



IBM TotalStorage®

IBM System Storage™ SAN Volume Controller Overview

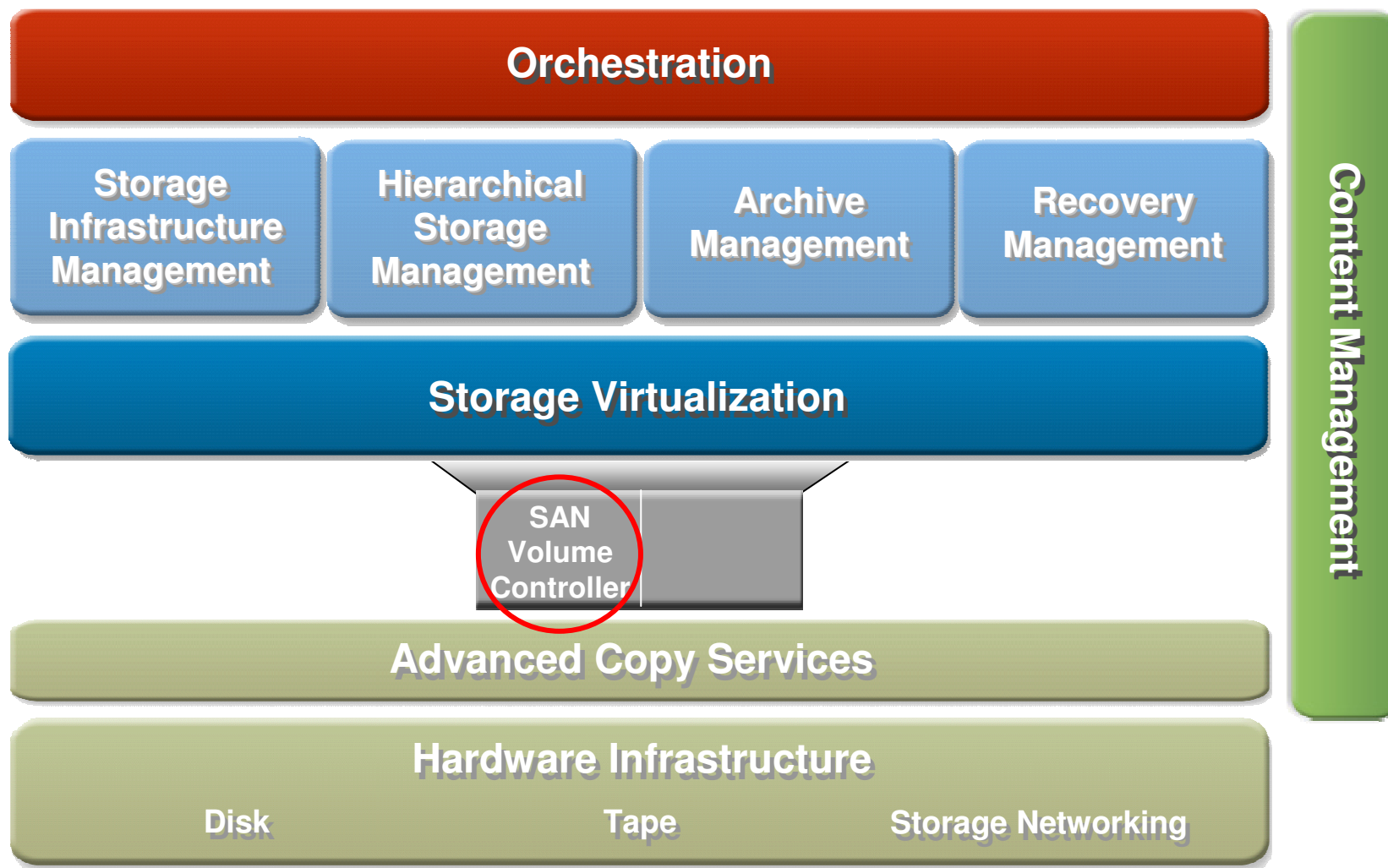


ON DEMAND BUSINESS™



IBM TotalStorage

Taking steps toward an On Demand storage environment



Value of the TotalStorage SAN Volume Controller

- Improve the flexibility of the disk storage infrastructure
- Results
 - **Improved Application Availability**
 - Eliminate many of the causes of storage-related downtime
 - Create a common platform and API for volume Point-in-time and Remote copy services
 - **Optimized Storage Resource Utilization**
 - Aggregate smaller islands of spare disk capacity and transparently reallocate to new servers or applications
 - **Enhanced Storage Personnel Productivity**
 - Create a single point of control, administration and security for disk volumes
 - Move, add or change physical disks without requiring application outages

SVC: Did You Know?

- **IBM has 40 years experience in virtualization technologies**
- **SAN Volume Controller has more than 2,000 clients, over 110 references, and is entering its fourth year of market acceptance**
- **SAN Volume Controller delivers the FASTEST storage performance benchmark ever recorded for ALL controllers**
- **15PB of client data managed today and growing!**
- **SVC manages 53% of network-based storage virtualization appliance capacity (Source: IDC/IBM)**
- **SAN Volume Controller can virtualize IBM and non-IBM storage (over 75 systems from EMC, HP, HDS, Sun, Dell, STK, NetApp)**



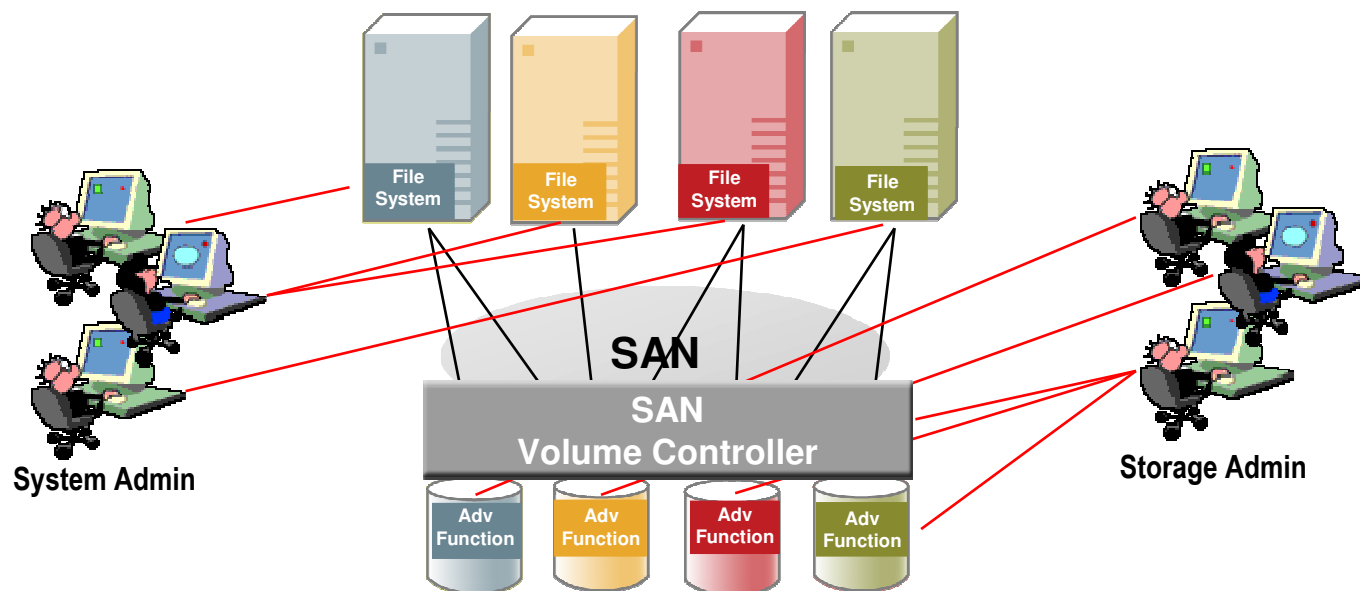
The Problem: SAN's have improved flexibility – Issues remain

Volume, Storage Management Issues

- Storage capacity is isolated in SAN islands
- Low capacity utilization, difficult to pool volumes
- SAN islands require unique mgmt interfaces
- Server downtime required to add/replace arrays, manage LUNs, migrate volumes
- Copy services are unique to each storage array

File, Data Management Issues

- File tasks must be done on each server
- Difficult to migrate applications to other servers
- Application downtime required for FS changes
- No single view/access to files or data
- Cannot pool files based on Quality of Service



SAN Volume Controller Delivers Value



Reduces the cost and complexity of managing storage

- **Creates tiers of storage**
- **Enables multi-vendor strategies**

Improves business continuity

- **Move data without interrupting applications**
- **Allocate more storage to applications automatically**

