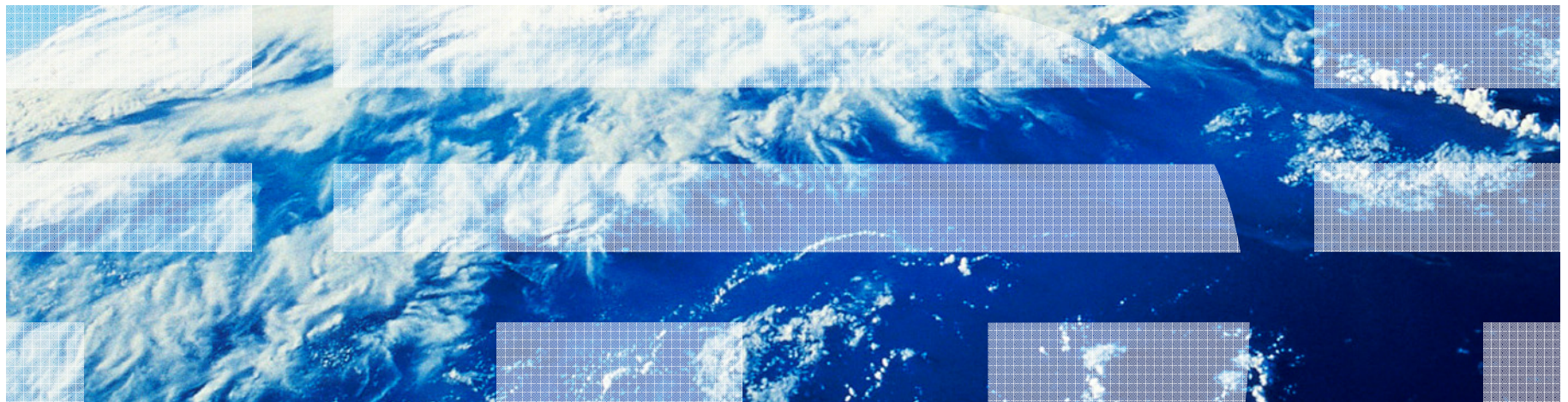# IBM Storwize® V7000

Changing the Storage Landscape with Enterprise Class Performance
Mid-range Storage Solution

Arnold Byron Lua
Product Manager, System Storage ASEAN

What if there was a Midrange Storage System that…

- Grows **as your needs grow**

- **Combines** high performance **with** ease of use

- **Includes built-in advanced** storage efficiency **capabilities**

Storwize V7000

For Clients who Need to Start Small and Easily grow

Scale Up
Easily add up to 9 expansion enclosures

Drive sizes can be intermixed in an enclosure

12 and 24 bay disk storage enclosures can be intermixed in a system

Grow Big

20 U = 1 M

Start small
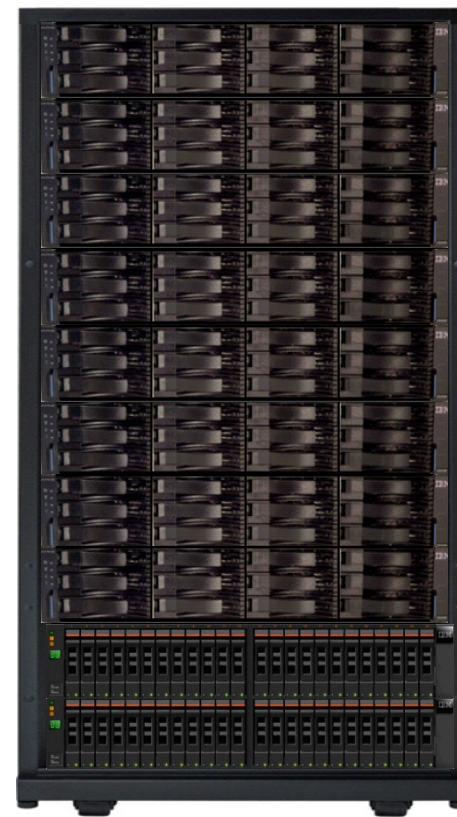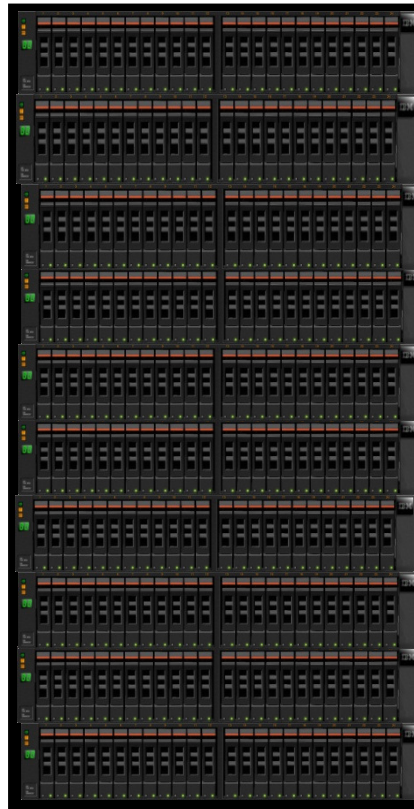One 24 bay control enclosure

8x 8Gbit FC
4x Gbit iSCSI
16GB System Cache

4

Storwize V7000 Overview

Modular Hardware Building Blocks

Software inherited from prior Offerings plus Enhancements

Software inherited from SVC and DS8000 RAID

- **RAID 0, 1, 5, 6, 10**
- **Storage Virtualization** *(Internal and external disks)*
- **Non-disruptive Data Migration**
- **Global & Metro Mirror** *(Multi-cluster)*
- **FlashCopy** *(256 targets,cascaded,incremental,Space Eff.)*
- **Thin Provisioning**
- **Clustering of V7000s (Future Direction)**

New and enhanced Software functions

- **New GUI** *(Easy-to-use, web based, XIV like)*
- **Easy Tier^{TM} SSD exploitation**
- **RAID & enclosure RAS services and diagnostics**
- **Additional scalability improvements**
- **Enhanced Host, Controller and ISV interoperability**
- **Integration with IBM Systems Director**
- **Enhancements to TPC, FCM and TSM support**

IBM Storwize V7000

Client Value Propositions
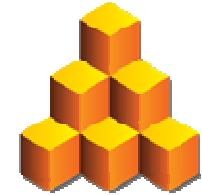
1. Storage Efficiencies (Free of Charge)

Thin provisioning

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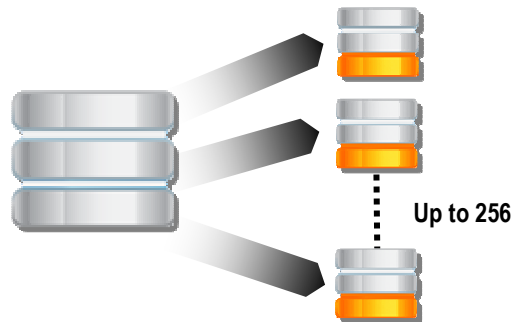
Dynamic growth

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

✓ More productive use of available storage.

