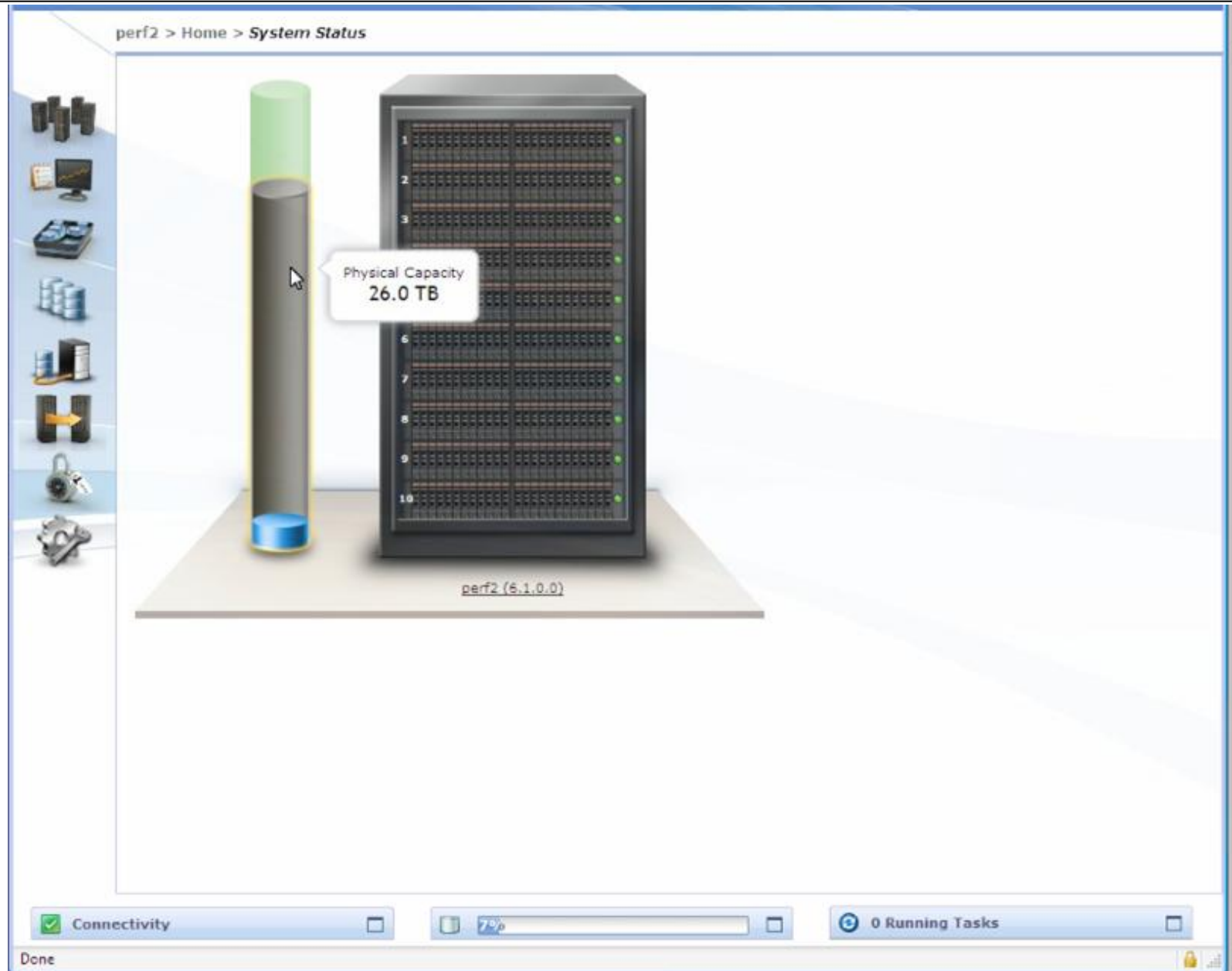
Volume Name	Size	Unit	Action
nearline_thin_2tb_01	2	TB	
nearline_thin_2tb_10	2	TB	
nearline_thin_2tb_09	2	TB	
nearline_thin_2tb_08	2	TB	
nearline_thin_2tb_07	2	TB	
nearline_thin_2tb_06	2	TB	
nearline_thin_2tb_05	2	TB	
nearline_thin_2tb_04	2	TB	
nearline_thin_2tb_03	2	TB	
nearline_thin_2tb_02	2	TB	

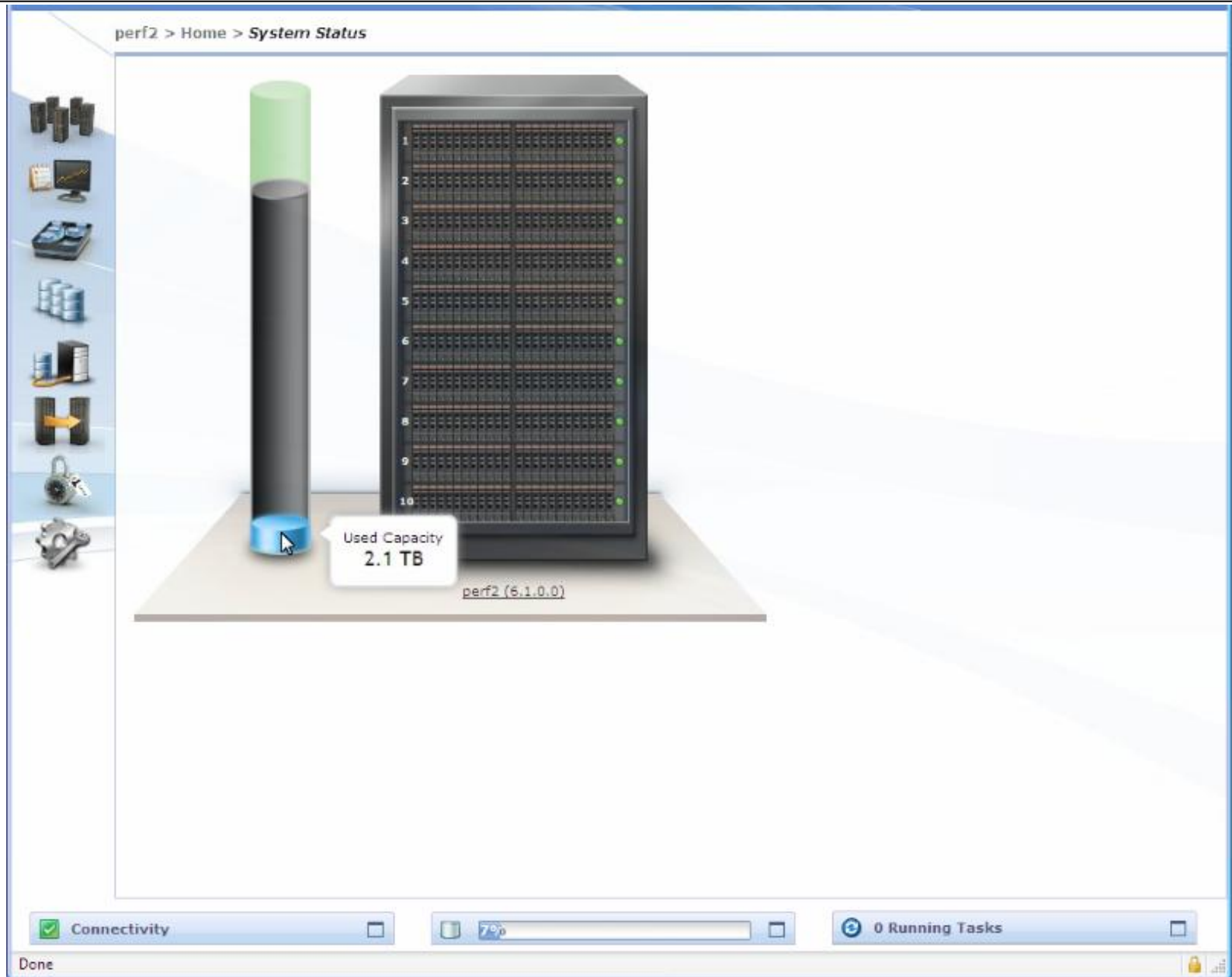
Summary: 10 thin-provisioned volumes, 20.0 TB total virtual capacity, 409.6 GB total real capacity, 9.8 TB free in pool

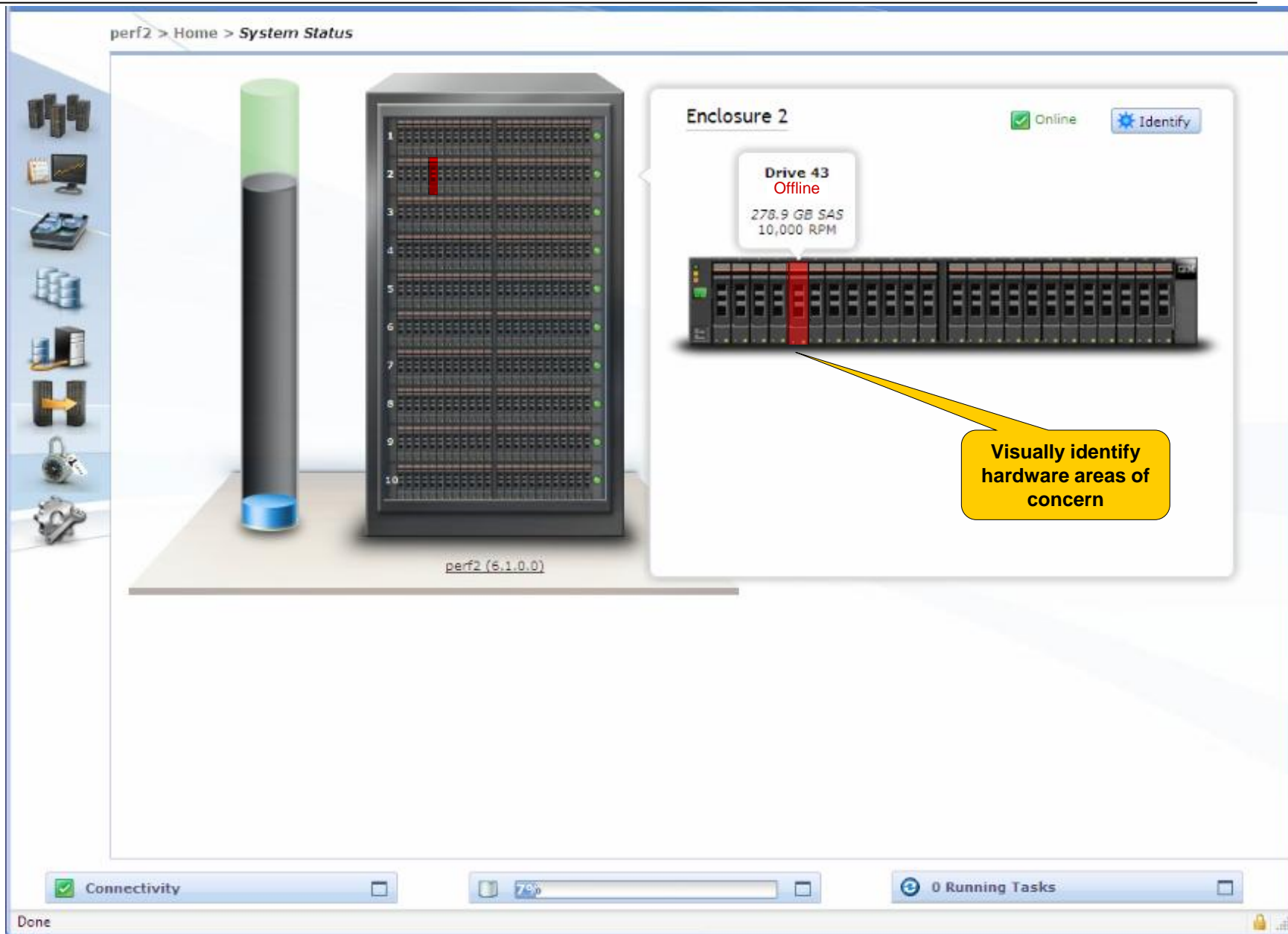
Advanced... Create Create and Map to Host Cancel