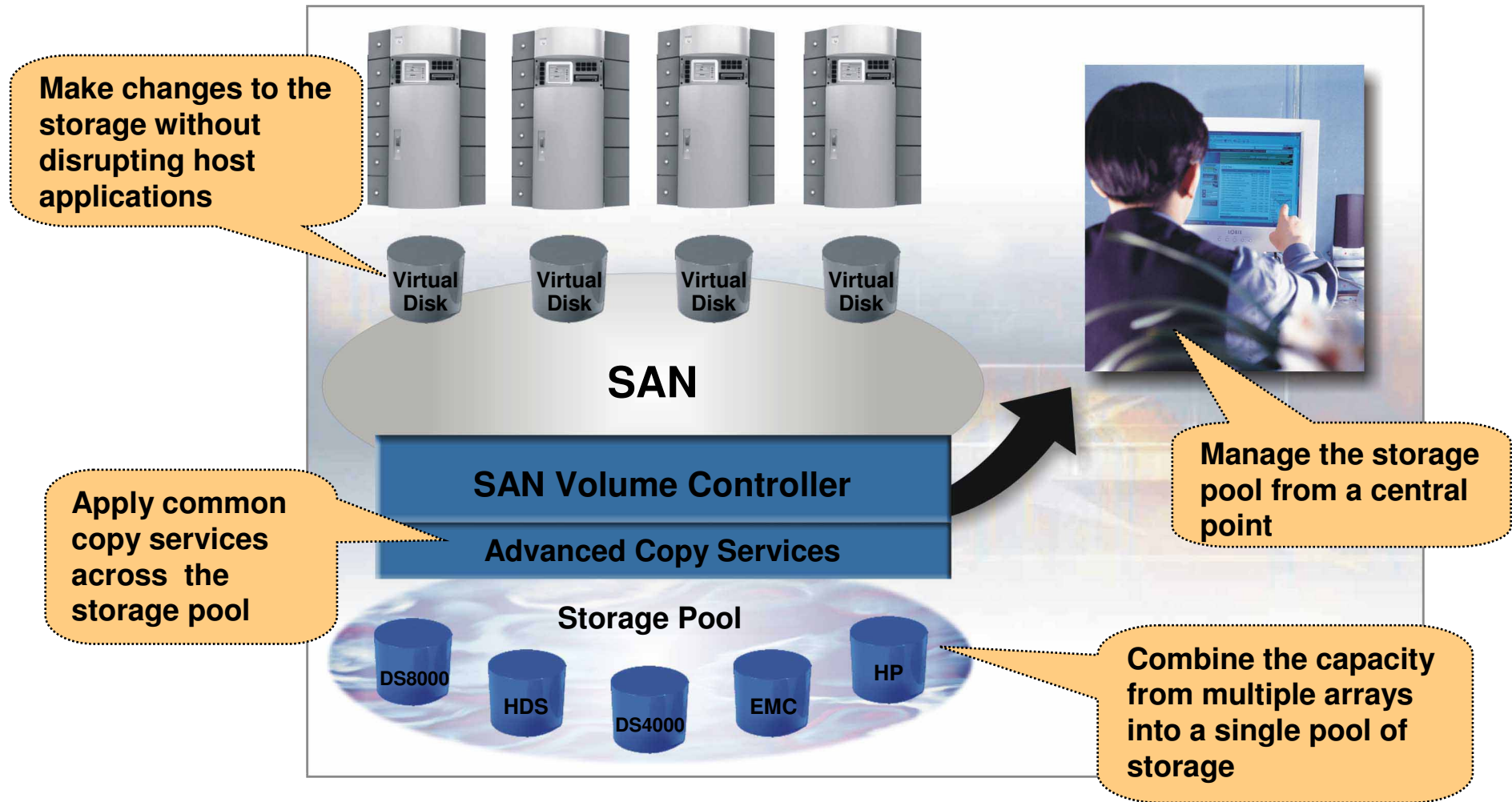
Improves storage utilization

- **Combines storage capacity into a single resource – from multiple vendors**
- **Manage storage as a business resource, not as separate boxes**

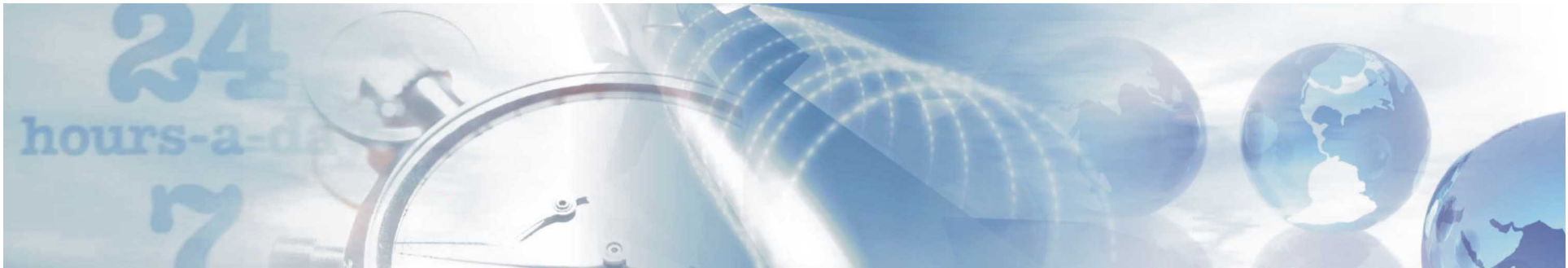
Improves personnel productivity

- **Manage a single storage resource from a central point**

Flexible Storage Infrastructure with SAN Volume Controller



SVC Delivers Availability, Performance, and Scalability



It's resilient
and highly available

- We designed and built SVC with the resiliency of a storage controller
- SVC now supports *non-disruptive* firmware updates and *hardware* maintenance on the disk arrays to further increase its availability
- SVC has over three years experience with customer implementations

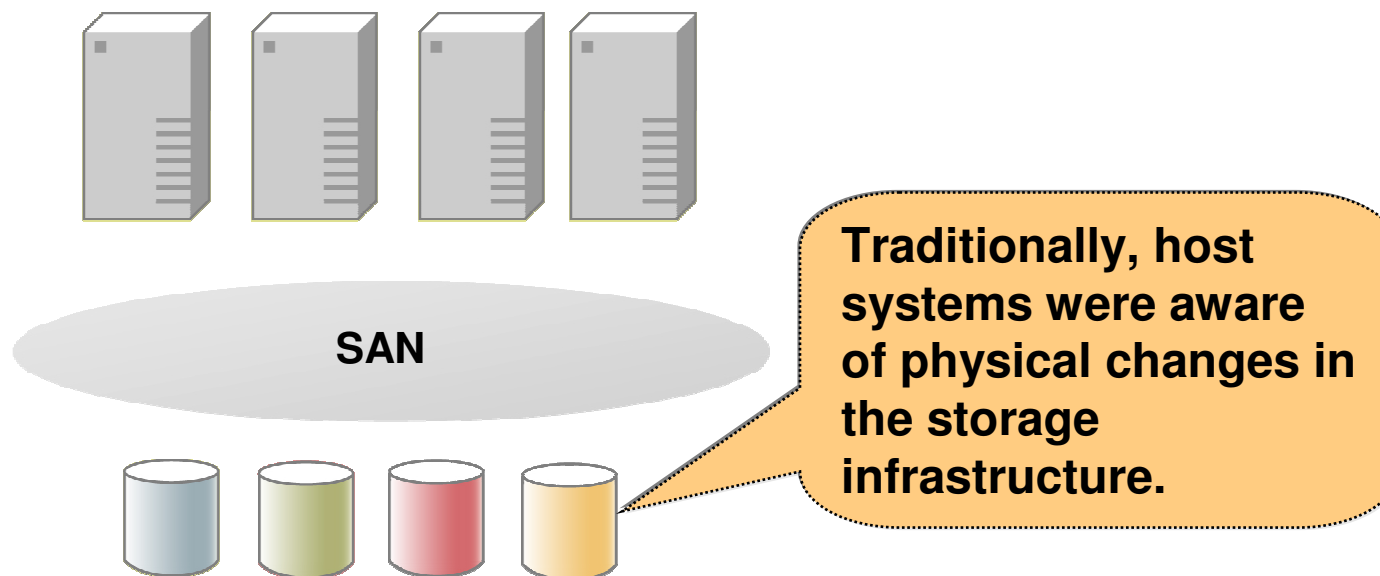
It has the *fastest* benchmark of any
controller

- SVC has the *fastest* SPC-1 benchmark EVER submitted (155K IOPS)
- SVC has the *fastest* SPC-2 benchmark EVER submitted (3.5 GBPS)
- Many references quote significant performance improvements (up to 10X faster)

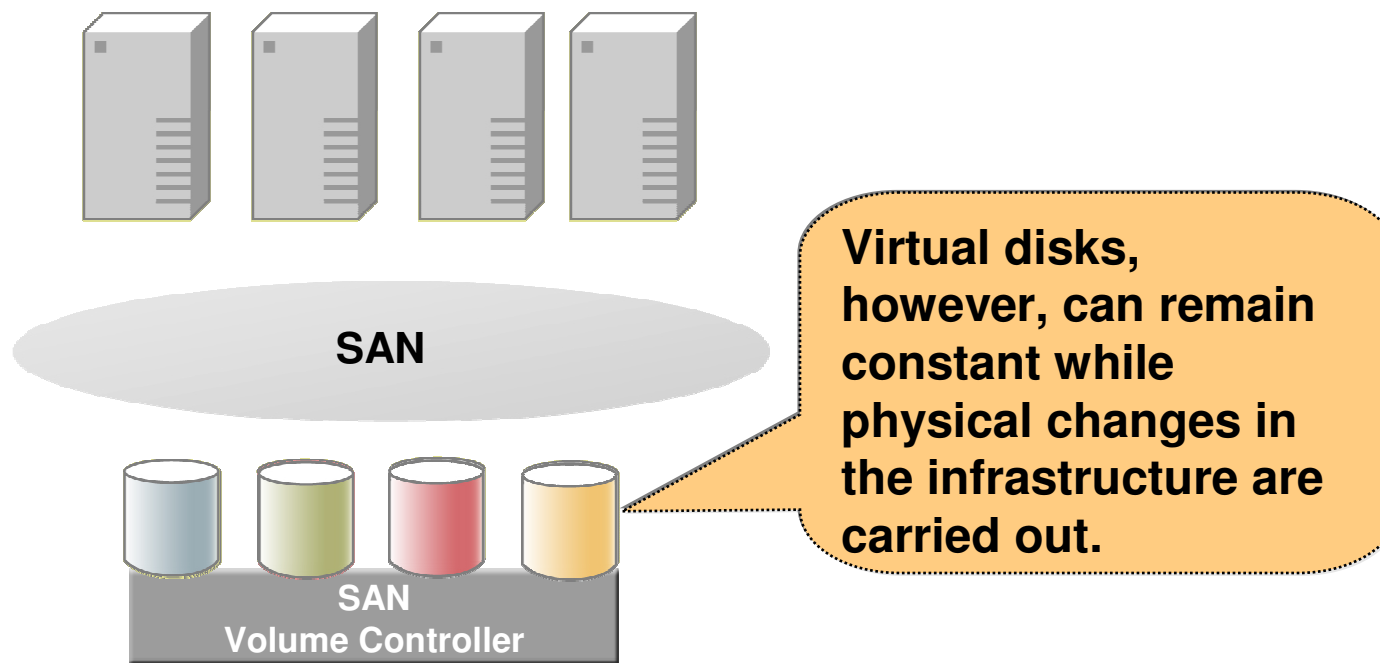
It scales to manage large
environments

- SVC scales from very small configurations (1TB) to large enterprises (> 500TBs) and growing !
- SVC now manages over 15PB of production storage worldwide