✓ Works across all supported host platforms and all supported external storage systems.
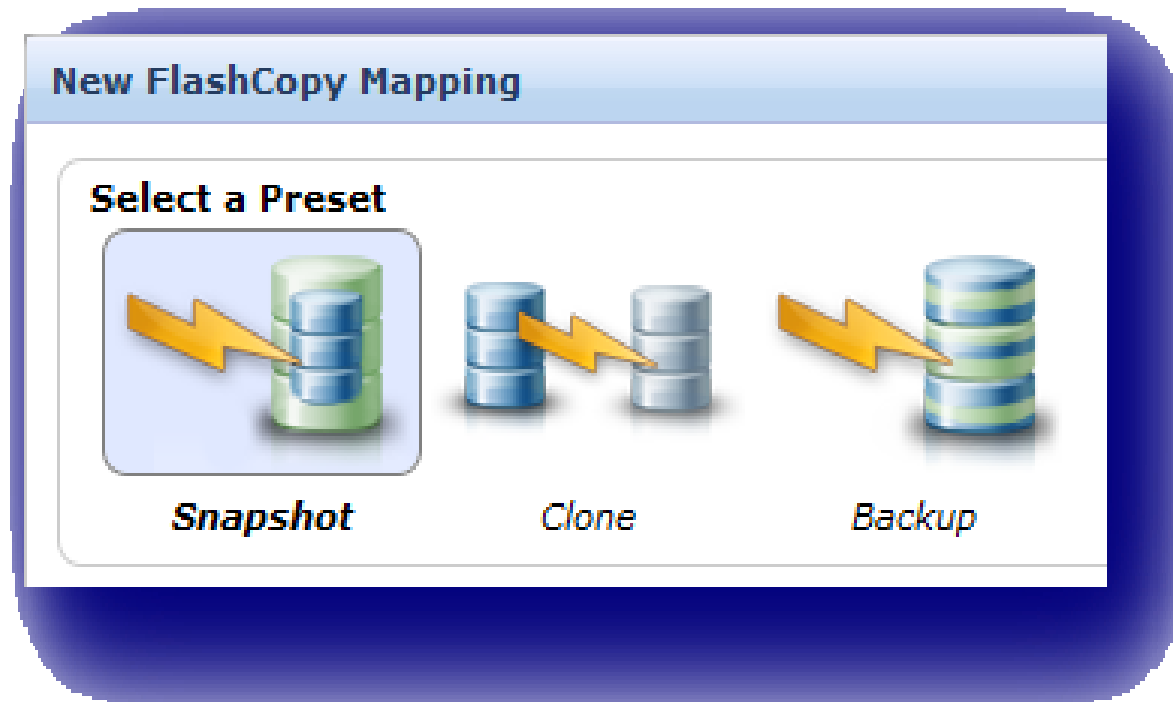
FlashCopy

Up to 256

✓ 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.
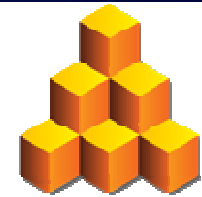
Efficient storage provisioning

- 100% virtualized **storage enables flexible provisioning from a central storage pool**

- **High-performance** thin provisioning **frees up pre-allocated space**

- **Multiple** internal mirroring **options – RAID levels – increases flexibility**
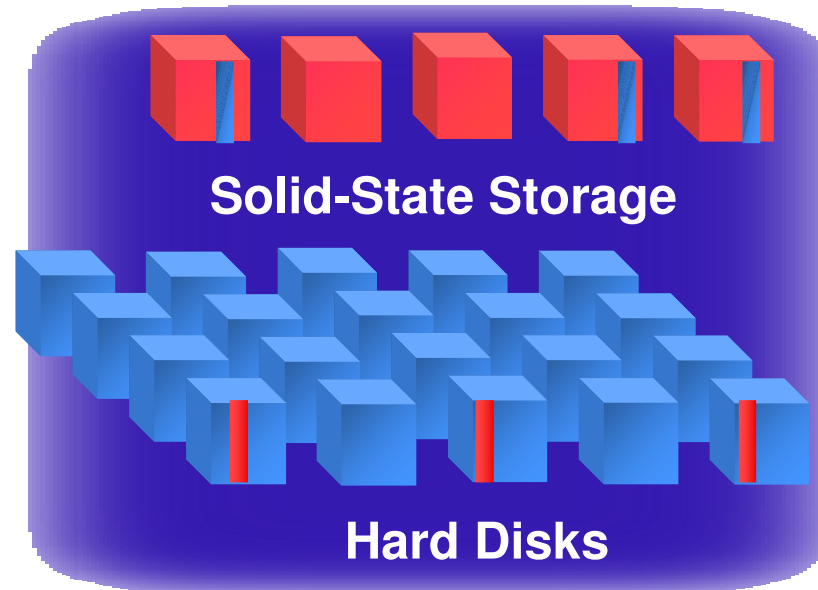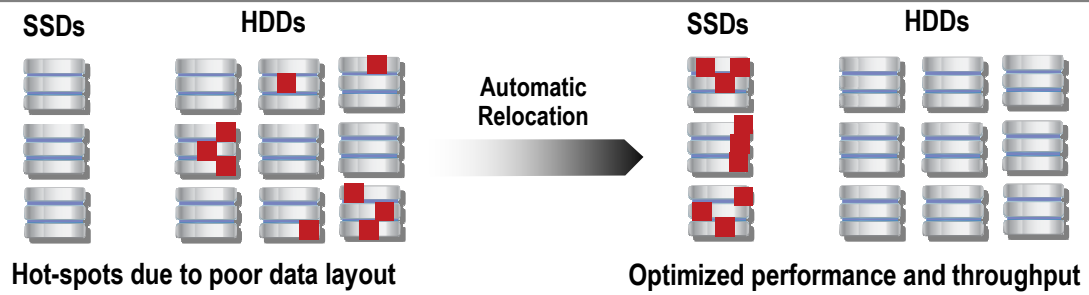
Efficient data protection