Quickly provision multiple volumes of the same type





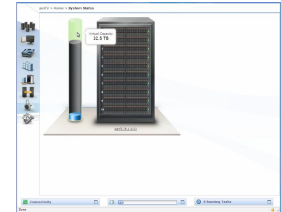




Manageability Features Overview

■ User Interface

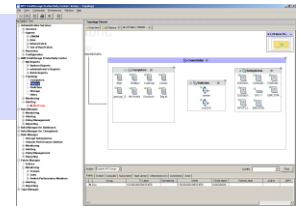
- Adopted from the easy-to-use XIV GUI
- For clients where the Storwize V7000 “is” the infrastructure



Easy-to-use management GUI

■ Enterprise Management

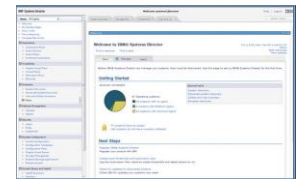
- Integrated management with a SAN-wide perspective
- For clients where the Storwize V7000 is connected to a SAN with other, perhaps heterogeneous storage



Tivoli Storage Productivity Center
Integrated SAN-wide management

■ Server / Storage Management

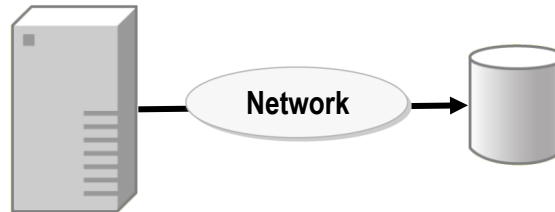
- Integrated management with a Systems and Storage perspective
- For clients with IBM servers and storage



Systems Director Storage Control
Integrated IBM server and storage mgmt

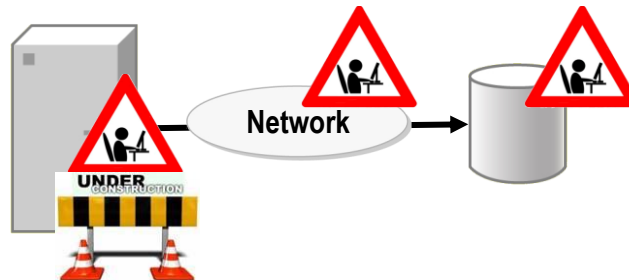
Enterprise Management Features

Visualize the SAN



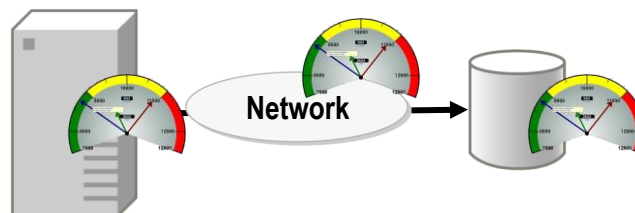
- ✓ From virtual machines to the physical server they reside on, through the SAN, to the disk systems ...
- ✓ Physical topology and logical data path
- ✓ Health/Status Monitoring
- ✓ Event Management
- ✓ Device Capacity Mgmt
- ✓ Policy-based Alerting

Provision storage



- ✓ For new or expanding applications, apply application-centric provisioning policies
- ✓ Provision host multi-pathing, SAN zones, and array capacity in a single action

Analyze performance



- ✓ Isolate application I/O performance problems across the entire data path
- ✓ Report on performance history

Analyzing Storage Performance

The screenshot displays the IBM TotalStorage Productivity Center interface. On the left is the **Navigation Tree** with the following structure:

- Administrative Services
 - IBM TotalStorage Productivity Cent
 - Configuration Utility
 - Rollup Reports
 - My Reports
 - Topology
 - Computers**
 - Fabrics
 - Switches
 - Storage
 - Other
- Monitoring
 - Analytics
 - Alerting
 - External Tools
- Data Manager
 - Data Manager for Databases
 - Data Manager for Chargeback
 - Disk Manager
 - Fabric Manager
 - Tape Manager
 - Element Manager

The main area is the **Topology Viewer**, which has tabs for **Overview** and **L0:Computers**. The **L0:Computers** tab is active, showing a large watermark text "L0:Computers". Below this, there are two groups of computer icons: "Computers (Normal) [6]" and "Computers (Unknown) 16 Computers". A context menu is open over one of the computer icons in the "Computers (Normal)" group. The menu options are:

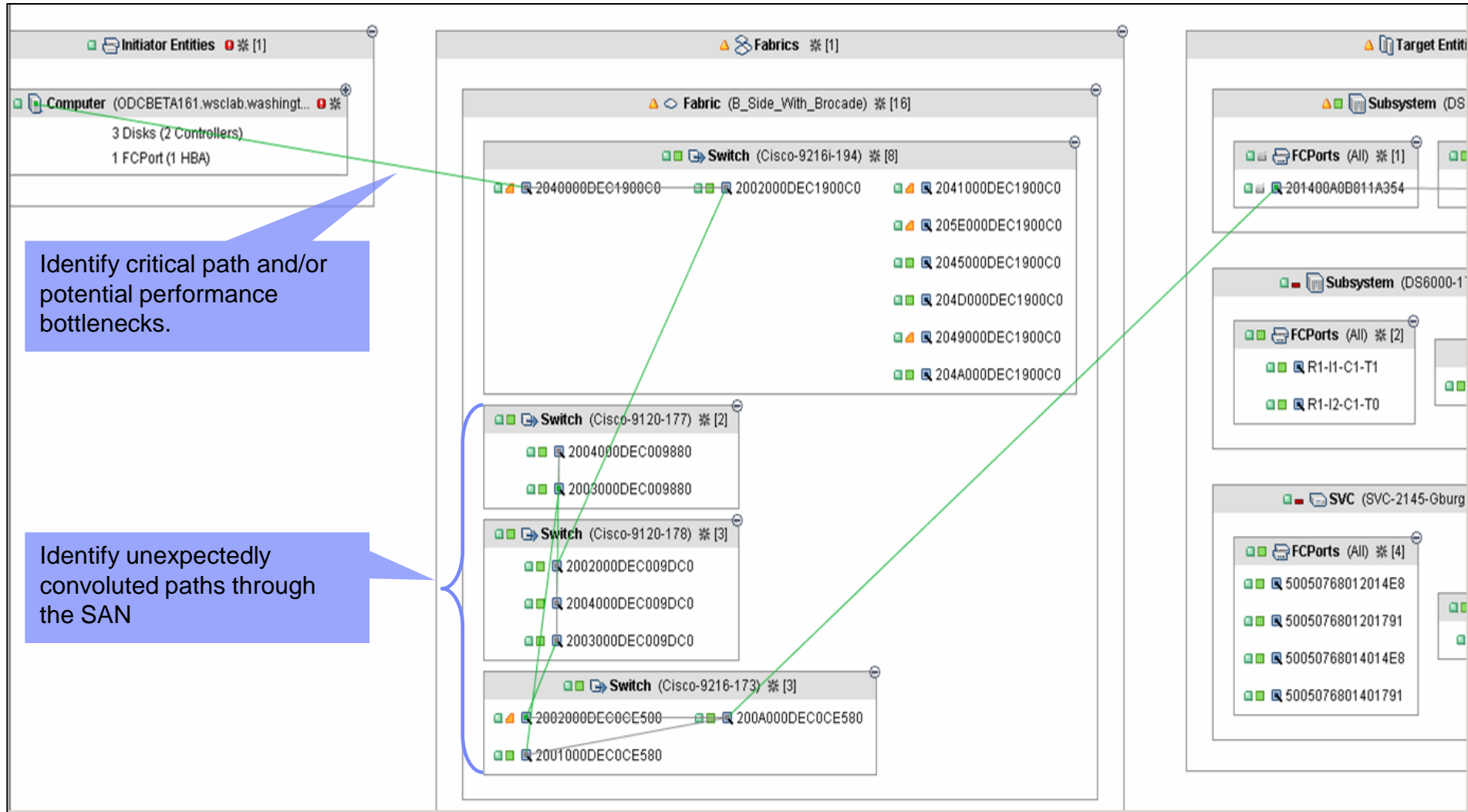
- Open Detail View
- Launch Detail Panel...
- Open DataPath View** (highlighted with a blue box)
- Pin
- Launch Planner...
- Show Alerts in Tabular View
- Show Computer Alerts
- Reports
- Expand All Groups
- Collapse All Groups
- Close View
- Close All Views
- Refresh View
- Refresh All Views

A blue callout box points to the context menu with the text: "Highlight the desired computer or storage device".