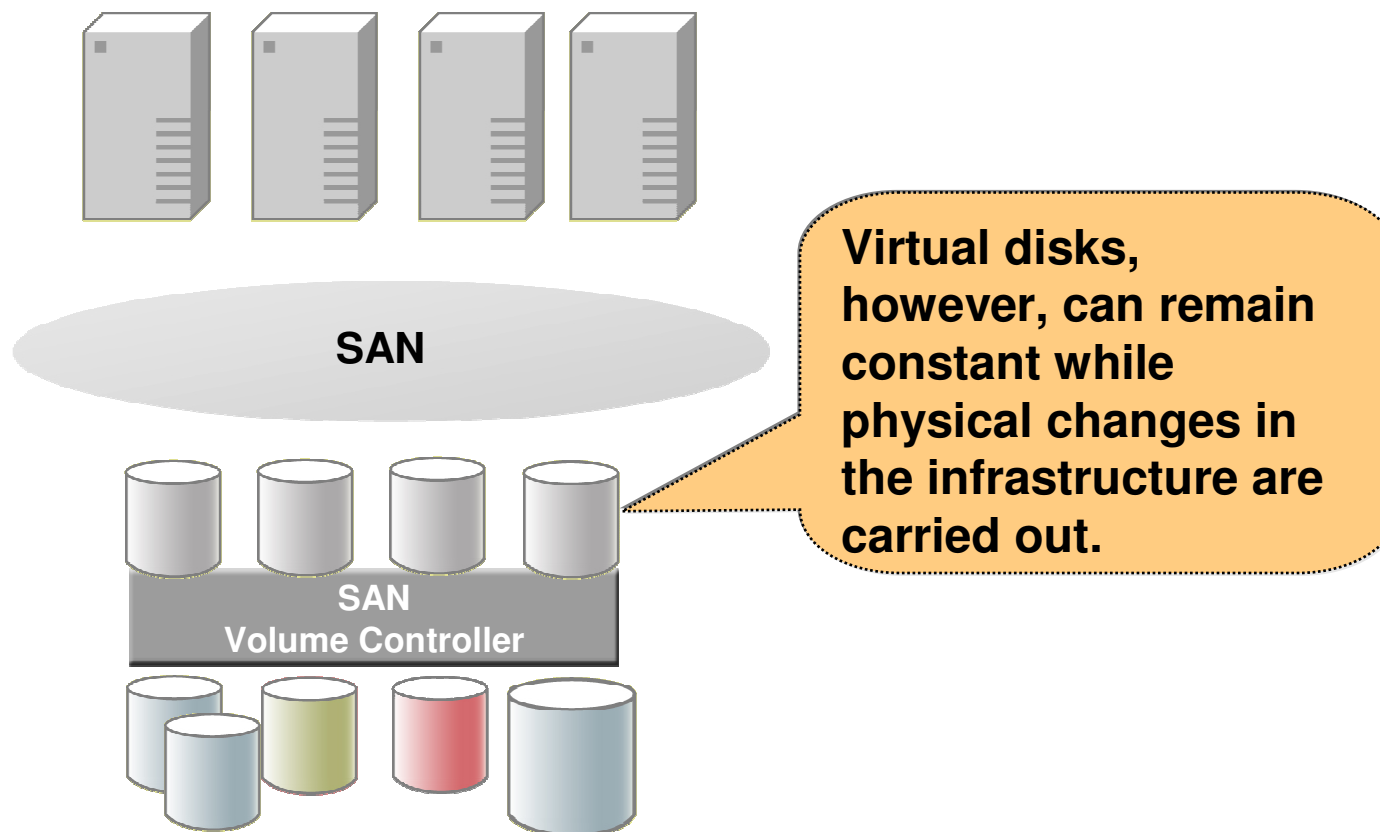
Virtualize the Disks



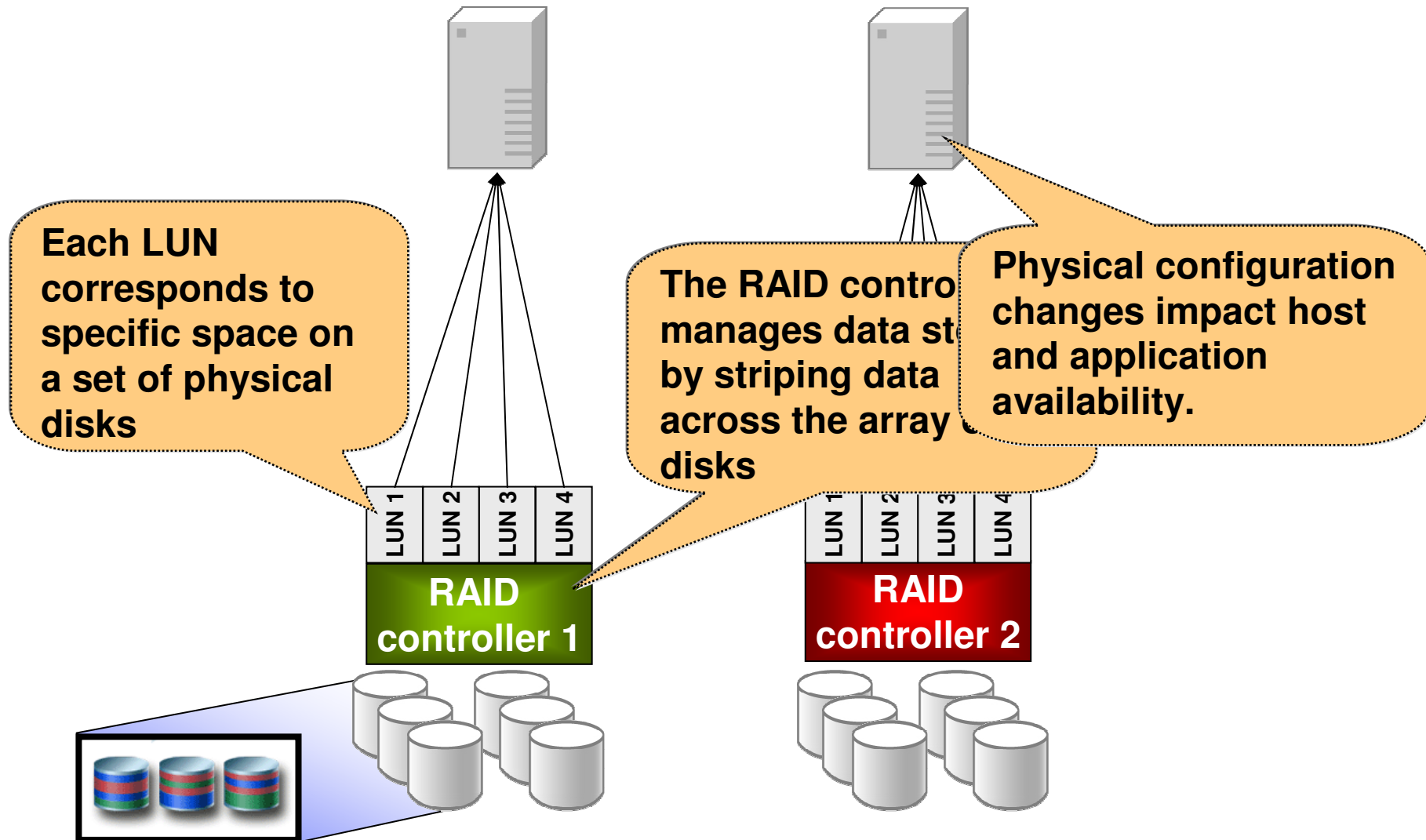
Virtualize the Disks



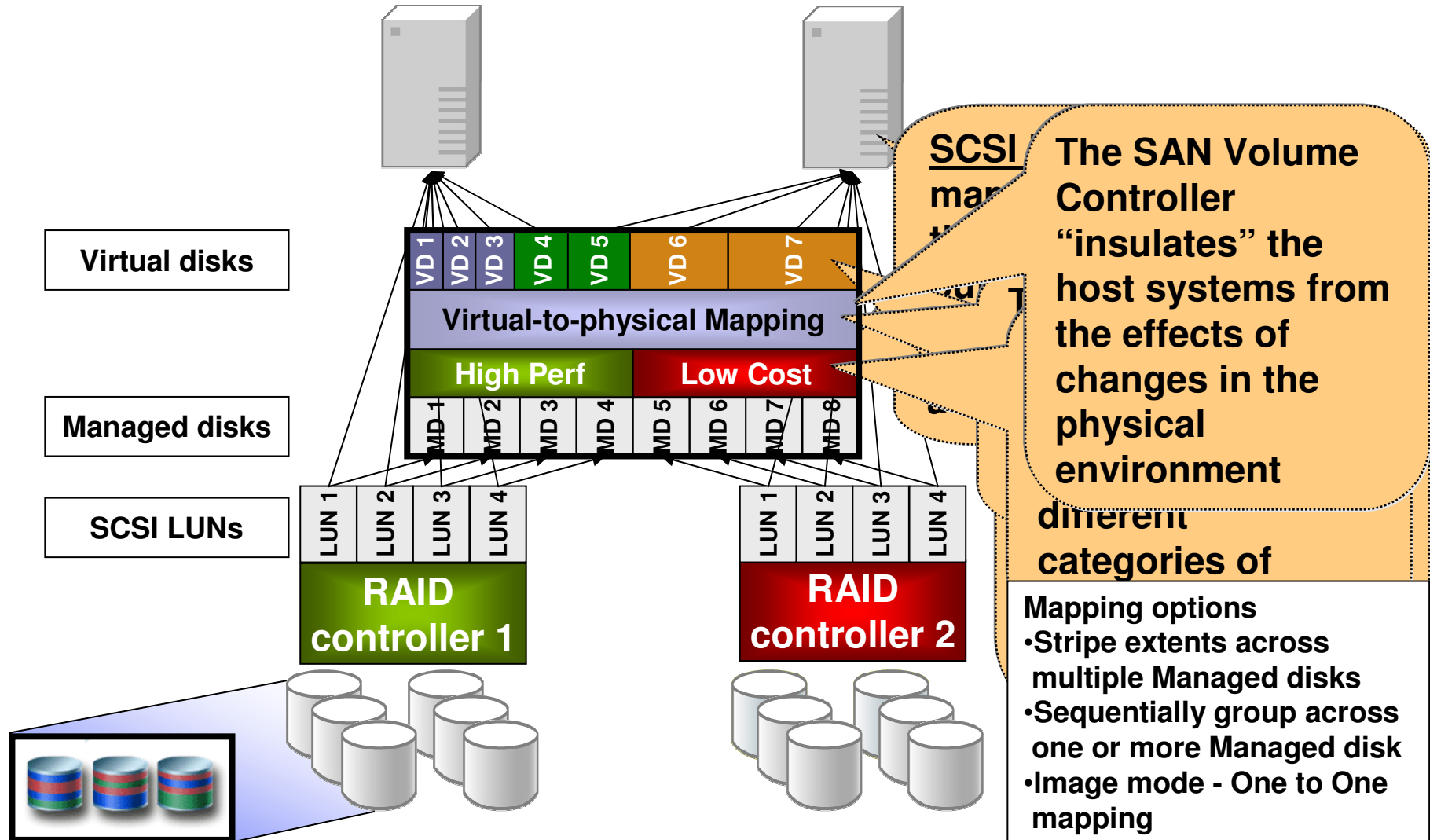
Virtualize the Disks



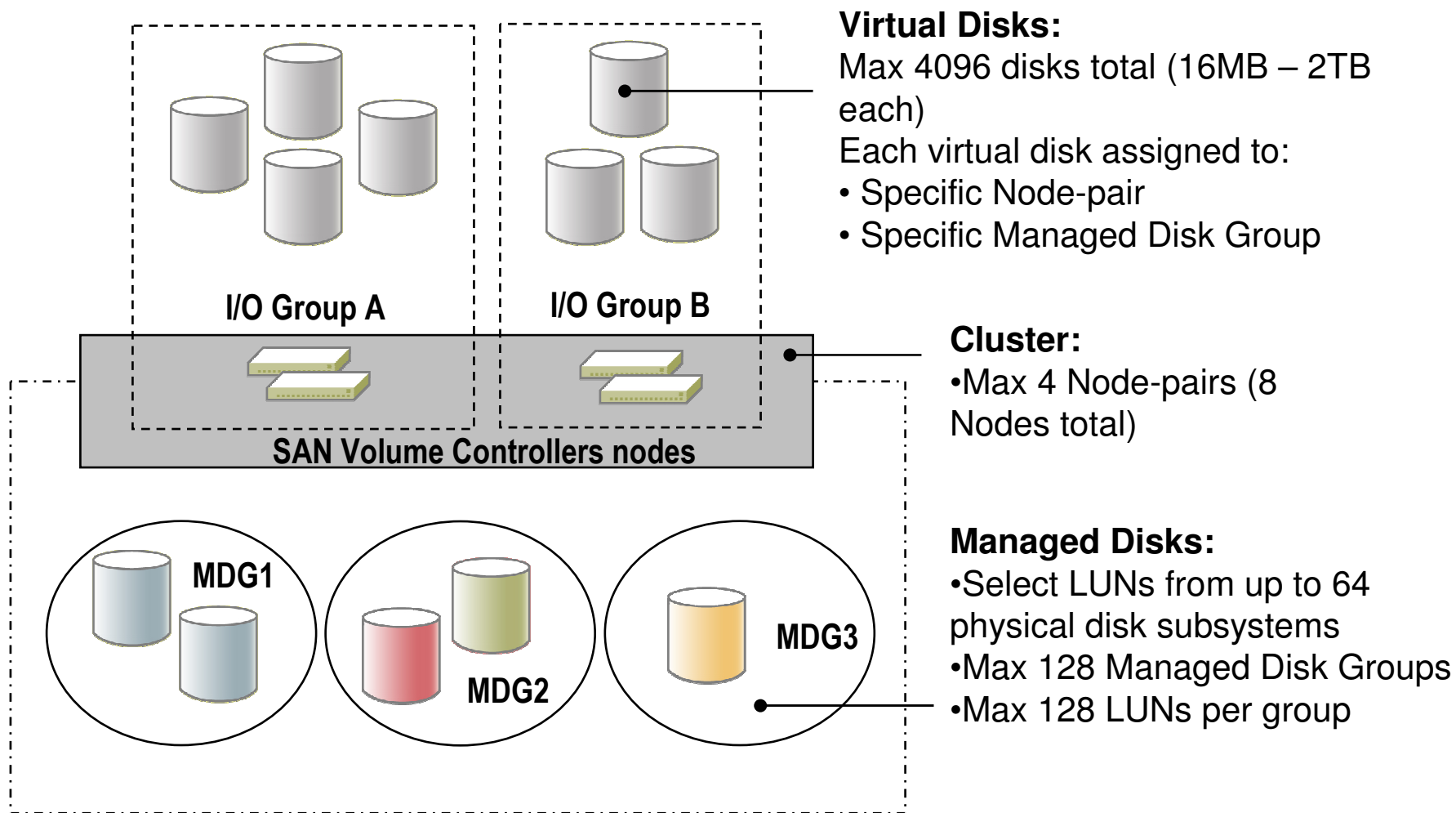
Traditional RAID Controllers



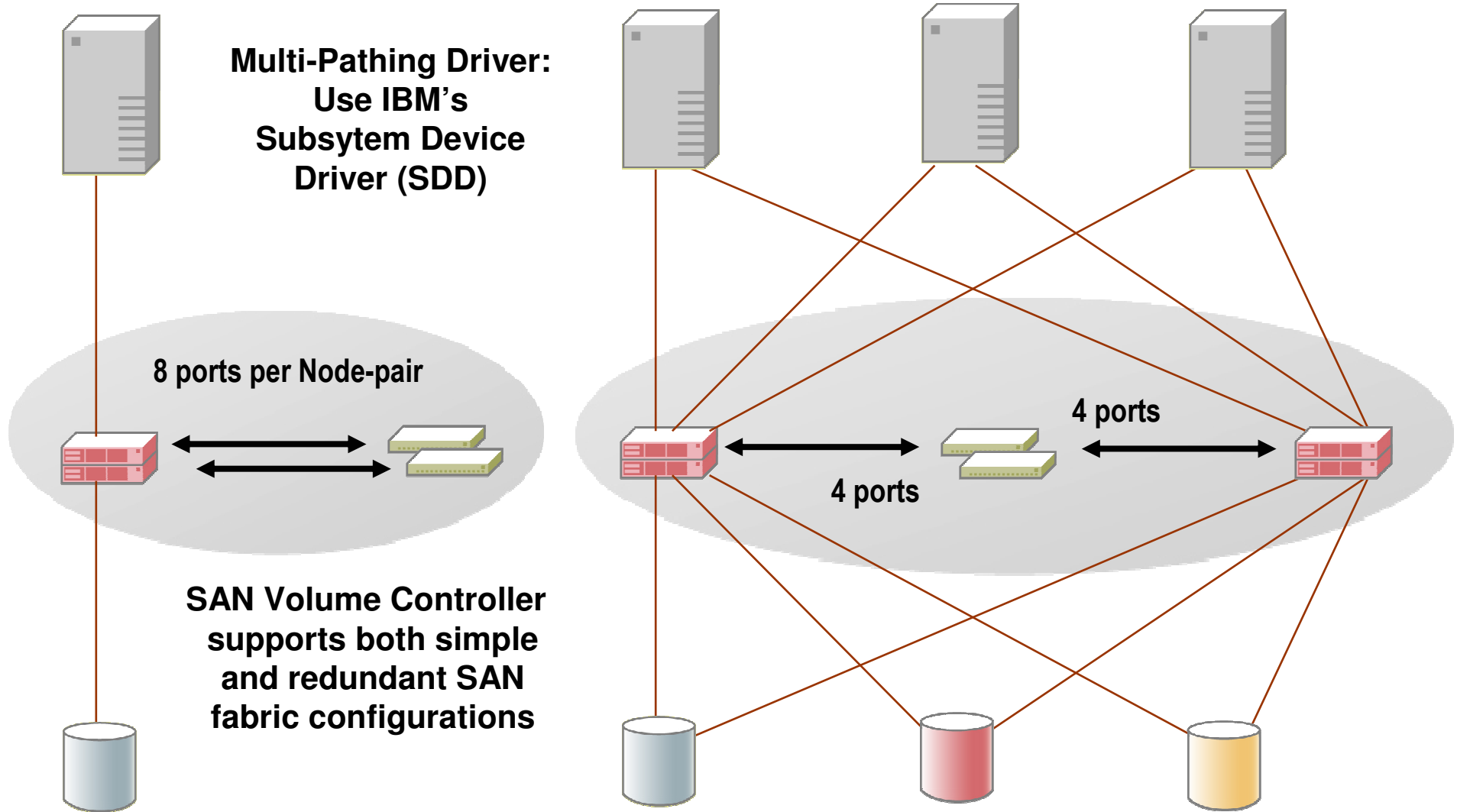
IBM TotalStorage SAN Volume Controller