- Space-efficient FlashCopy™ **(snapshots) make data protection fast and easy**

- **Reverse FlashCopy enables** restores in minutes

2. Easy Tier (Free of Charge)

Solid-State Storage

Hard Disks

Easy Tier™ SSD sub-Volume Exploitation

SSDs	HDDs		SSDs	HDDs

Automatic Relocation

Hot-spots due to poor data layout

Optimized performance and throughput

- ✓ Busiest data extents are identified and automatically relocated to highest performing Solid State Drives

- ✓ Remaining data extents can take advantage of higher capacity, price optimized drives
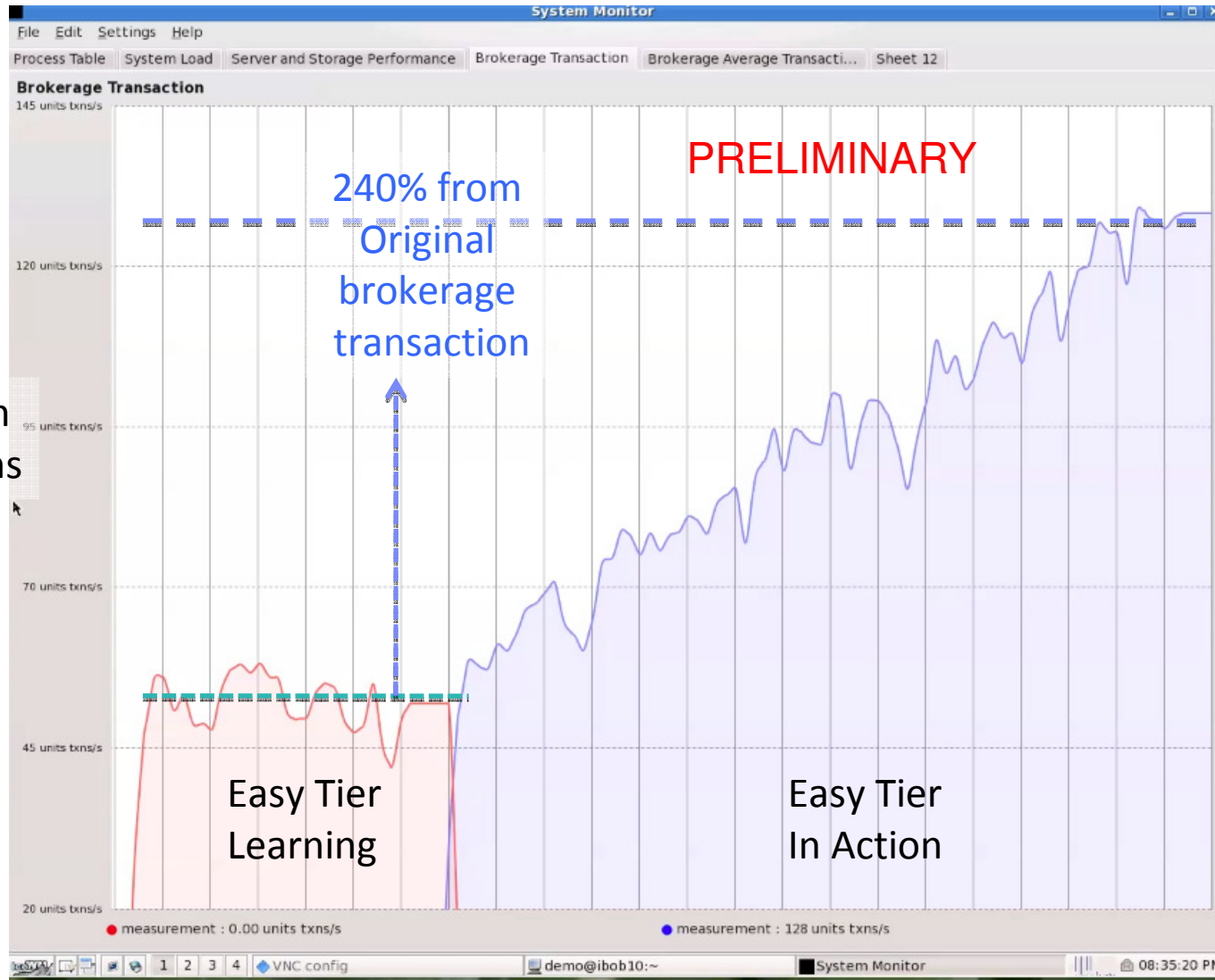
Efficient tuning
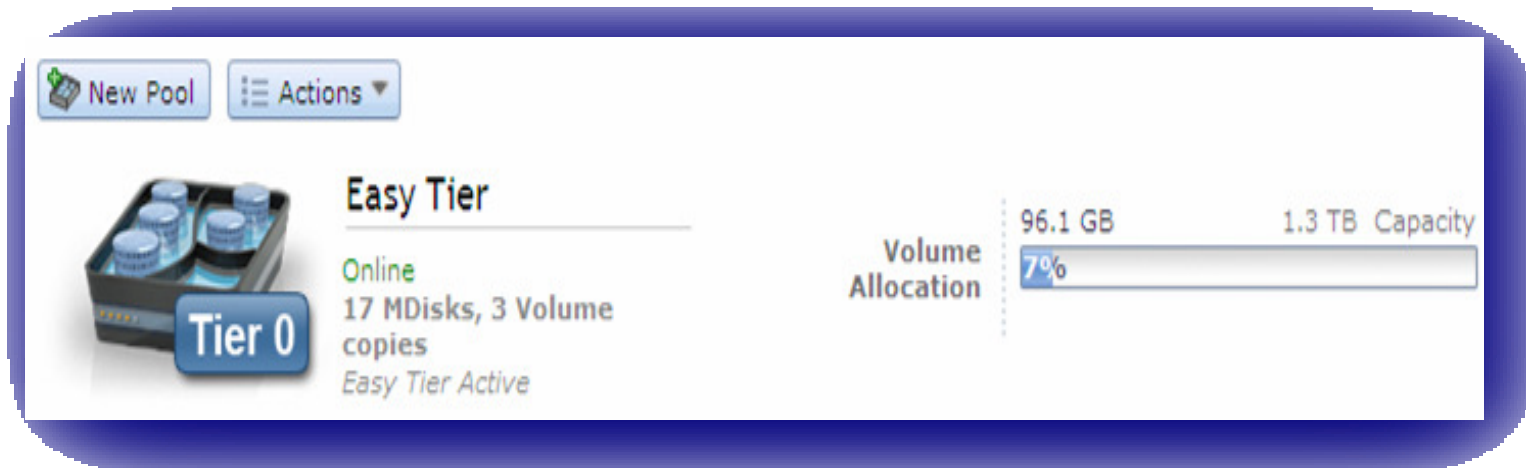
- **IBM Easy Tier optimizes the use of solid state drives**