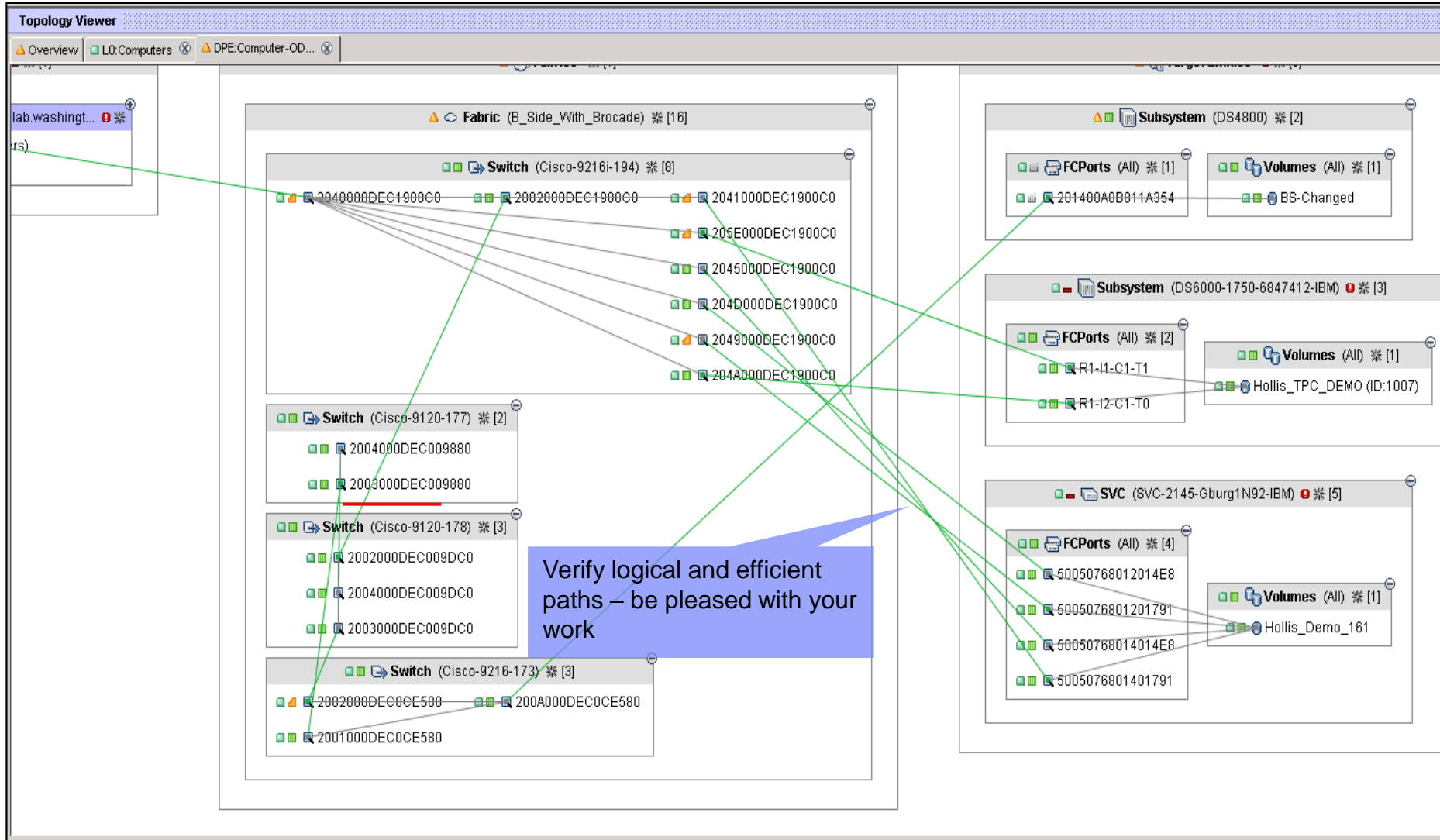
On the right side of the interface, there is a small window titled "L0:Compute..." containing a green and blue bar chart. Below this is a **Shortcuts** section with links to [Data Path Explorer](#) and [Topology Settings](#).

At the bottom of the interface, there is an **Action:** dropdown menu set to "Open Detail View", and a **Computer** | **Alert** tab set to "Computer".

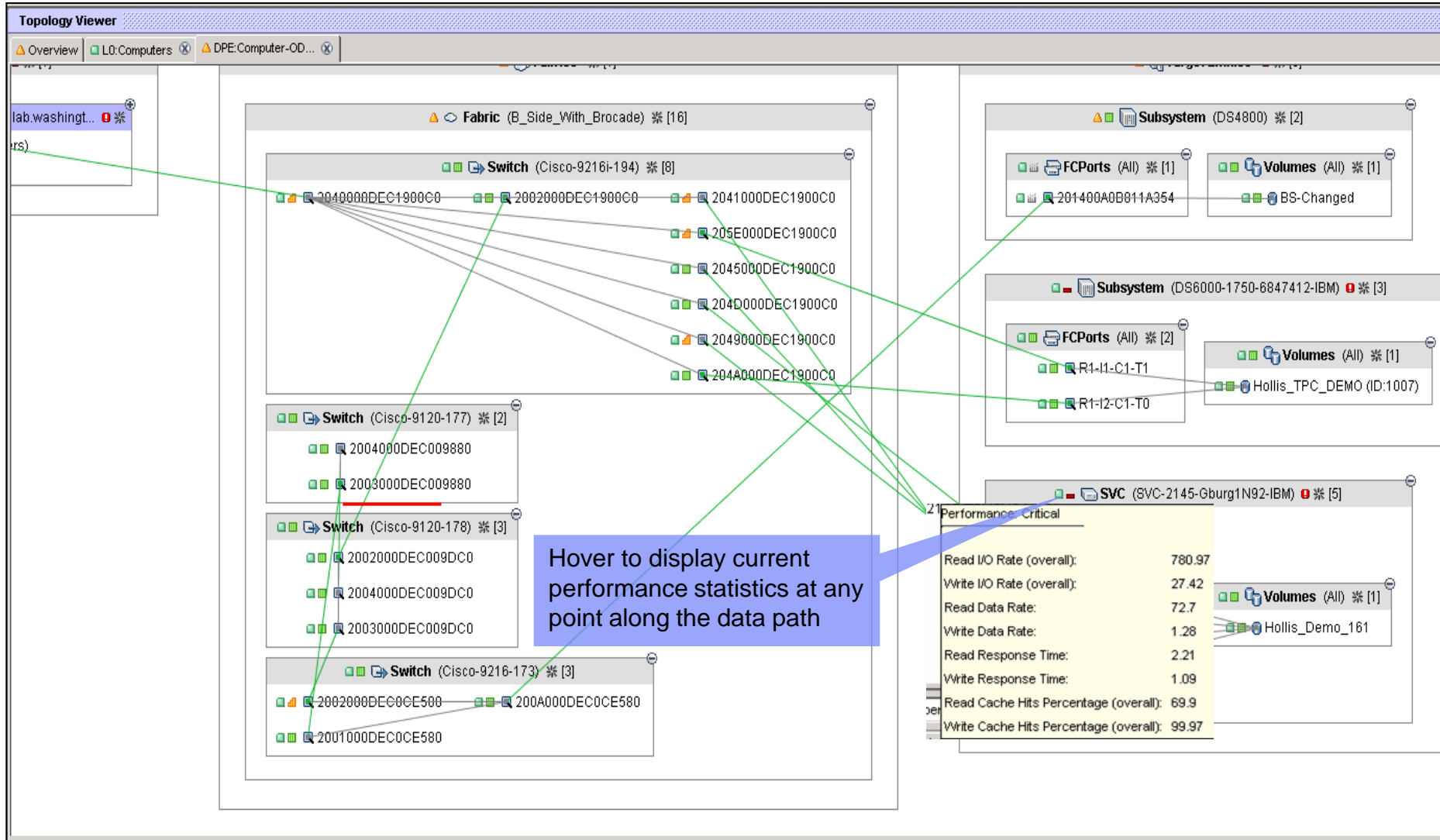
Analyzing Storage Performance



Analyzing Storage Performance



Analyzing Storage Performance



Analyzing Storage Performance

The screenshot displays the IBM Storage Performance Analyzer (SPA) interface. On the left is a **Navigation Tree** with the following structure:

- Administrative Services
- IBM TotalStorage Productivity Center
- Data Manager
- Data Manager for Databases
- Data Manager for Chargeback
- Disk Manager
 - Storage Subsystems
 - SAN Planner
 - Monitoring
 - Alerting
 - Policy Management
 - Reporting
 - Groups
 - Storage Subsystems
 - Storage Subsystem Performance
 - By Storage Subsystem
 - By Controller
 - By I/O Group
 - By Node
 - By Array
 - By Managed Disk Group
 - By Volume**
 - By Managed Disk
 - By Port
 - Constraint Violations

- Fabric Manager
- Tape Manager
- Element Manager

The main area is titled **Selection** and contains the **Report Filter Specifications** section. It includes a **Generate Report** button and a **Filter...** button (highlighted with a blue box). The filter options are:

- ☐ Display latest performance data
- ☐ Display historic performance data using absolute time
 - From: December 17, 2008 3:26 PM
 - To: December 18, 2008 3:26 PM
- ☒ Display historic performance data using relative time
 - 30 days ago until now

The **Summation Level** is set to **By Sample**.

Below the filter specifications are two columns:

- Available Columns:**
 - Read Cache Hits Percentage (sequential)
 - Read Cache Hits Percentage (overall)
 - Write Cache Hits Percentage (normal)
 - Write Cache Hits Percentage (sequential)
 - Write Cache Hits Percentage (overall)
 - Total Cache Hits Percentage (normal)
 - Total Cache Hits Percentage (sequential)
 - Total Cache Hits Percentage (overall)
 - Read Data Rate
 - Write Data Rate
 - Total Data Rate
 - Read Response Time
 - Write Response Time
 - Read Transfer Size
 - Write Transfer Size
 - Overall Transfer Size
- Included Columns:**
 - Subsystem
 - Volume
 - Time
 - Total I/O Rate (overall)
 - Overall Response Time

Navigation buttons (up, down, left, right) are located at the bottom right. A blue callout box with an arrow points to the **Included Columns** list, containing the text: **Define the data columns you want to report on**.