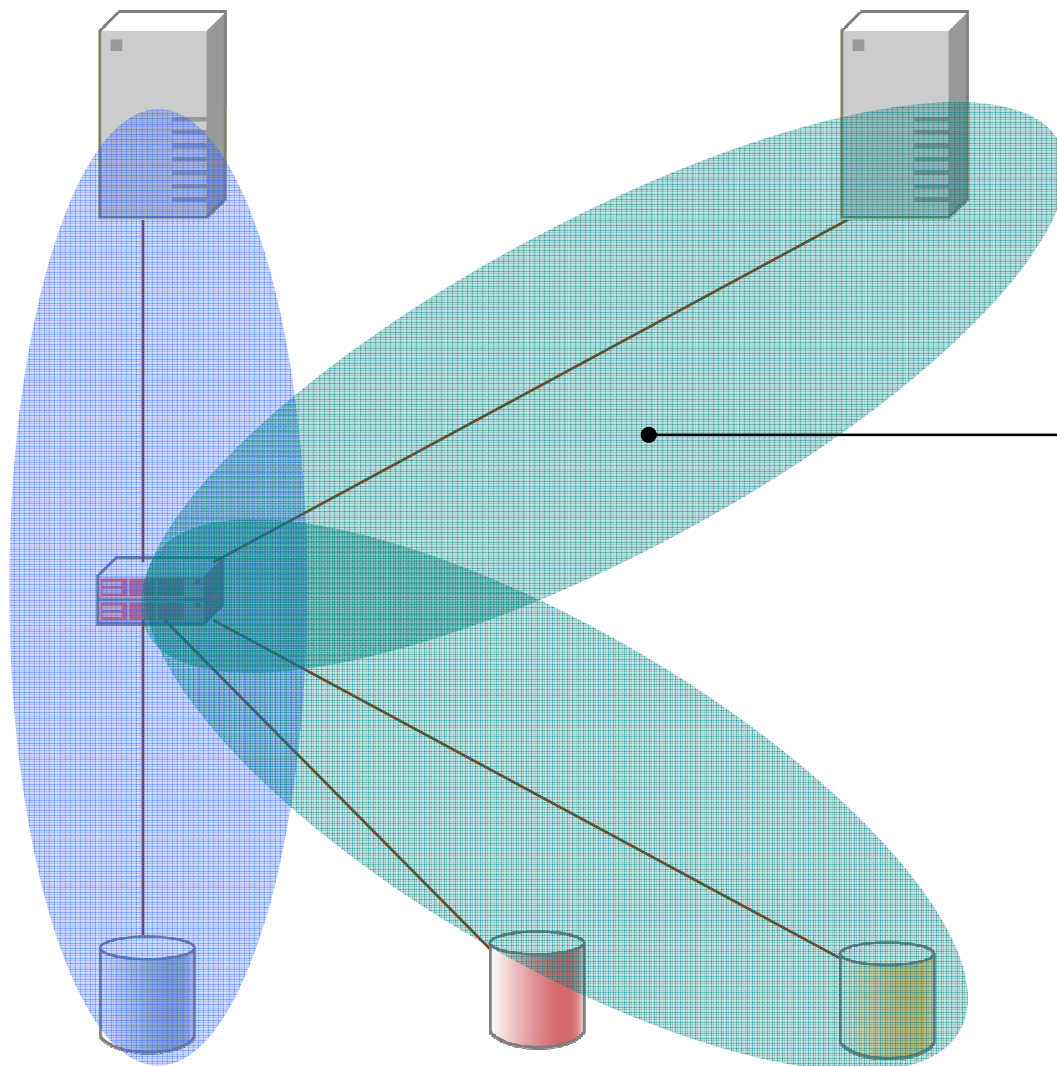
SAN Volume Controller - Terminology



SAN Volume Controller - Connections



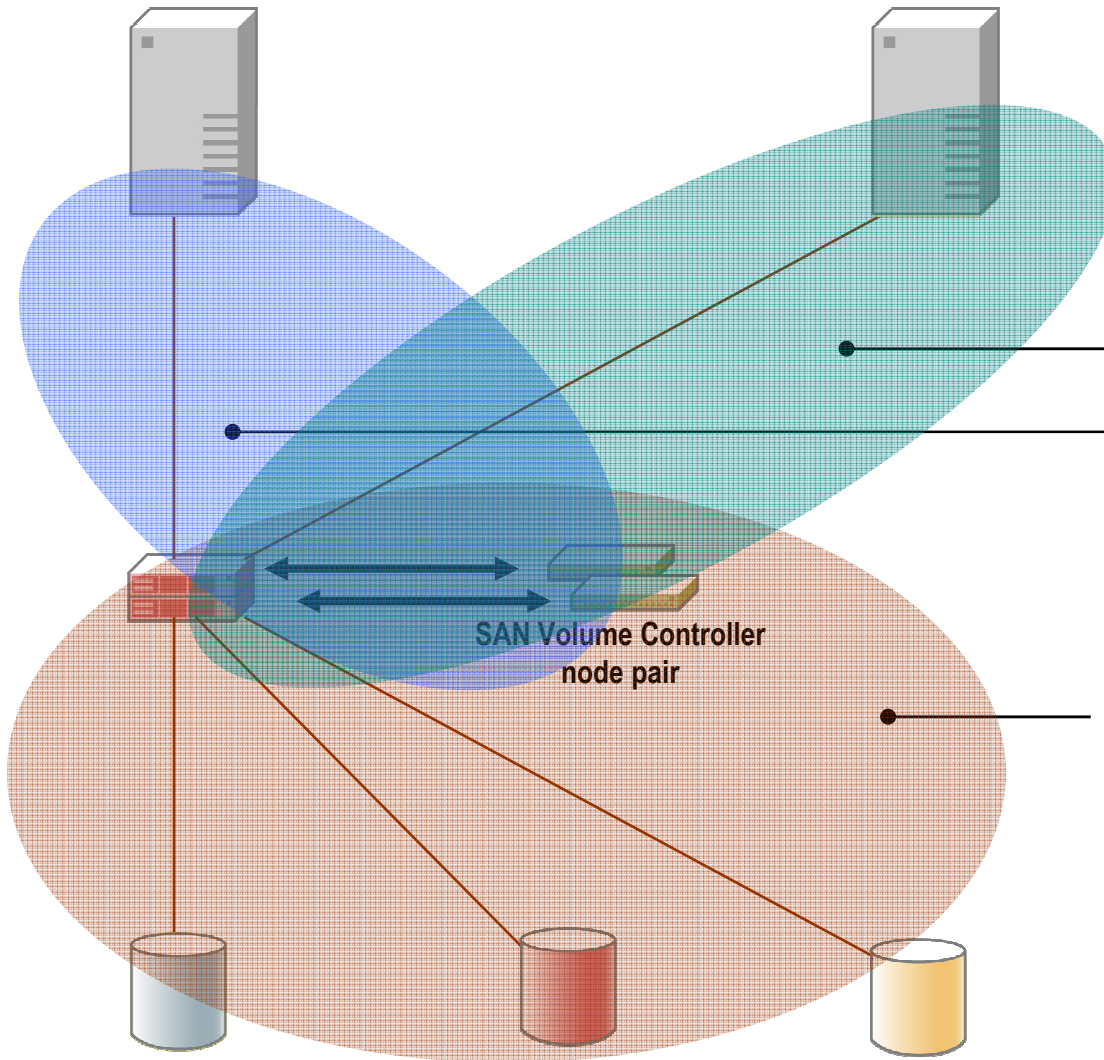
SAN Volume Controller - Zoning



Traditionally, host systems are zoned to the disks they are allowed to talk to.

But with the SAN Volume Controller...