- Boost performance up to 100% **while** lowering per transaction costs up to 30%, **using as little as 6% solid-state storage***

- **Simple to set up – simply turn it on and it** runs automatically

* Source: IBM Internal Study of Benchmark Factory transactional database workload using IBM Storwize V7000, IBM Easy Tier and 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 significantly. While IBM has reviewed each item for accuracy in a specific situation, there is no guarantee that the same or similar results will be obtained elsewhere.
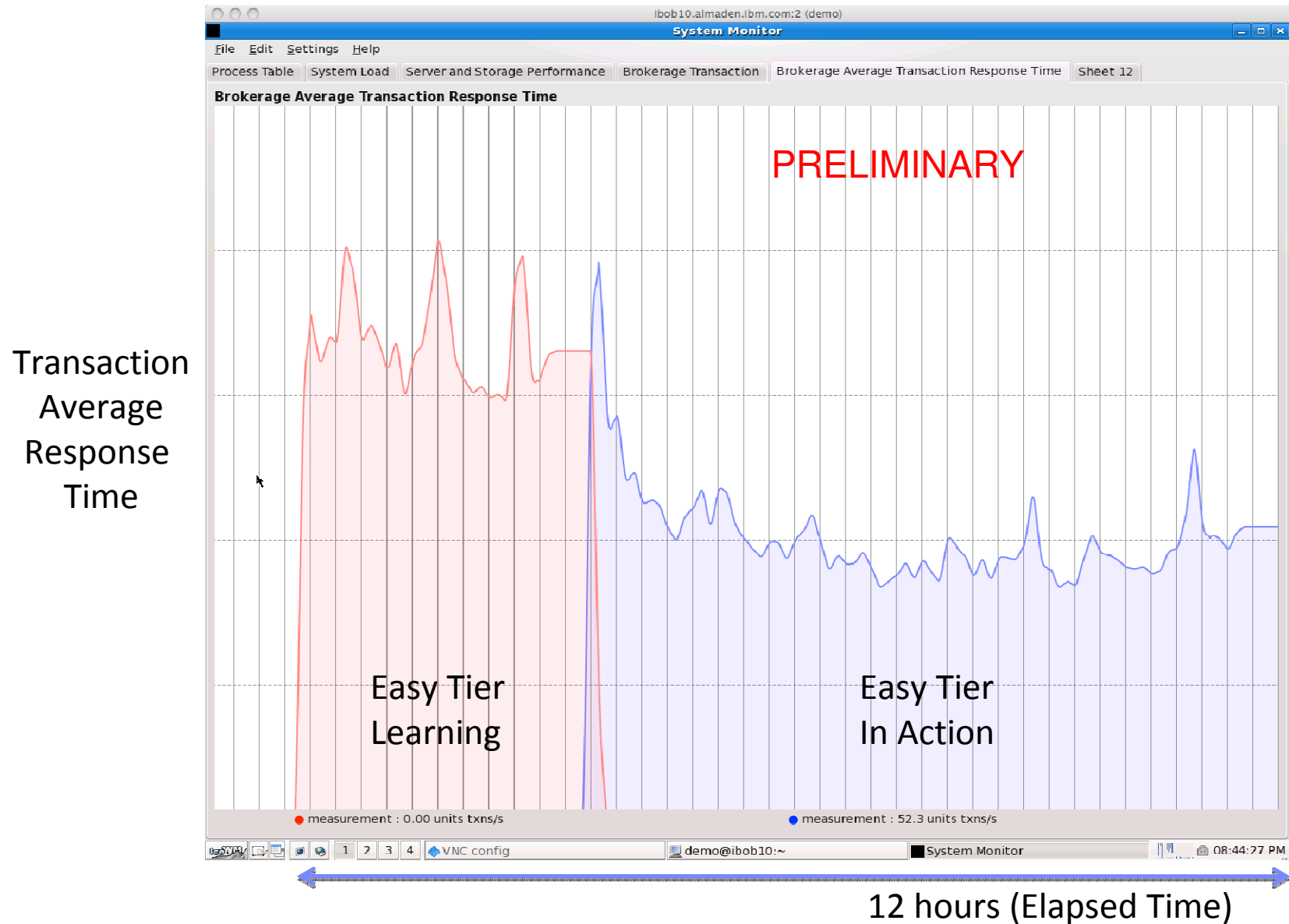
Storwize V7000 Easy Tier Application Transaction Improvement

System Monitor

File Edit Settings Help

Process Table | System Load | Server and Storage Performance | Brokerage Transaction | Brokerage Average Transacti... | Sheet 12

Brokerage Transaction

145 units txns/s

PRELIMINARY

240% from Original brokerage transaction

Application Transactions

120 units txns/s

95 units txns/s

70 units txns/s

45 units txns/s

Easy Tier Learning

Easy Tier In Action

20 units txns/s

● measurement : 0.00 units txns/s   ● measurement : 128 units txns/s

1 2 3 4 ◆ VNC config   demo@ibob10:~   ■ System Monitor   08:35:20 PM

12 hours (Elapsed Time)