Analyzing Storage Performance

on Tree

Administrative Services

TotalStorage Productivity Center

Configuration Utility

Rollup Reports

My Reports

System Reports

student0's Reports

- BigBadJohn 25 Largest Files
- Dupl Files GT 500MB
- JLH Vol IO GT 1 and RT GT 15
- ODCBETA161 volume DR
- ODCBETA161 volume RT
- Storage Subsystems by Capacity
- Storage Subsystems by Compu
- Storage Subsystems Total DR
- SVC_vdisk_2_backend_assignr
- Volume IO GT 1 and RT GT 15**
- wm_1_non_config_disk
- wm_1b_formatted_space
- wm_2_ds6k_lun_assignment
- wm_2_vdisk_assignment
- wm_3_host_8_allocated_disk
- wm_4_ds4k_lun_io_rate
- wm_5_array_io_perf

Batch Reports

Topology

Monitoring

Analytics

Alerting

Selection Volumes

Storage Subsystem Performance: By Volume

Number of Rows: 5022

Display More Rows

Subsystem	Volume	Time ▲	Total I/O Rate (overall)	Overall Response Time
DS6000-1750-6847412-IBM	vWenVol01 (ID:1001)	May 13, 2008 12:55:20 PM	18.77 ops/s	49 ms/op
SVC-2145-Gburg1N92-IBM	Hollis_PRF_163V	May 13, 2008 12:55:36 PM	158.48 ops/s	91.2 ms/op
DS6000-1750-6847412-IBM	vWenVol01 (ID:1001)	May 13, 2008 1:00:16 PM	14.38 ops/s	39.2 ms/op
SVC-2145-Gburg1N92-IBM	Hollis_PRF_163V	May 13, 2008 1:00:37 PM	162.96 ops/s	89 ms/op
DS6000-1750-6847412-IBM	Yu_TPCRM_vm_89 (ID:1	May 13, 2008 1:05:15 PM	12.97 ops/s	19 ms/op
DS6000-1750-6847412-IBM	vWenVol01 (ID:1001)	May 13, 2008 1:05:15 PM	8.89 ops/s	81 ms/op
SVC-2145-Gburg1N92-IBM	Hollis_PRF_163V	May 13, 2008 1:05:38 PM	163.47 ops/s	88.5 ms/op
DS6000-1750-6847412-IBM	vWenVol01 (ID:1001)	May 13, 2008 1:10:15 PM	13.72 ops/s	66 ms/op
SVC-2145-Gburg1N92-IBM	Hollis_PRF_163V	May 13, 2008 1:10:39 PM	162.31 ops/s	89.2 ms/op
DS6000-1750-6847412-IBM	Yu_TPCRM_vm_89 (ID:1	May 13, 2008 1:15:14 PM	12.86 ops/s	17.6 ms/op
DS6000-1750-6847412-IBM	vWenVol01 (ID:1001)	May 13, 2008 1:15:14 PM	12.31 ops/s	60.3 ms/op
SVC-2145-Gburg1N92-IBM	Hollis_PRF_163V	May 13, 2008 1:15:40 PM	160.38 ops/s	90.5 ms/op
DS6000-1750-6847412-IBM	vWenVol01 (ID:1001)	May 13, 2008 1:20:17 PM	12.52 ops/s	58.4 ms/op
SVC-2145-Gburg1N92-IBM	Hollis_PRF_163V	May 13, 2008 1:20:41 PM	160.21 ops/s	90.3 ms/op
DS6000-1750-6847412-IBM	vWenVol01 (ID:1001)	May 13, 2008 1:25:13 PM	11.22 ops/s	63.9 ms/op
SVC-2145-Gburg1N92-IBM	Hollis_PRF_163V	May 13, 2008 1:40:45 PM	159.99 ops/s	90.6 ms/op
DS6000-1750-6847412-IBM	vWenVol01 (ID:1001)	May 13, 2008 1:45:20 PM	11.43 ops/s	72.4 ms/op
DS6000-1750-6847412-IBM	Yu_TPCRM_vm_89 (ID:1	May 13, 2008 1:45:20 PM	3.5 ops/s	154.4 ms/op
SVC-2145-Gburg1N92-IBM	Hollis_PRF_163V	May 13, 2008 1:47:56 PM	160.54 ops/s	90.2 ms/op
DS6000-1750-6847412-IBM	vWenVol01 (ID:1001)	May 13, 2008 1:50:15 PM	14.48 ops/s	57.8 ms/op

Use the "Drill up" option to go to reports that may provide insight to the root cause

IBM TotalStorage Productivity Center: john -- Create Storage Subsystem Alert

File View Connection Preferences Window Help

Element Management

Navigation Tree

- + Administrative Services
- + IBM TotalStorage Productivity Center
- + Data Manager
- + Data Manager for Databases
- + Data Manager for Chargeback
- Disk Manager
 - Storage Subsystems
 - + SAN Planner
 - + Monitoring
 - Alerting
 - Storage Subsystem Alerts**
 - TPCUser.Default Disk Array Discovery
- + Fabric Manager
- + Tape Manager
- + Element Manager

Create Storage Subsystem Alert

Creator: administrator Name: unnamed

Description:

Alert Storage Subsystems

Triggering-Condition

Condition: Critical Stress Warning Stress Warning Idle Critical Idle Mill

☒ Suppress alerts when Sequential I/O exceeds %

Triggered-Actions

☐ SNMP Trap

☐ TEC Event

☐ Login Notification Login ID:

☐ Windows Event Log Event Type:

☐ Run Script

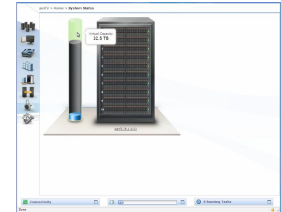
☐ Email

Email Recipients:

Manageability Features Overview

■ User Interface

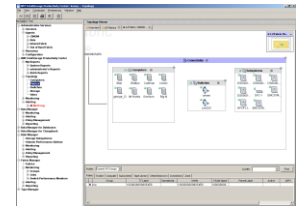
- Adopted from the easy-to-use XIV GUI
- For clients where the Storwize V7000 “is” the infrastructure



Easy-to-use management GUI

■ Enterprise Management

- Integrated management with a SAN-wide perspective
- For clients where the Storwize V7000 is connected to a SAN with other, perhaps heterogeneous storage



Tivoli Storage Productivity Center
Integrated SAN-wide management

■ Server / Storage Management

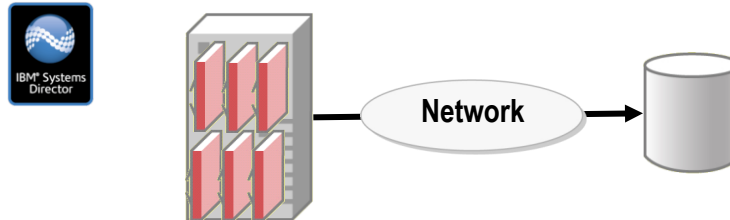
- Integrated management with a Systems and Storage perspective
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Systems Director Storage Control
Integrated IBM server and storage mgmt

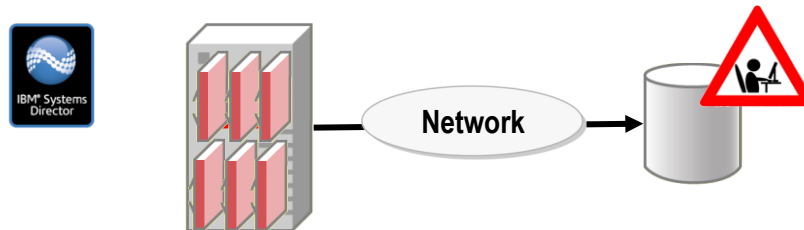
Server / Storage Management Features

Visualize and manage the complete infrastructure




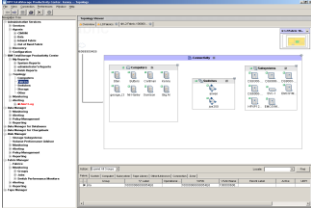
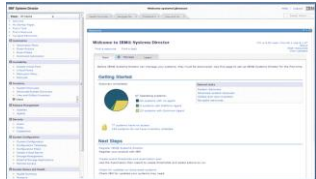
- ✓ From virtual machines to the physical server they reside on, through the SAN, to the disk systems ...
- ✓ Physical and virtual resource relationships and utilization
- ✓ Health/Status Monitoring
- ✓ Event Management
- ✓ Triggered action plans

Provision Virtual Server Images and storage



- ✓ For virtual server environments, dynamically provision virtual server images and array capacity in a single action

Manageability Features Summary

	User Interface	Enterprise Management Tivoli Storage Productivity Center	Server / Storage Management Systems Director Storage Control
			
Perspective			
Device	✓	✓	✓
Device + surrounding SAN		✓	✓
Servers + Storage			✓
Capabilities			
Health	✓	✓	✓
Capacity	✓	✓	✓
File System Utilization Analytics		✓	
Provisioning	✓	✓	✓
Performance Analytics		✓	
Replication Management	✓	✓	
Recovery Automation		✓	

Replication Features

Overview

■ IP Replication

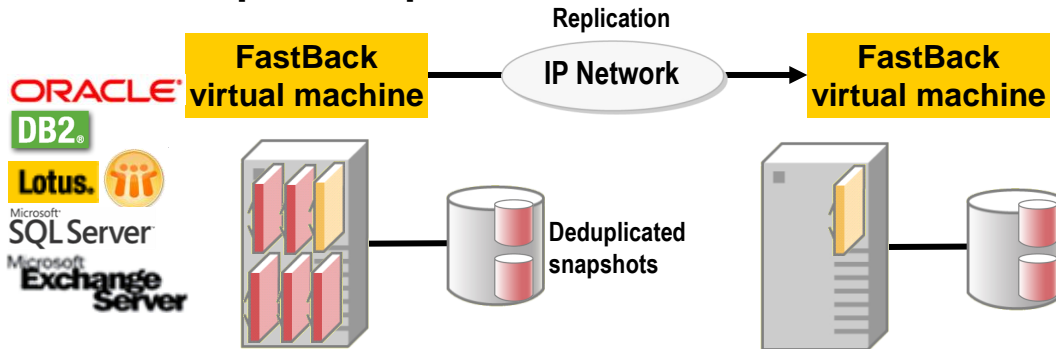
- Application-integrated capabilities for clients needing instant recovery with cost-optimized disaster recovery options