SAN Volume Controller - Zoning



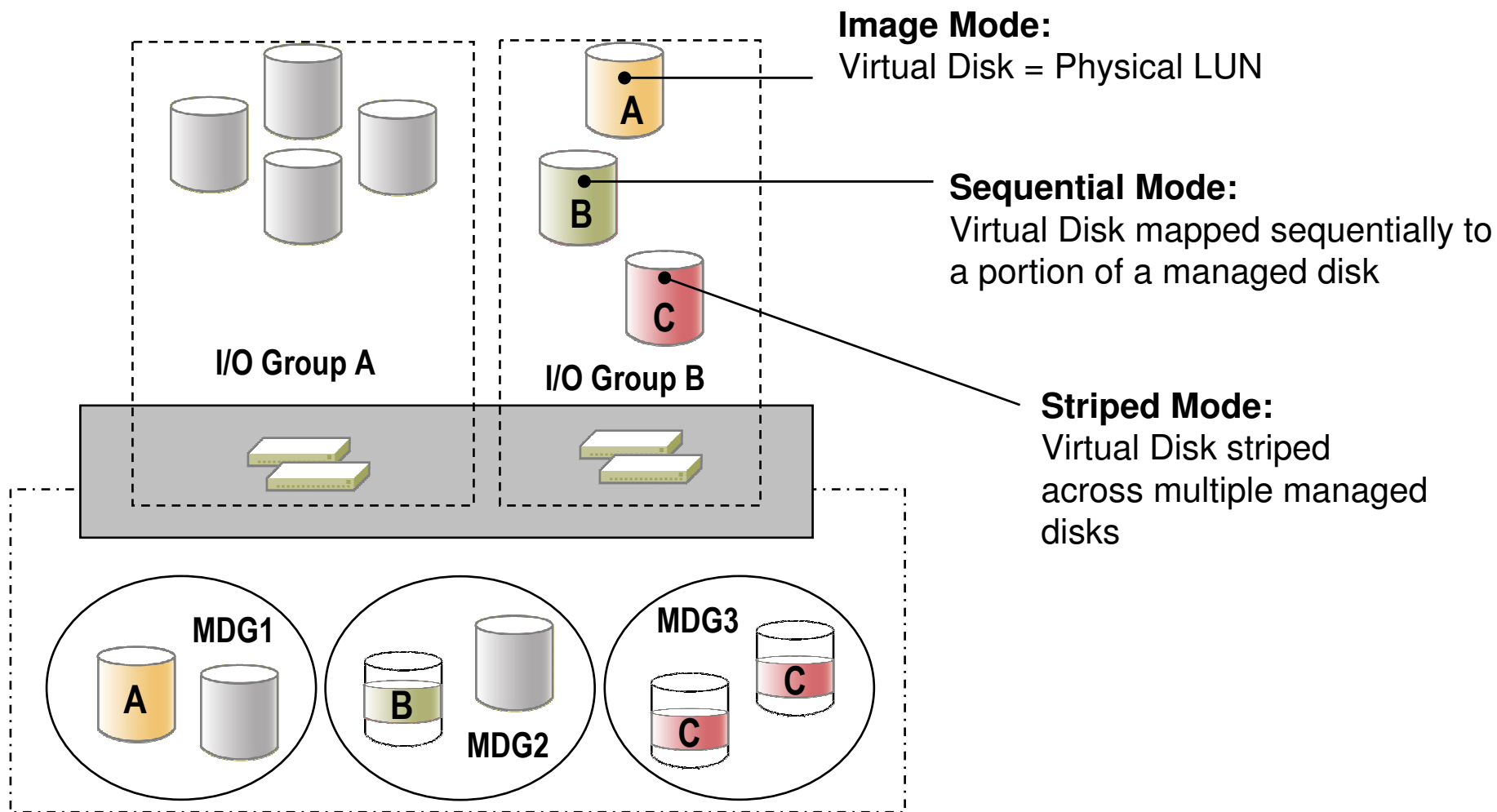
Host Zones:

- Hosts are zoned only to SAN Volume Controller.
- They see only the Virtual Disks they are allowed to talk to.

Device Zone:

- Devices are zoned only to the SAN Volume Controller.
- They see the SAN Volume Controller as their connected host.