Storwize V7000 EasyTier Application Transaction Improvement
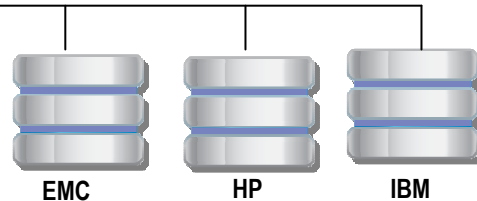

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3. External Virtualization (Premium Feature)

Storwize V7000 Can Virtualize External Fibre Channel Storage

- Single user interface to manage all storage, regardless of vendor

- Virtualized storage inherits all Storwize V7000 rich function including FlashCopy, Easy Tier, and thin provisioning

- Improve availability by practically eliminating storage-related causes of
application downtime

- Extends life and enhances value of existing storage assets

- Supports storage systems from IBM, EMC, HP, Sun/Oracle, Hitachi, NetApp, Fujitsu, Bull, Compellent, NEC, Pillar, and more

External Virtualization

HITACHI   EMC²   NetApp   IBM.   ◆Sun microsystems

hp invent   NEC   BuLL   FUJITSU   pillar Data Systems

External Virtualization

EMC   HP   IBM
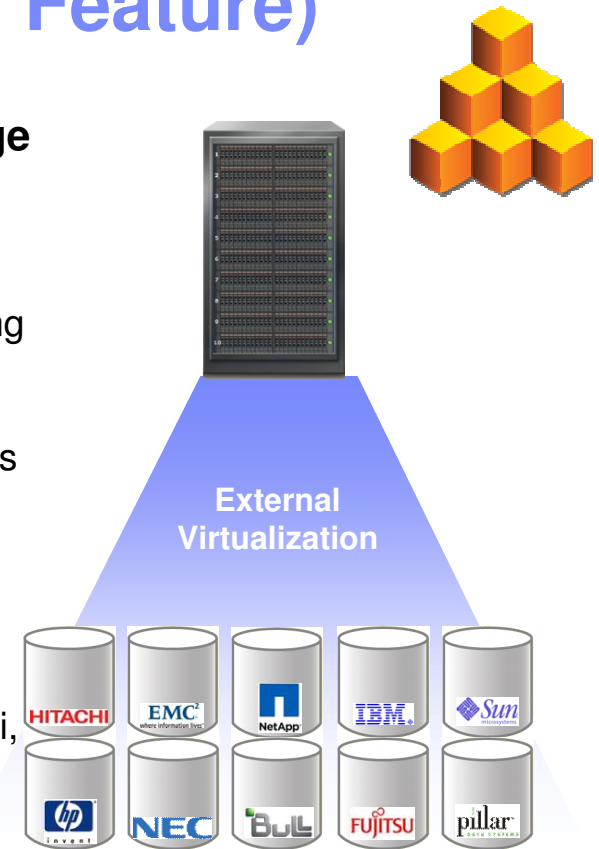
✓ Manage heterogeneous storage from a single console

✓ **Increase disk utilization up to 30% and administrator productivity up to 2X**

# Storwize V7000 Brings New Life to Existing Storage Systems

- **External storage systems become part of the Storwize V7000 "pool" of storage**

- **Reclaim space easily with** thin provisioning

- Increased performance **with IBM Easy Tier**

- **Simplify management**
  - Single advanced **Graphical User Interface**
  - Tivoli **Integrated Service Management**

- **More flexible data protection:**
  - **Snapshots** on different storage tiers
  - **Remote mirroring** between different types of systems
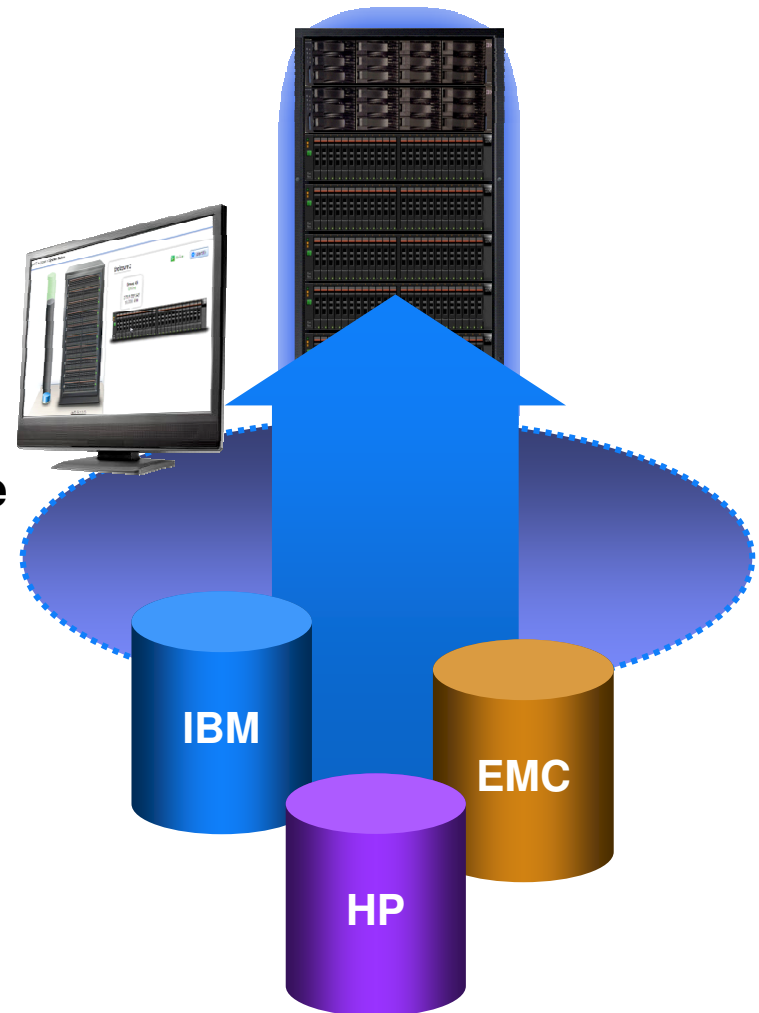
4. Transparent Data Migration (Free Of Charge)
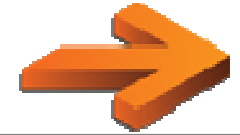
Transparent data movement