■ Fibre Channel Replication

- Application-integrated capabilities for clients needing instant recovery with full-featured enterprise replication solutions

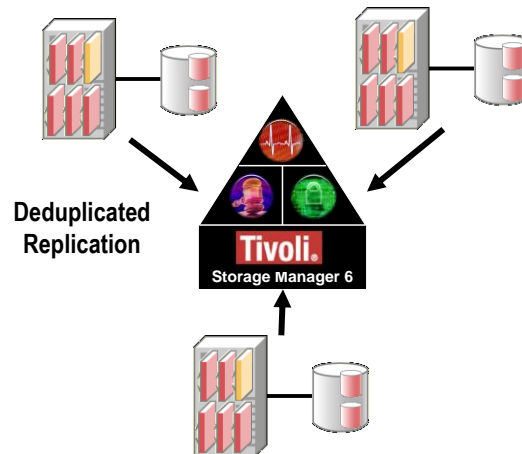
IP Replication Features

Snapshot replication



- ✓ Create instant copies of applications or file systems for backup
- ✓ Make better use of space with incremental (only changed blocks) and deduplicated snapshots
- ✓ Replicate snapshots off-site for disaster recovery

Enterprise snapshot replication



- ✓ For enterprise and branch office configurations
- ✓ Replicate distributed snapshots to a central Tivoli Storage Manager server for Unified Recovery Management and disaster recovery
- ✓ Make better use of network resources by deduplicating data before transmission

Replication Features

Overview

■ IP Replication

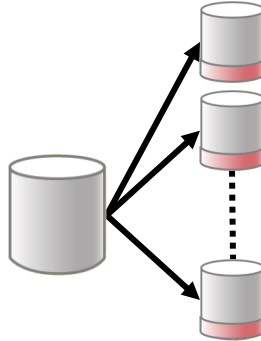
- Application-integrated capabilities for clients needing instant recovery with cost-optimized disaster recovery options

■ Fibre Channel Replication

- Application-integrated capabilities for clients needing instant recovery with full-featured enterprise replication solutions

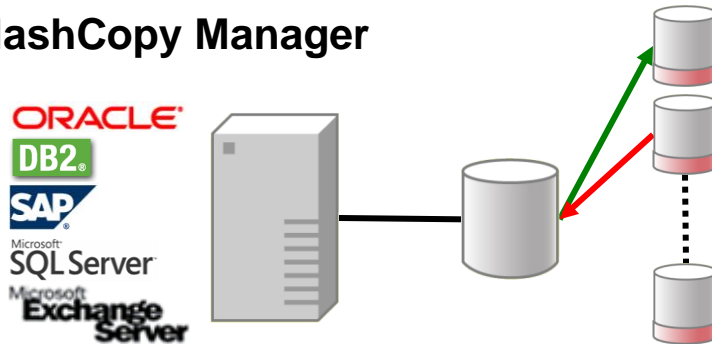
FlashCopy Features

FlashCopy



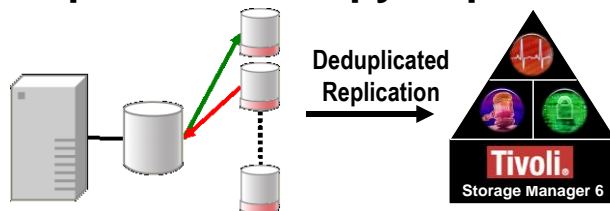
- ✓ Create instant application copies for backup or application testing
- ✓ Make better use of space with incremental (only changed blocks) or space-efficient (thin provisioned) snapshots

FlashCopy Manager



- ✓ Integrated, instant copy for critical applications
- ✓ Virtually eliminate backup windows
- ✓ Rapidly create clones for application testing
- ✓ View inventory of application copies and instantly restore

Enterprise FlashCopy Replication



- ✓ Replicate FlashCopy's to a central Tivoli Storage Manager server for Unified Recovery Management and disaster recovery
- ✓ Make better use of network resources by deduplicating data before transmission

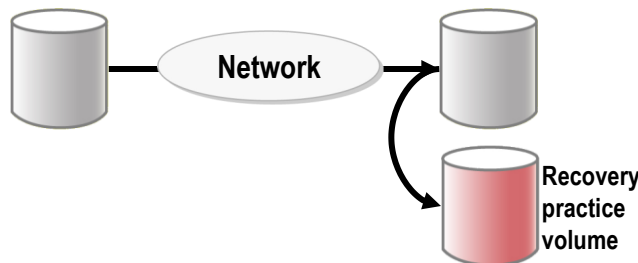
Fibre Channel Mirroring Features

Mirror data off-site



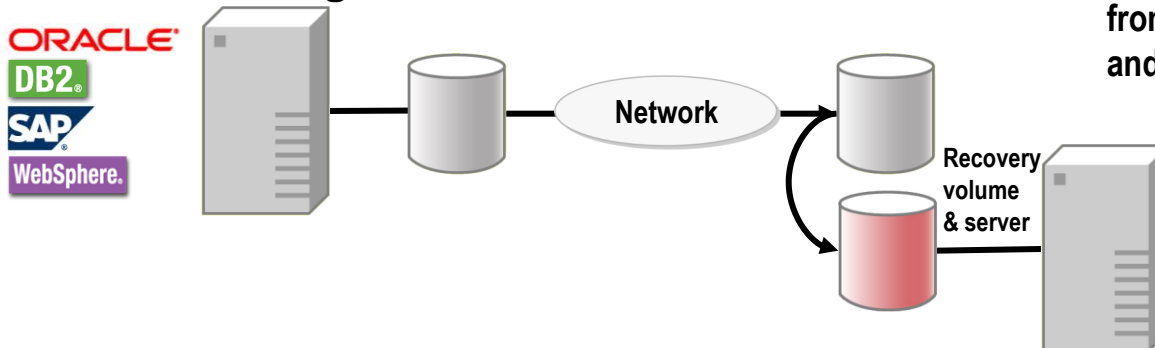
- ✓ Synchronously over Metro distances
- ✓ Asynchronously over Global distances
- ✓ Application-level consistency groups

Practice and Automatically Respond to Disasters



- ✓ For critical application consistency groups, freeze the Mirror and take a consistent FlashCopy
- ✓ Practice application recovery procedures from the FlashCopy
- ✓ Detect mirroring failure and automate failover to Recovery volume
- ✓ Automate fail-back after repair

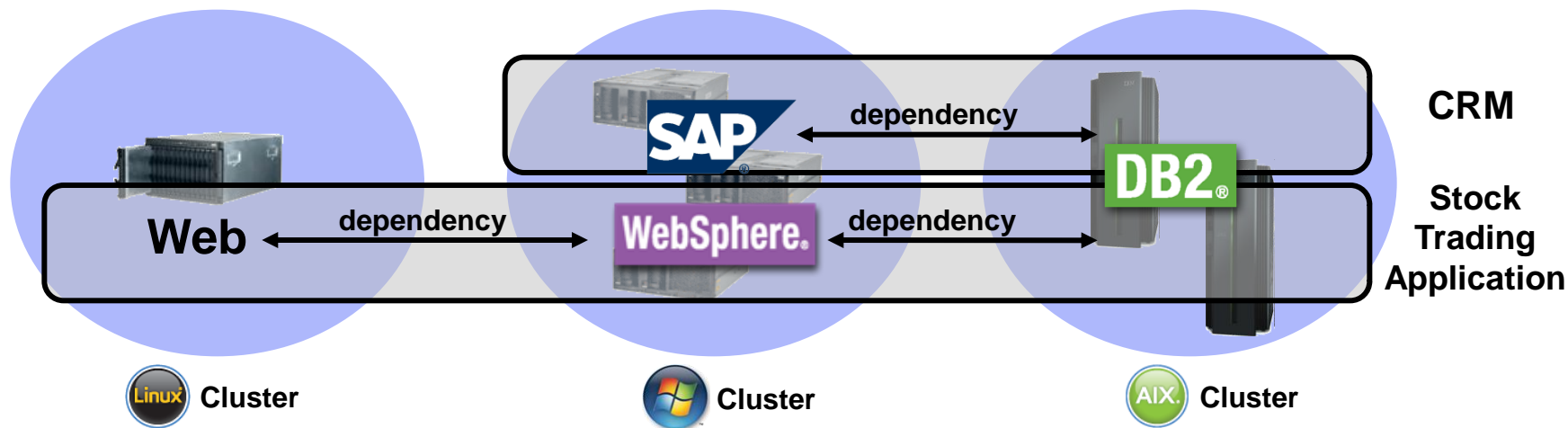
Site Switching Automation



- ✓ Monitor and manage IT-wide site switching from a single console (Applications, servers, and storage)

Site Switching

- **Single Cluster** automation and high availability can be ensured...
 - Tivoli System Automation for Multiplatforms on Windows, AIX, Linux and SUN Solaris
 - Other clustering products such as IBM HACMP, Microsoft® Server Cluster, Veritas Cluster on SUN
- ... but **Cross-cluster dependencies** in many business processes require a wider perspective.