SAN Volume Controller – Virtual Disk Modes



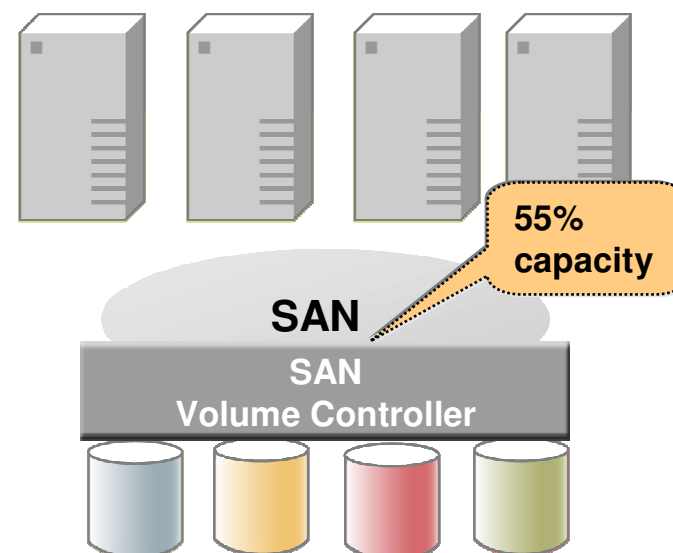
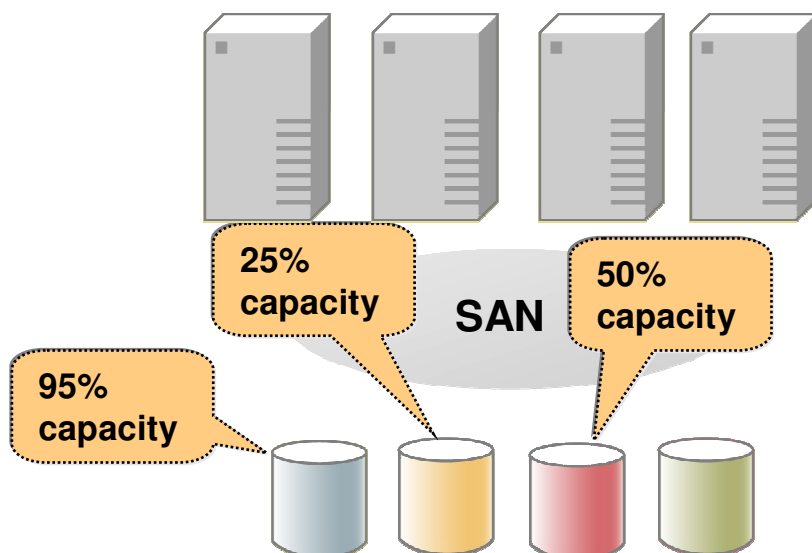
Optimized Storage Resource Utilization

Traditional SAN

- Shared physical network
- Limited capacity sharing
- Capacity purchased for, and owned by individual processors
- Poor capacity utilization

SAN Volume Controller

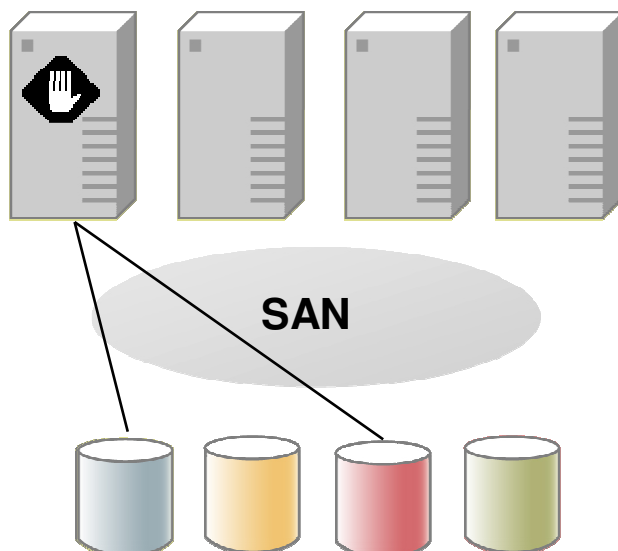
- Hosts own “virtual” disks
- Capacity can be more easily reallocated
- Capacity purchases can be deferred until the physical capacity of the SAN reaches a trigger point.



Improved Application Availability

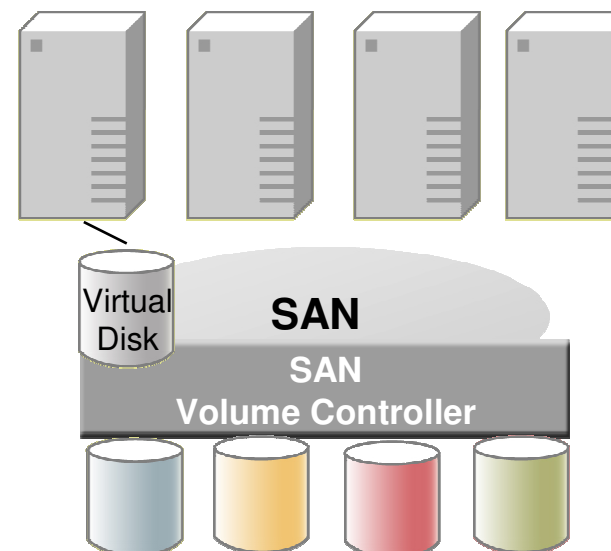
Traditional SAN

1. Stop the application
2. Move data
3. Re-establish host connections
4. Start application



SAN Volume Controller

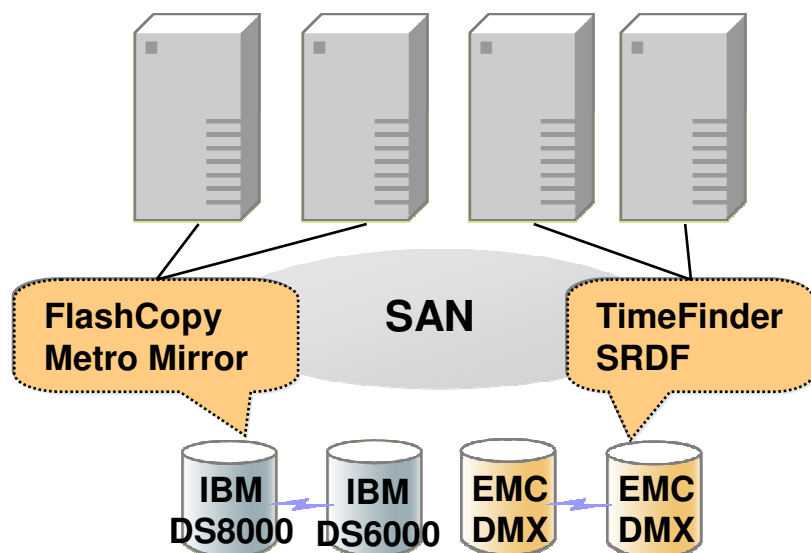
1. Move data
 - Host systems and applications are not affected.



Reduced Cost and Improved Flexibility for Replication Services

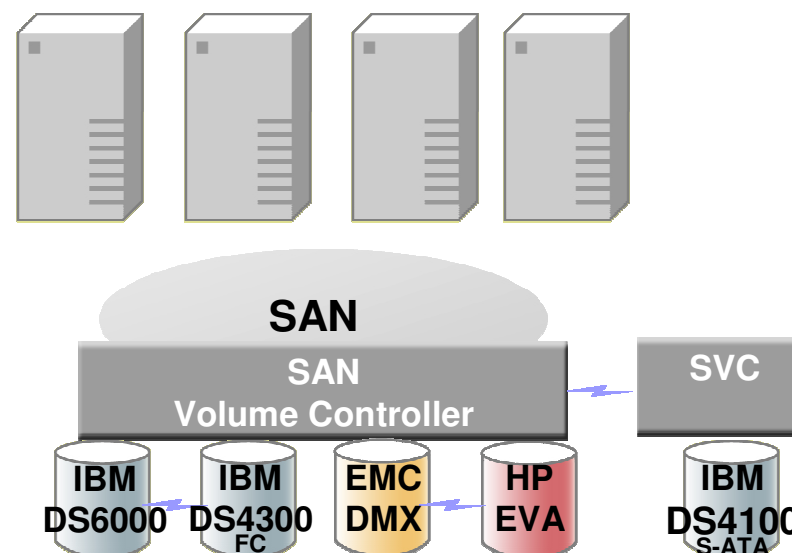
Traditional SAN

- Replication service API's differ by vendor, making it difficult to integrate applications
- Lower-cost disks offer primitive, or no replication services