Application server

Network
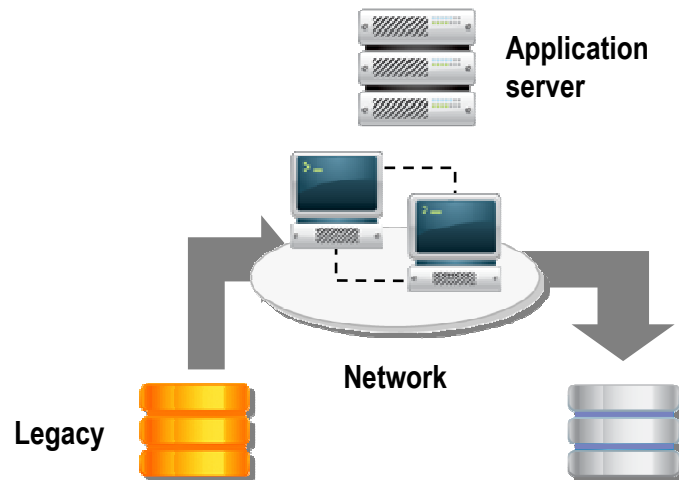
Legacy

✓ Efficiently manage technology upgrades and lease terminations by transparently moving application data from legacy disk arrays to the Storwize V7000.

Local Mirror

✓ For ultra-high availability applications, synchronously mirror application data between two separate disk enclosures attached to the same Storwize V7000 system.
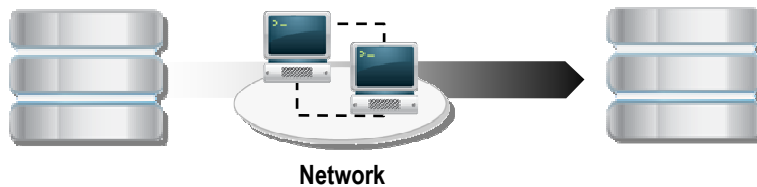
16

Efficient data migration
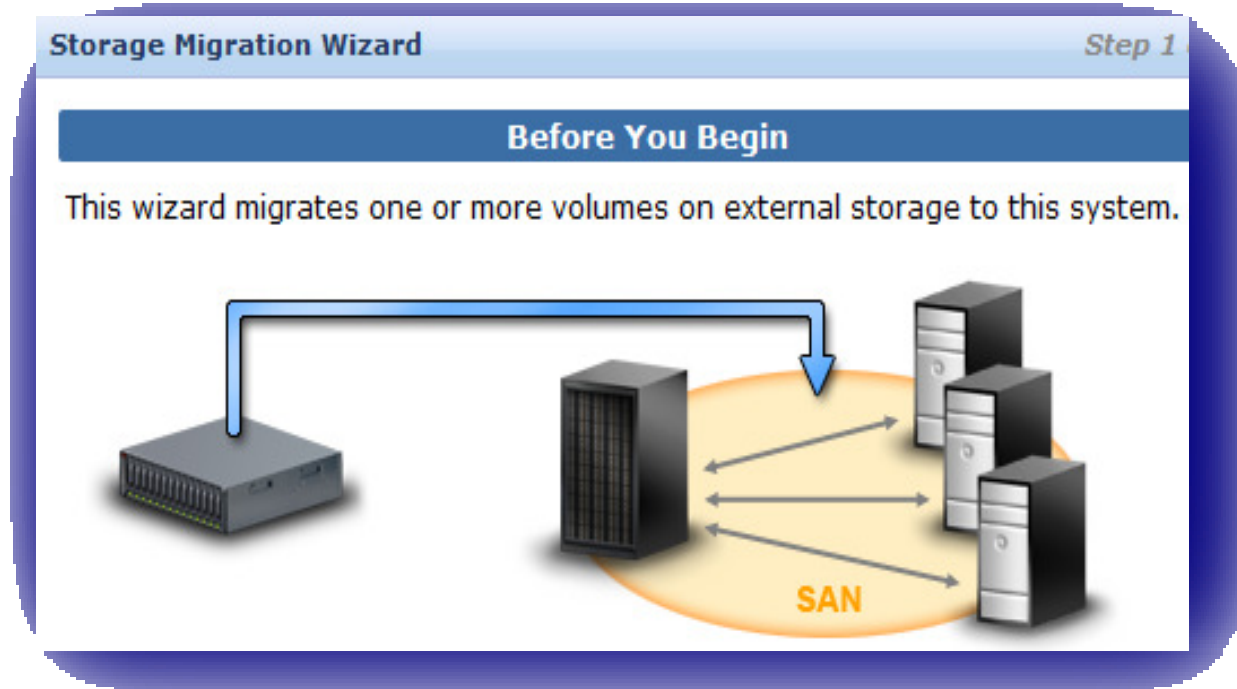
- Migrate data online, **with no performance impact**

- **Migrate to thin provisioned volumes to** reclaim space

- One-time data migration **speeds deployment**
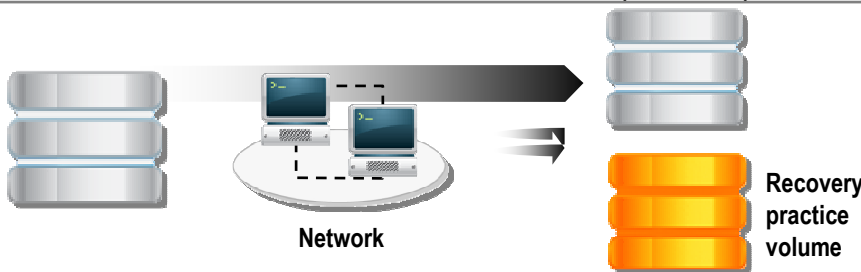
5. Advanced Copy Functions (Premium Feature)

BUSINESS
CONTINUANCE

Mirror data off-site

Network

✓ Synchronously over Metro distances.

✓ Asynchronously over Global distances.

✓ Application-level consistency groups.

Practice recovery procedures

(Via TPC-R)

Network

Recovery
practice
volume

✓ For critical application consistency groups, freeze the Mirror and take a consistent FlashCopy.

✓ Practice application recovery procedures from the FlashCopy.