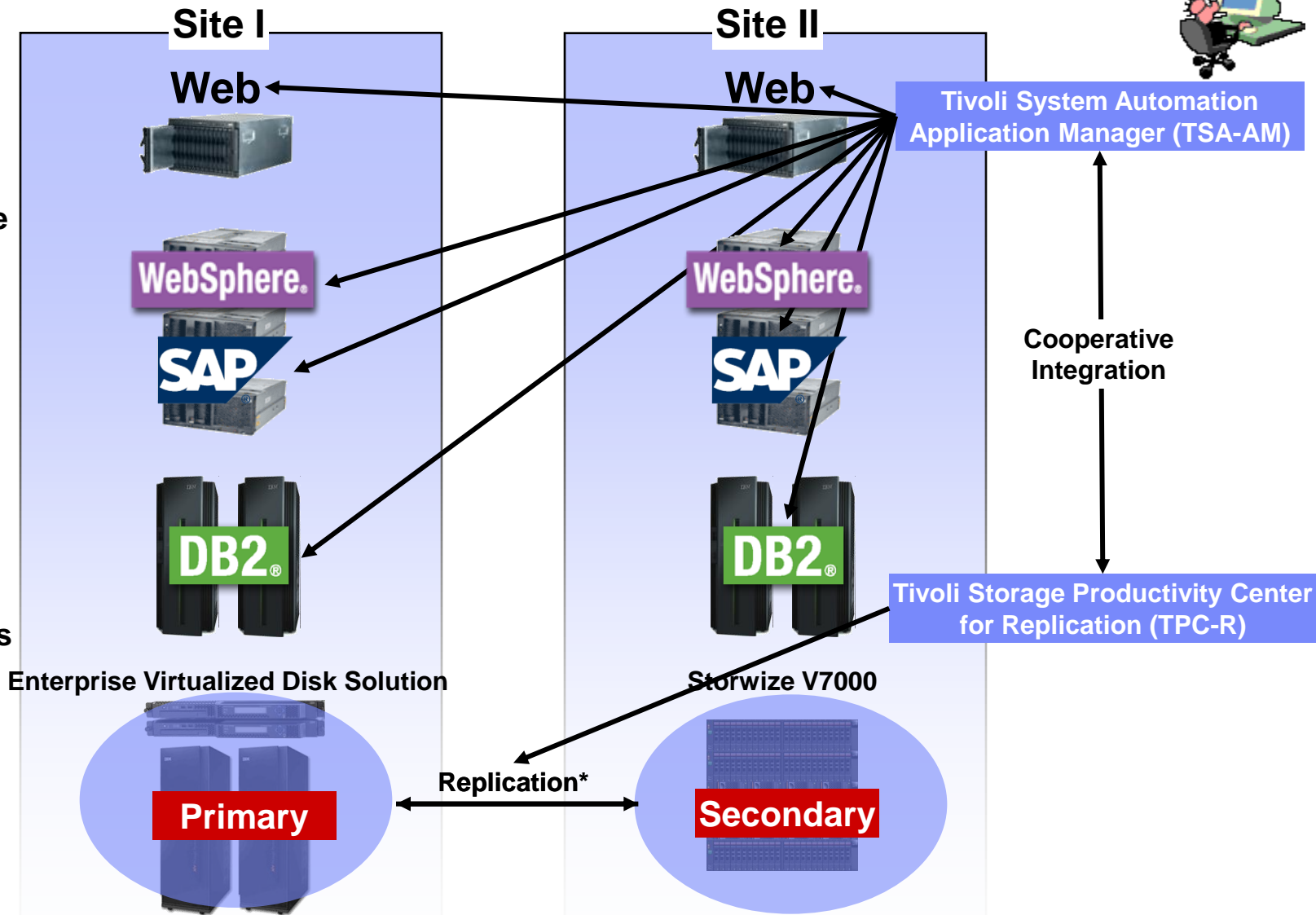


Scenario – Planned Site Switch



Automated Steps

1. Operator initiates planned site switch
2. TSA-AM triggers TPC-R to switch replication direction
3. TSA-AM starts application components at Site II



Replication Features Summary

Optimal Client Environment
Application integrated

Out-of-the-box Applications

Operating Systems

Custom application support

Efficient Use of Space

Incremental snapshot

Thin Provisioned snapshot

Deduplicated snapshot

Focus on Recovery

Instant Restore

Off-site replication

Synchronous mirroring

Asynchronous mirroring

Copy

Site Switching Automatiioon

Enterprise Recovery Management





Replicate snapshots to

Tivoli Storage Manager

Deduplicated network traffic to

TSM repository

IP Replication FastBack for Storwize V7000	Fibre Channel Replication FlashCopy and Mirroring
Entry and Lower Midrange	Upper Midrange

	
	
✓	✓

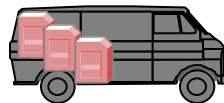
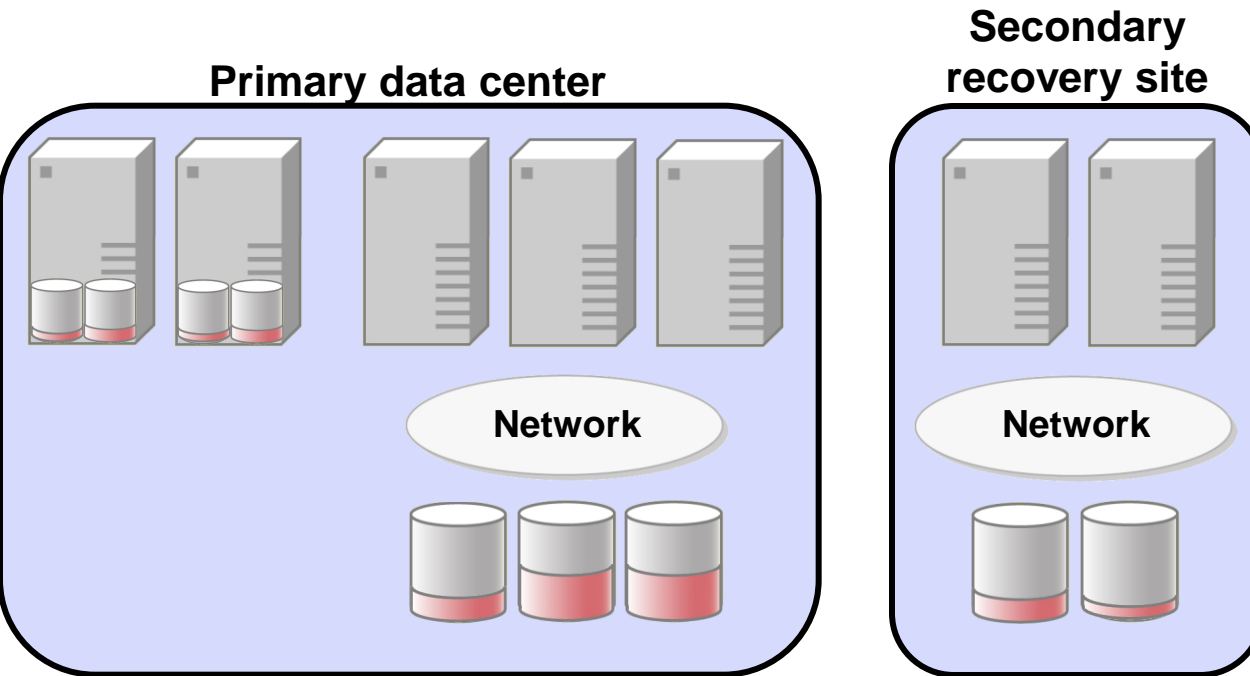
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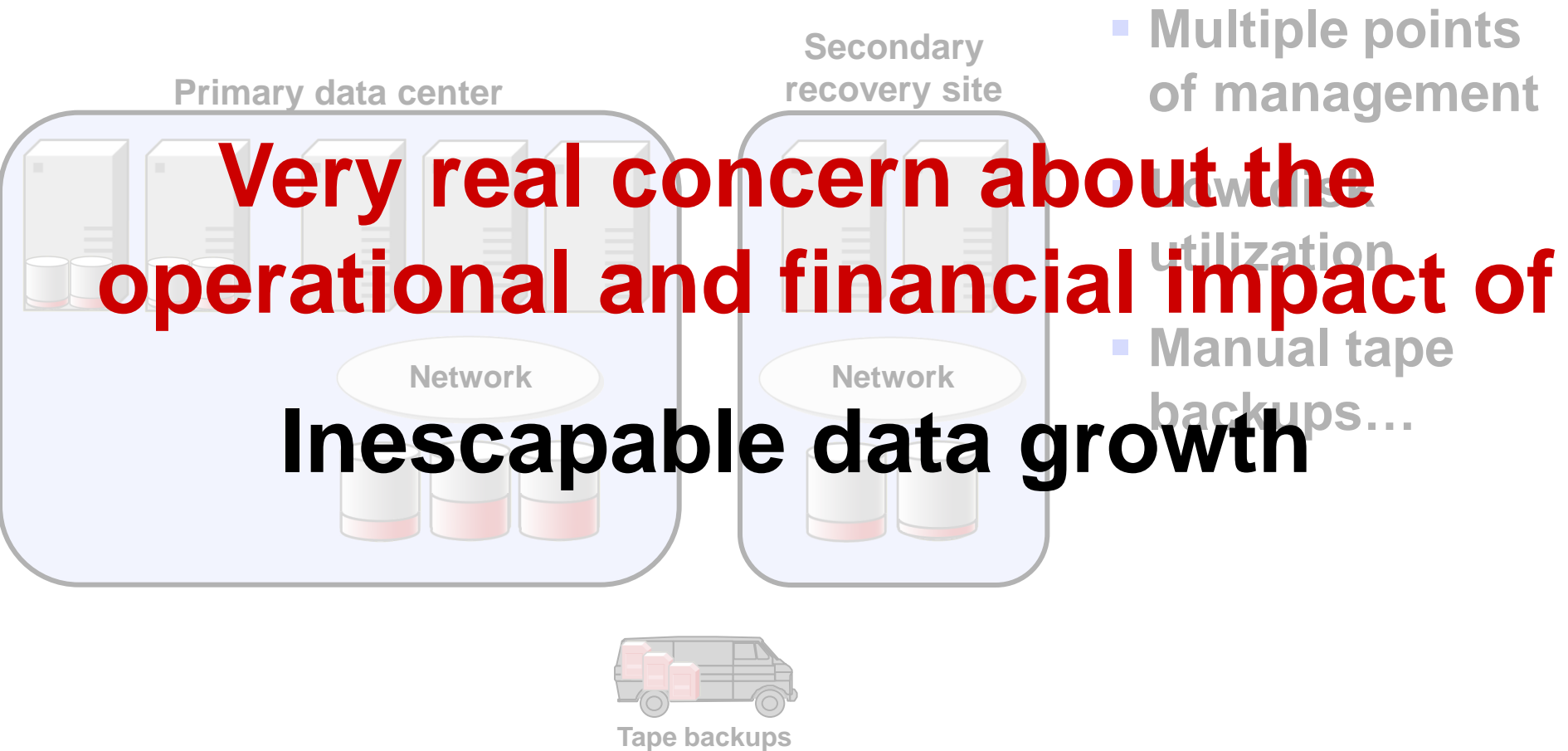
Do you remember when...