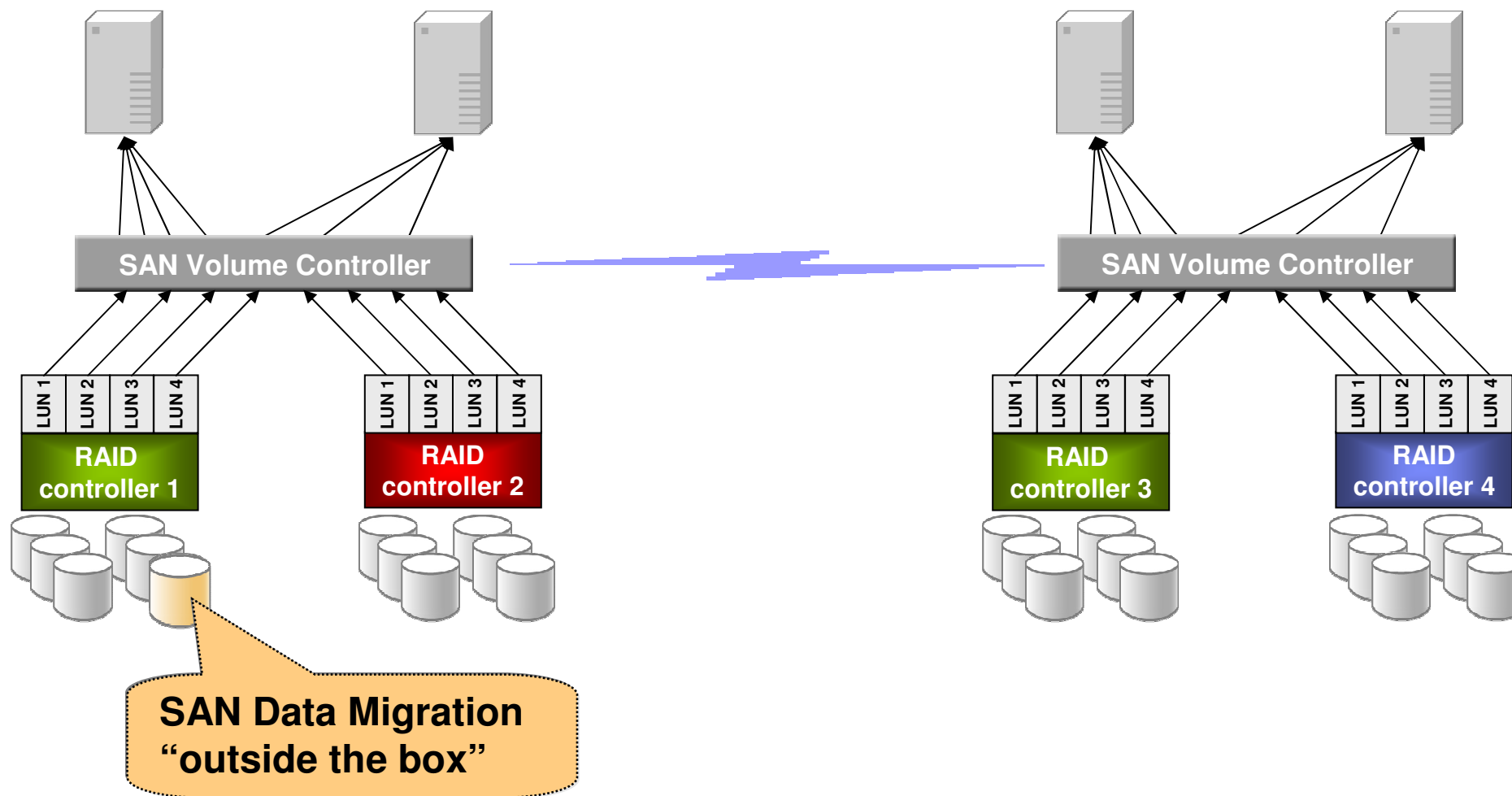


SAN Volume Controller

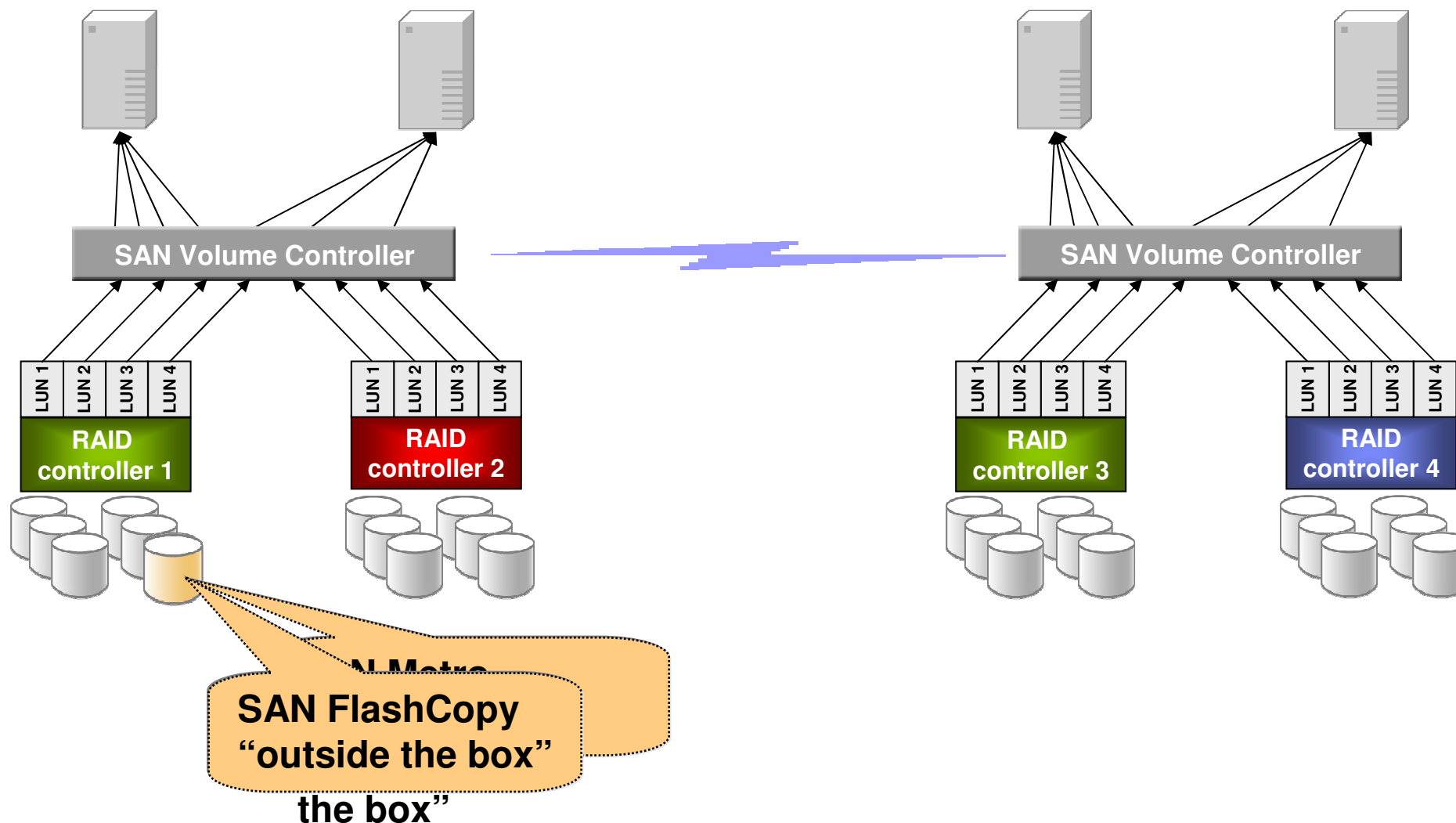
- Common replication API, SAN-wide, that does not change as storage hardware changes
- Replication targets can be on lower-cost disks, reducing the overall cost of exploiting replication services



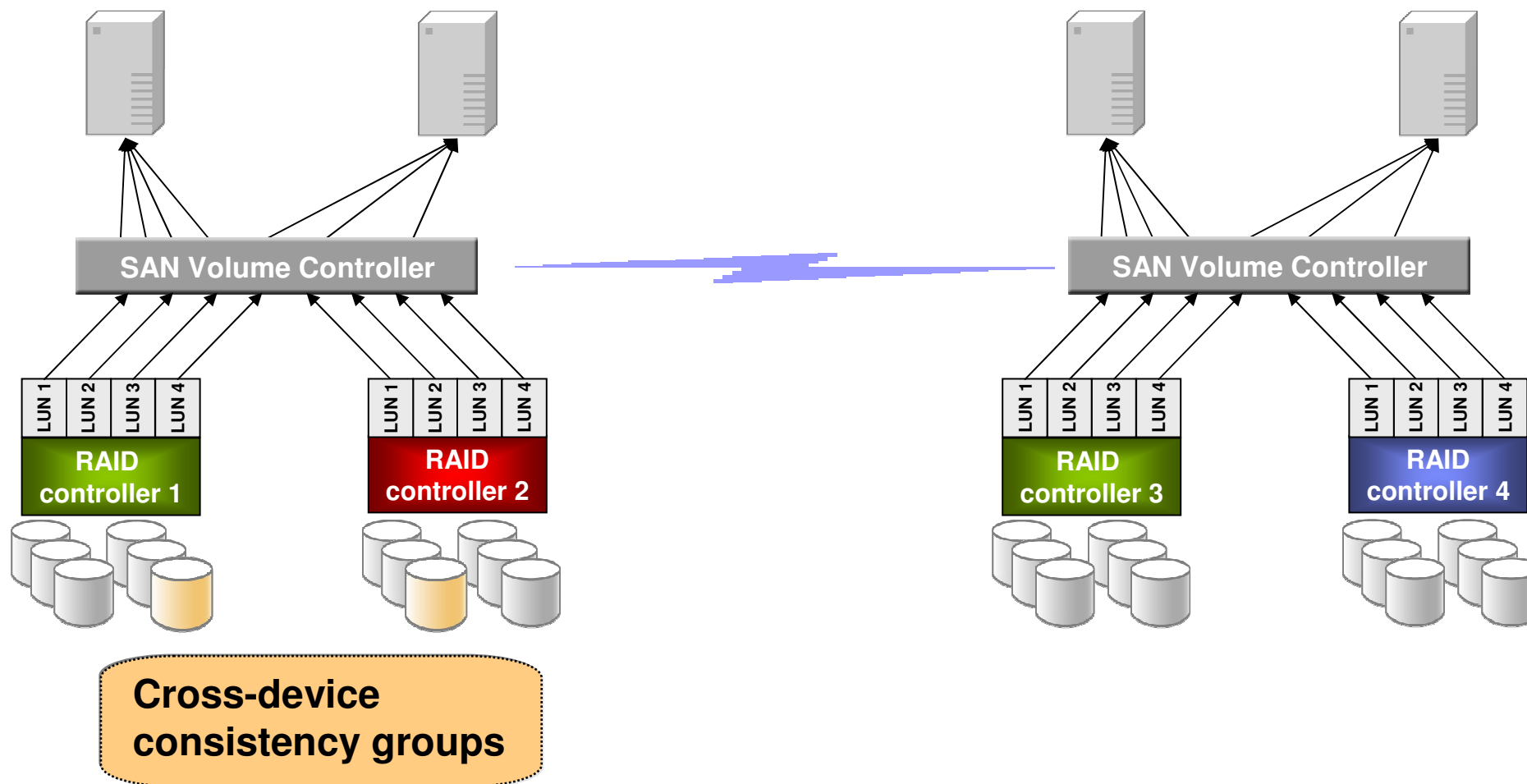
TotalStorage SAN Volume Controller Copy Services