Automate response to disasters
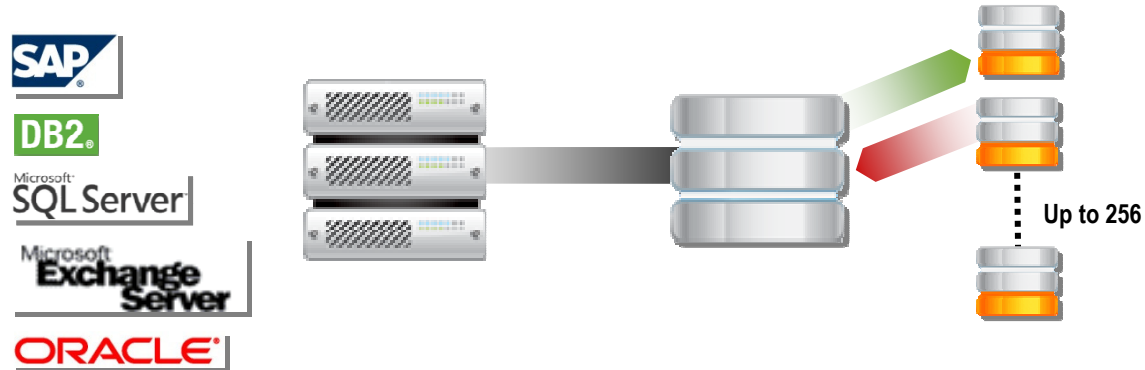
(Via TPC-R)

Network
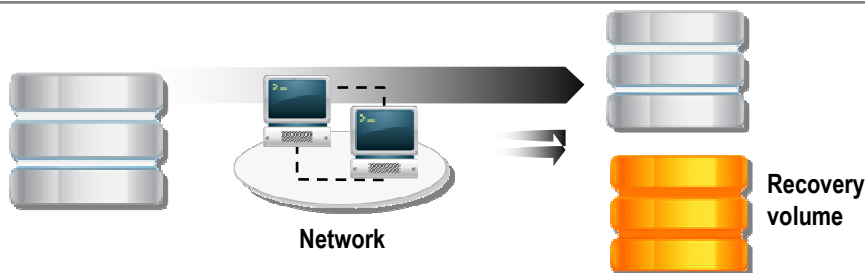
Recovery
volume

✓ Automate failover to Recovery volume.

✓ Execute practiced application recovery procedures.

✓ Automate fail-back after repair.

5. Advanced Copy Functions Continued…

FlashCopy Manager

SAP

DB2

Microsoft SQL Server

Microsoft Exchange Server

ORACLE

Up to 256
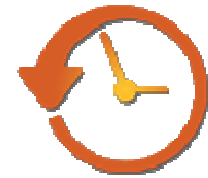
✓ Integrated, instant copy for critical applications

✓ Virtually eliminate backup windows

✓ Rapidly create clones for application testing

✓ View inventory of application copies and instantly restore

6. Ease of Management (Free of Charge)

20

Breakthrough Graphical User Interface Eliminates Complexity

- Auto-discovery and presets **slash system setup time**

- Easy navigation aids **speed administrator task selection and completion**

- Realistic graphics **simplify capacity and event management**

Breakthrough Graphical User Interface Eliminates Complexity

- Auto-discovery and presets **slash system setup time**

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- Realistic graphics **simplify capacity and event management**

Features: *Manageability* *(provided by TPC)*

MANAGEABILITY

Visualize the SAN

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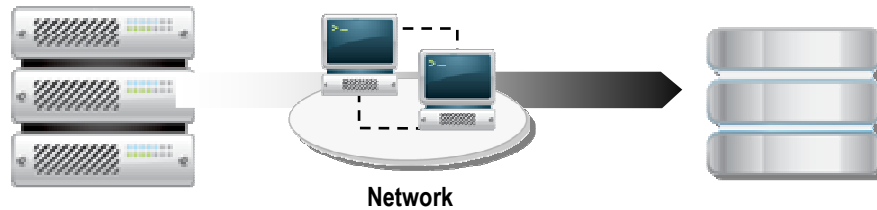
- ✓ From virtual machines to the physical server they reside on, through the SAN, to the virtual and physical disk systems …
- ✓ Physical topology and logical data path.
- ✓ Health/Status Monitoring.
- ✓ Event Management.
- ✓ Device Capacity Management.
- ✓ Policy-based Alerting.

Network

Analyze performance

(Via TPC)
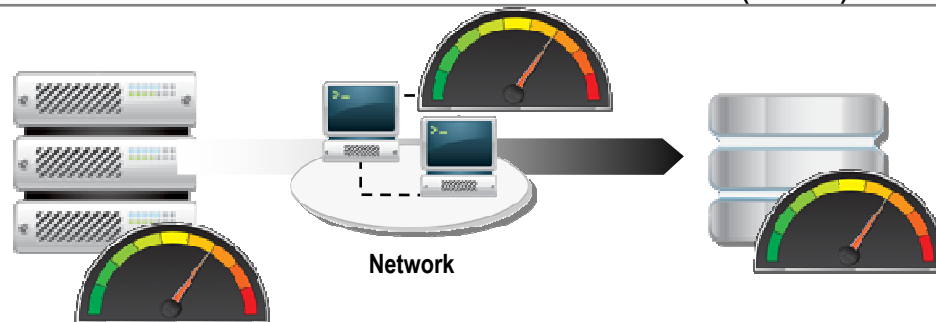
- ✓ Isolate application I/O performance problems.
- ✓ Report on performance history.