Tape backups

- Multiple points of management
- Low disk utilization
- Manual tape backups...

Do you remember when...



Solution Scenario 1

■ Client characteristics

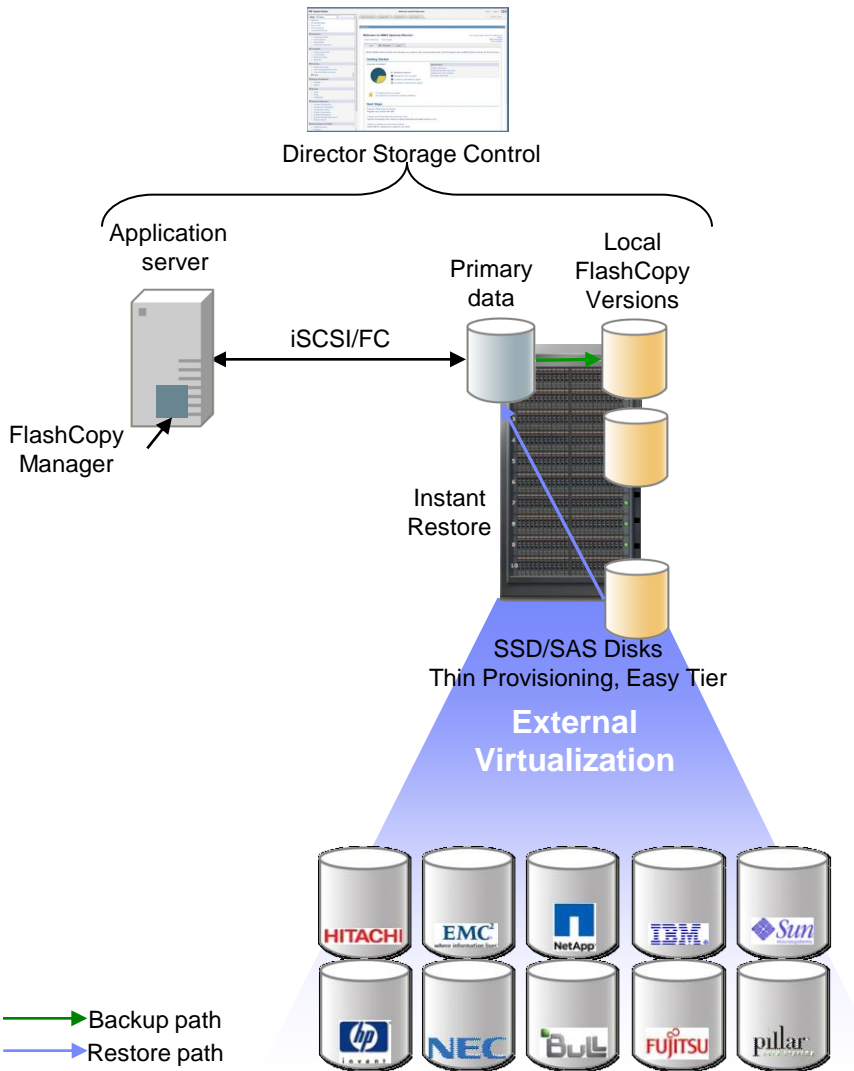
- Runs their business on Windows and Linux



- Operates only IP networks (iSCSI storage attach)
- Values simplicity because administrators are responsible for multiple pieces of the infrastructure (servers, storage, etc.)
- Sensitive to overall solution cost

Storwize V7000

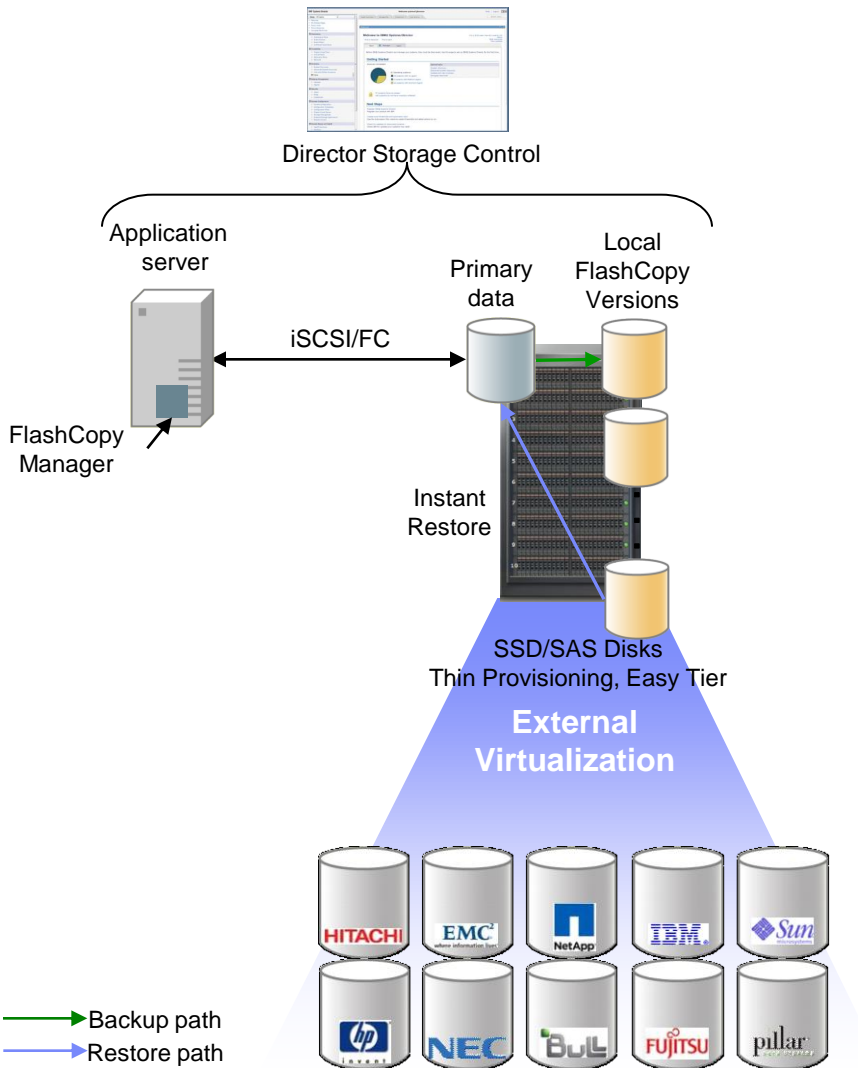
Solutions at a Glance



- **For smaller clients looking for easy-to-use, scalable storage with intelligent support for their business applications**
- **IBM offers an integrated solution formed from extraordinary building blocks**
 - Scalable Storage
 - Efficient utilization of space
 - Application-integrated data protection
 - Simple manageability
 - Transparent data migration
 - Virtualization of external disks
- **For clients with IBM servers, a single point of management for both servers and storage**

Storwize V7000

Solutions at a Glance



■ Efficiency drives capital cost reduction

- **30% improvement** in storage utilization
 - Virtualization (internal and external)
 - Thin provisioning
- **120% improvement** in throughput
 - Easy Tier with just a 6% mix of Solid State Disks

Solution Scenario 2

■ Client characteristics

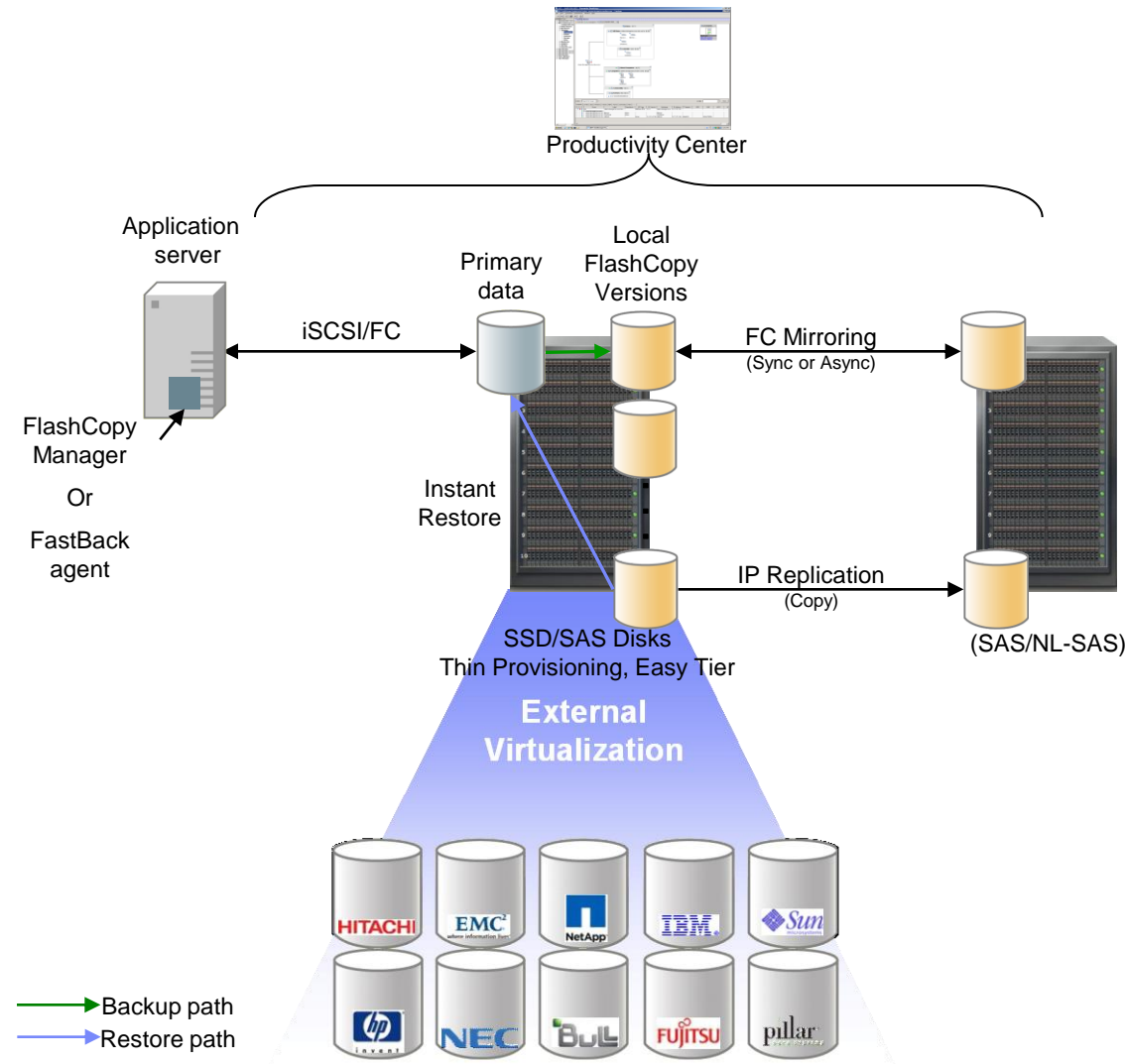
- Runs their business on Unix, Linux, and Windows



- Operates Fibre Channel SANs
- Values efficiency because scale drives environmental and power concerns
- Exploits enterprise management and automation to enhance productivity of storage administrators
- Protects against disaster situations by replicating data offsite

Storwize V7000

Solutions at a Glance

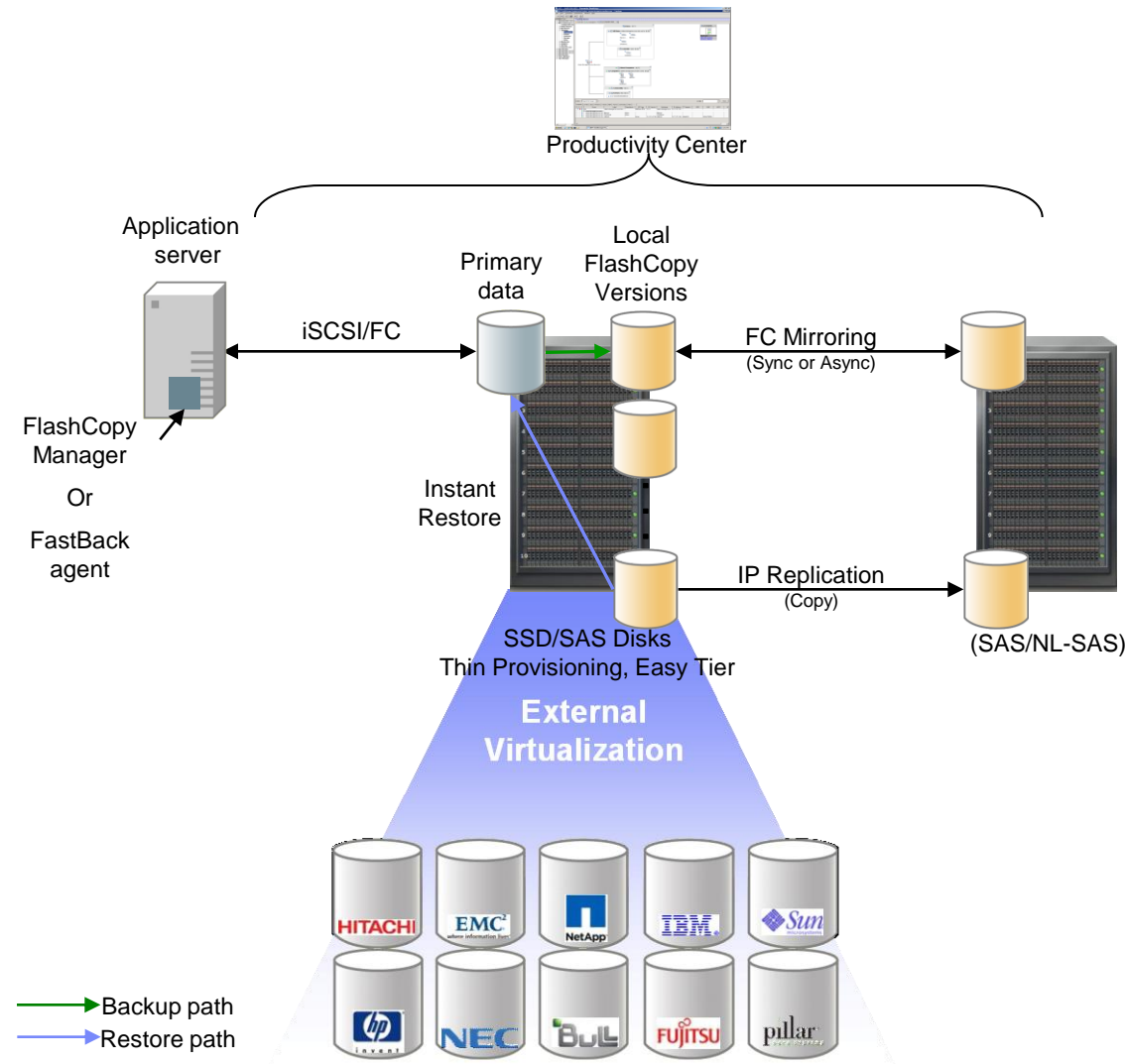


- **For larger clients looking to expand the intelligent support for their business applications across sites for disaster recovery protection**

- **IBM offers**
 - IP Replication
 - Fibre Channel Mirroring
 - Enterprise SAN-wide Management

Storwize V7000

Solutions at a Glance



Manageability drives operational cost reduction

- **19% improvement** in capacity and performance management
 - Enterprise SAN-wide management
 - Integrated Server / Storage management
- **36% improvement** in replication management
 - Replication
 - Mirroring
 - Automation

Solution Scenario 3

■ Client characteristics

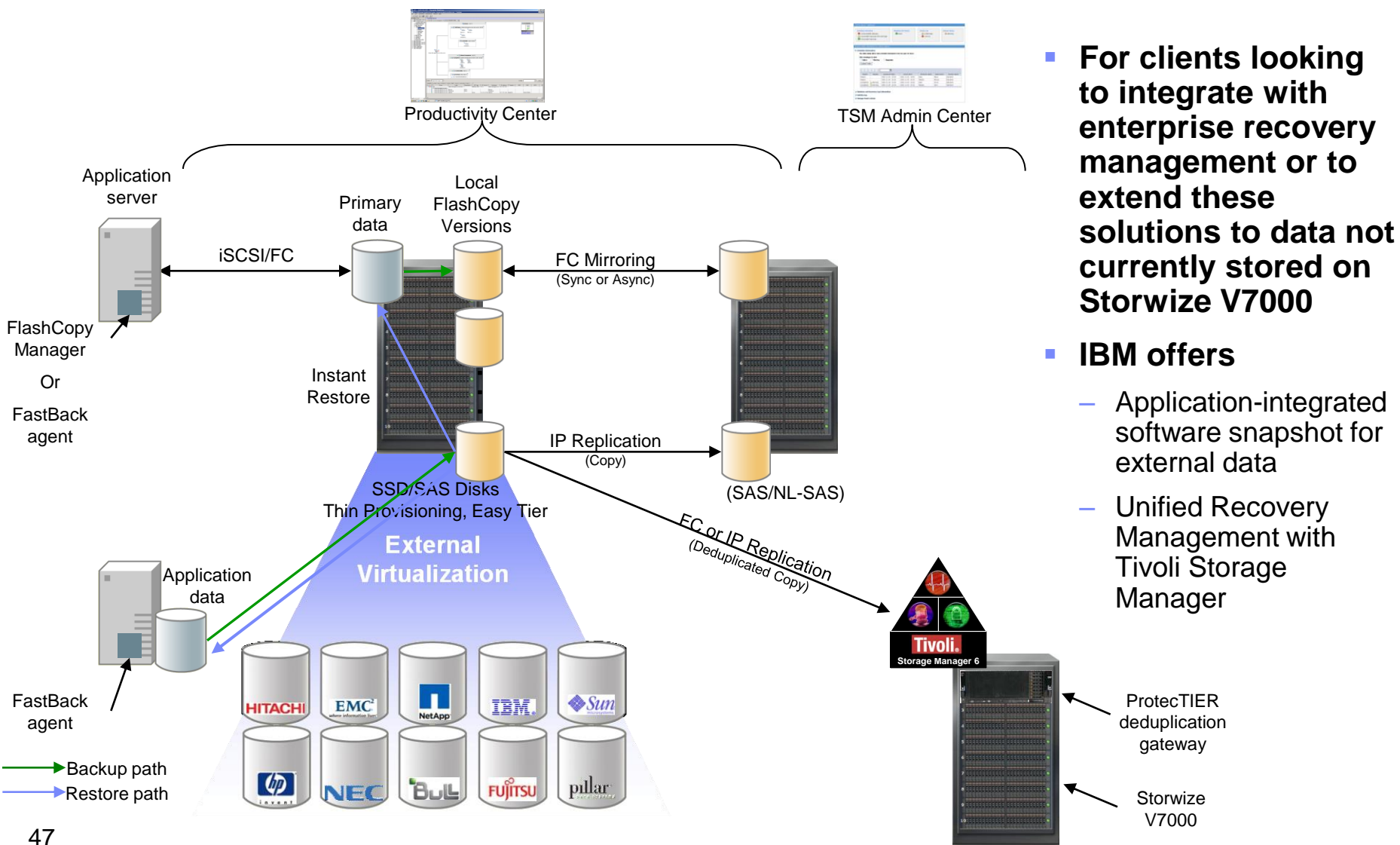
- Enterprise application data not stored on a SAN or on Storwize V7000



- Centralized Recovery Management across the enterprise

Storwize V7000

Solutions at a Glance



- For clients looking to integrate with enterprise recovery management or to extend these solutions to data not currently stored on Storwize V7000
- IBM offers
 - Application-integrated software snapshot for external data
 - Unified Recovery Management with Tivoli Storage Manager

The screenshot shows the Microsoft Project software interface. The main window displays a Gantt chart with three tasks: 'Task 1' (duration 1 day), 'Task 2' (duration 1 day), and 'Task 3' (duration 1 day). The task list pane on the left shows the same tasks. The status bar at the bottom indicates the current task is 'Task 1' and the duration is 1 day.

[illegible]

Application

Primary

Local FlashCopy Versions

iSCSI/FC

Instant Restore

External Virtualization

Application
data

FastBack
agent

► Backup path

- ▶ Restore path

- Deduplication

Source: IBM internal study

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The economics of storage have changed

22% fewer labor hours

40% improvement in 3-year TCO



Inescapable Data Growth

Meet the IBM Storwize V7000