Network

IBM Storwize V7000 Value Proposition Summary

1. **Storage Efficiencies (Free of Charge)**
   - Thin Provisioning
   - Space Efficient Flash Copy up to 256 copies per volume

2. **Easy Tier (Free of Charge)**
   - Seamless Sub-LUN migration of Hot Data from Spinning Disks to SSD and Cold Data from SSD to Spinning disks **FREE OF CHARGE!**

3. **External Virtualization (Premium Feature)**
   - Virtualize existing Disk Systems; boosting performance and increasing overall storage efficiency of the Data Center

4. **Transparent Data Migration (Free of Charge)**
   - Seamless migration of data to aid in smooth decommissioning of old traditional Disk Systems

5. **Advanced Copy Functions (Premium Feature)**
   - Metro Mirror for Synchronous Data Replication
   - Global Mirror for Asynchronous Data Replication

6. **Ease of Management (Free of Charge)**
   - XIV-Like GUI with configuration wizards and presets to simplify implementation.
   - Instructional Video embedded for added configuration information

Business Challenge:

Inefficient use of a very expensive asset is difficult to justify

- SSDs are considerably more expensive than traditional disks

- Without Efficiency tools, clients have been over-provisioning them

- And administrators spend too much time monitoring, reporting, and tuning tiers

Solution:

IBM Easy Tier

- Data relocation function that enable smart data placement for efficient SSD deployments with minimal costs
    - Automatically migrate sub-volume data to right tier
    - Manually migrate full volumes non-disruptively

- New Storage Tier Advisor tool provides guidance for existing client workloads

Customer Smarter Benefits:

Easy Tier is for Smarter Storage solutions

- Deploy SSDs in an optimal manner- improve performance and avoid unnecessary expenses
- Reduces administrative effort and costs
- Setup takes Minutes
- Can 'right size' storage infrastructure AND server infrastructure for a greener data center
    - Higher performance with 50% of the footprint and 40% energy consumption
    - Automated and granular: Flexibility to move small extents
    - Virtually no administrative effort: No need to bother with tiering policies that must be manually set to accommodate changing workload dynamics

Business Challenge:

Traditional volumes, reserve physical capacity of the entire capacity even if it is not used

- Many disks in Windows, Linux, and UNIX environments have a great deal of allocated but unused space.

Solution:

Thin Provisioning Function

- System allocates and uses physical disk capacity *when data is written*
  - Can significantly reduce amount of physical disk capacity
- Applications grow dynamically, consuming only the space they are actually using (on demand)
- Available at *no additional charge* with base software license.

Customer Benefits:

Thin provisioning makes smarter use of the capacity

- Proper capacity allocation can reduce future storage acquisitions up to 20 %

- Fully integrated thin provisioning function- No extra software needed
- Improves efficiency of storage use
- Reduces manual effort
- Simple to use - Easy to monitor
- Reductions in electrical energy use, heat generation and hardware space requirements.
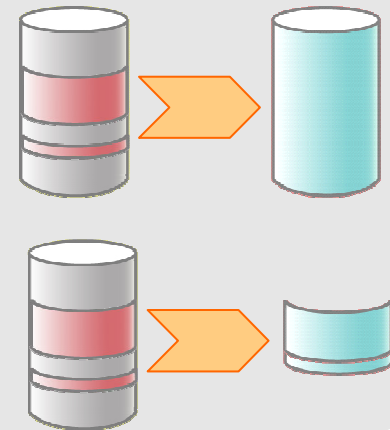
Business Challenge:

Disaster recovery causes disruptions among critical applications

- Applications downtime or disruptions occur while copies are being made. Causing non productive spare time
- Conventional copy functions, are not able to create copies when the source and target volumes are different disk systems.

Solution:
FlashCopy Function

- Allows faster and more efficient data copies for online backup, testing or data mining purposes, backup or parallel processing
- Volume-level local replication function
- Copies available almost immediately for use, up to 256 of single source volume
- Background copy operation or "copy on write"
- Source and target volumes may be on internal or external disk

Customer Benefits:

Better Copies Availability. Smarter Instant copies, Instant Benefits

- Minimize data loss by creating instant copies of data
- Minimize the impact caused by backups by using Tivoli Storage FlashCopy Manager .Applications do not need to await
- 75 % less capacity needed with Space-Efficient FlashCopy
- Unique capability to create copy of damaged data for diagnosis even for production data

FlashCopy relationships

Source vdisk

Up to 256 targets
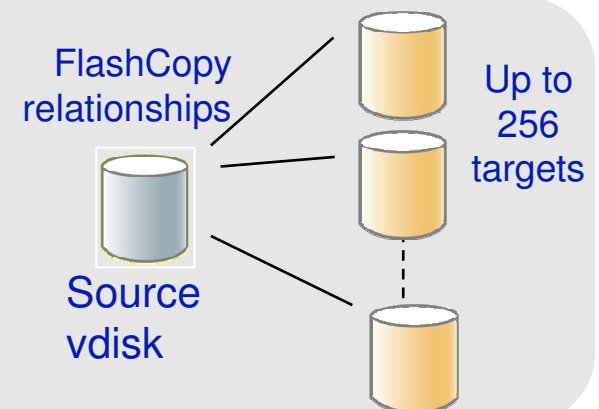
Business Challenge:

Poor deployment to recover data in case of an emergency: low data protection

- Loosing critical data due to catastrophic events at a data center

Solution:

Mirror Functions: Metro and Global Mirror

- Provide data replication over extended distances between 2 sites
- "Metropolitan" distance synchronous remote mirroring function: up to 300km between sites.
- "Global" distance asynchronous remote mirroring function: up to 8000km distance between sites
- Designed to maintain copies at both sites - Once initial copy has completed
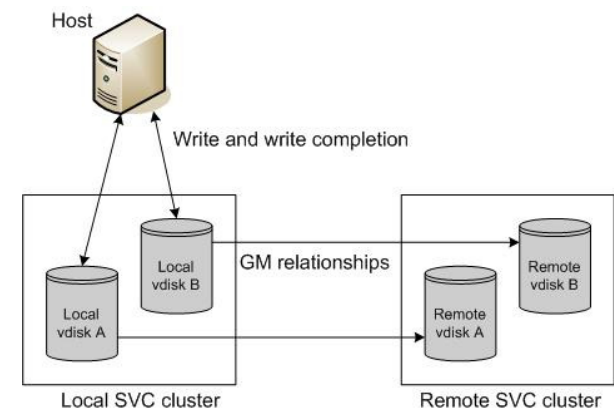
Customer Benefits:

Remote copies, locally managed

- Assure business continuity and disaster recovery
- Metro and Global Mirror delivered as single feature - Offer great implementation flexibility
- Does not wait for secondary I/O before completing host I/O - Helps reduce performance impact to applications
- Less impact to application writes for source volumes and less demand for bandwidth resources, while allowing a more flexible use of the available bandwidth.
- Operates between clusters at each site
  - Local and remote volumes may be on any attached disk systems

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Questions?

IBM Storwize V7000

Reap The Benefits By Breaking the Norm!