TotalStorage SAN Volume Controller Copy Services



TotalStorage SAN Volume Controller Copy Services



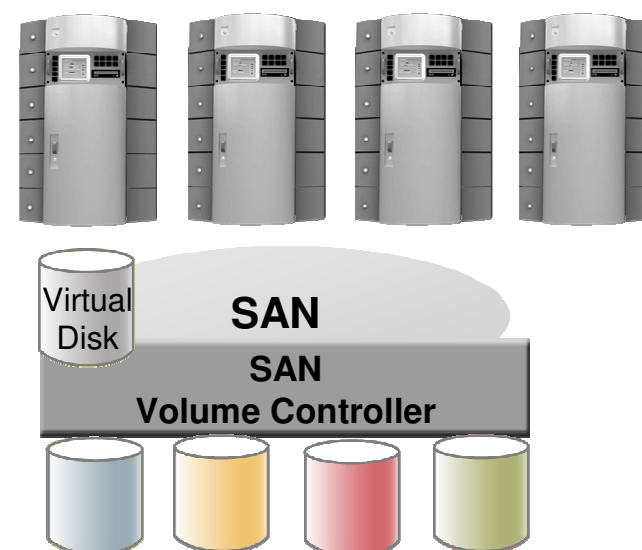
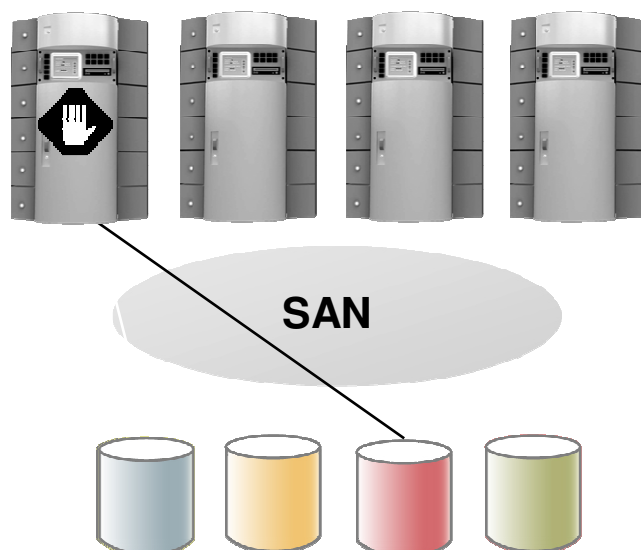
Non-disruptive Data Migration with SAN Volume Controller

Traditional SAN

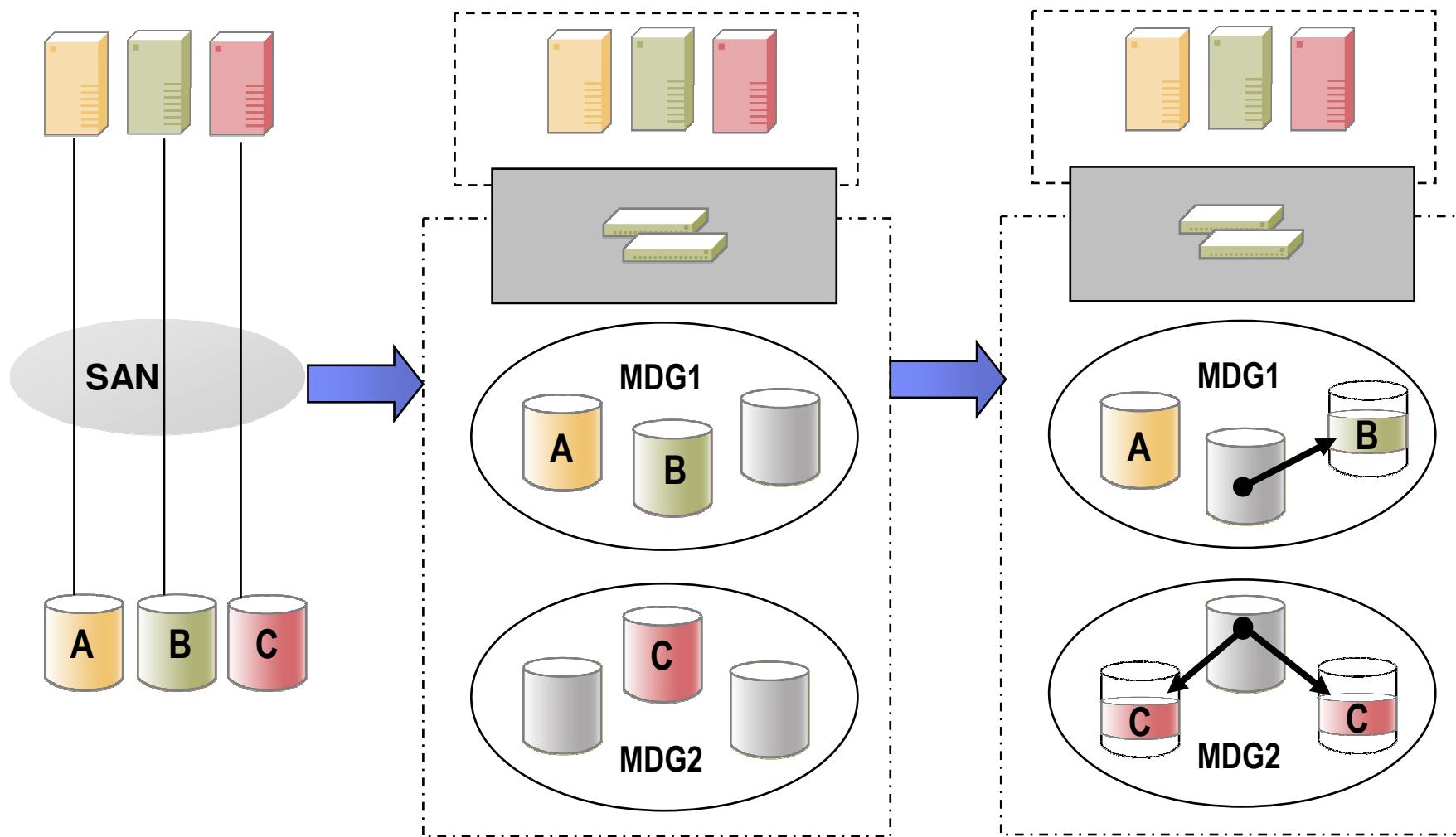
1. Stop applications
2. Move data
3. Re-establish host connections
4. Restart applications

SAN Volume Controller

1. Move data
Host systems and applications are not affected.



SAN Volume Controller – Migration





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SVC Performance



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Latest SAN Volume Controller SPC-1 Benchmark – Ver 3.1

SPC-1 Results

Tested Storage Configuration (TSC) Name:

**IBM TotalStorage
SAN Volume Controller 3.1**

Metric

Reported Result

SPC-1 IOPS

155,519.47

SPC-1 Price-Performance

\$12.76/SPC-1 IOPS

Total ASU Capacity

12,216.796 GB

Data Protection Level

Mirroring

Total TSC Price
(including three-year maintenance)

\$1,983,784.74

http://www.storageperformance.org/results/a00043-r1_IBM_SPC1_executive-summary.pdf

Key Points:

- SVC delivers the highest results **EVER** posted in this industry-recognized storage performance test
 - SVC is 50% better than the next closest disk array
 - SVC (155,519 IOPS) + DS8000 (101,101 IOPS) lead the industry in virtualization and disk array performance benchmarks

SPC-2 Benchmark



- Newest addition to the Storage Performance Council Benchmarks
- Composite of three workloads to measure sequential performance
 - Large file processing – scientific and large-scale financial processing
 - Large database queries – data mining and business intelligence
 - Video on demand – streaming movies to end users
- SVC posted the highest results in this industry-recognized storage performance test
 - SVC (3.517 GB/s) + DS8300 (3.217 GB/s) lead the industry in this new benchmark



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Automating SAN Volume Controller Management



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TPC Enhances SAN Volume Controller



Asset and Capacity Reporting

- **Physical characteristics such as the manufacturer, model, serial number, capacity, etc.**
- **Show the allocated and free capacity of every SVC on the network**

Configuration Reporting
and Management

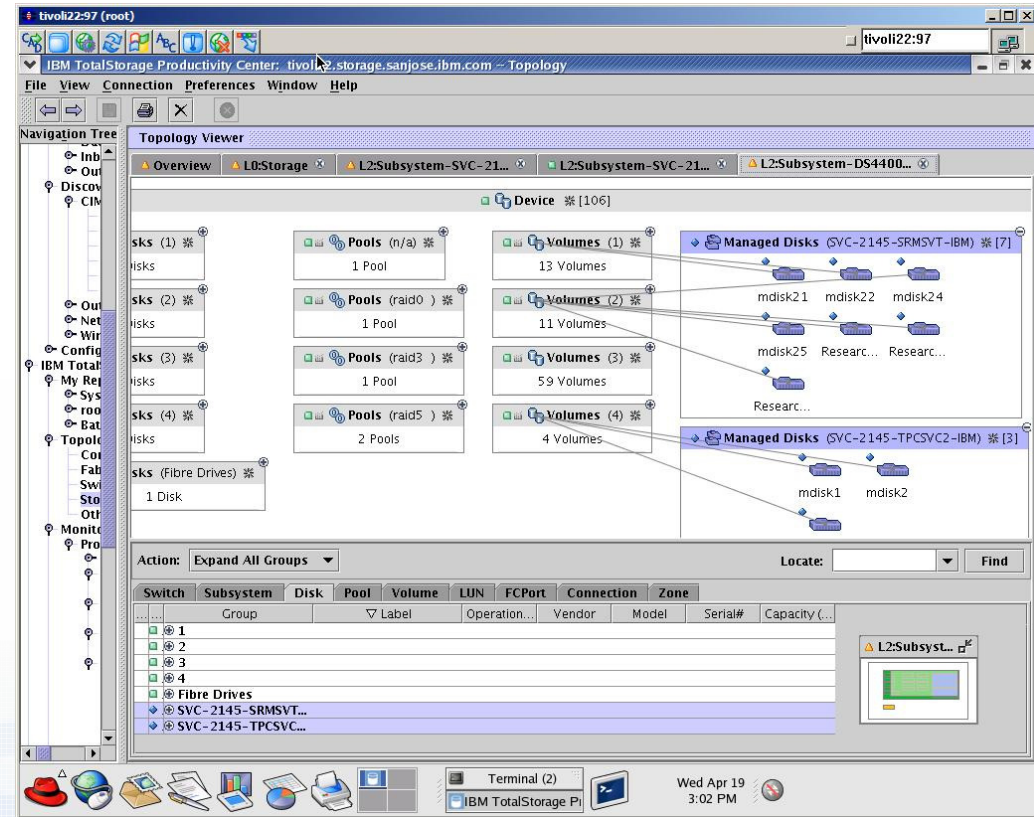
- **Reports on SVC's storage allocated to logical host volumes (which appear to hosts as disk drives) and the managed disks being used on the backside**
- **Display the physical managed disks behind what the host sees as a disk drive**
- **List all SVC volumes which have been allocated but aren't in use**
- **Show which hosts have access to a given SVC volume**
- **Show which hosts have access to a given disk drive (within the SVC)**
- **Show which SVC volume (and managed disks) a host has access to**
- **Discovery, Show the Storage Controllers (ex., ESS/DS4000) that provide volumes to SVC**

Performance Management

Basic and Automated
Provisioning

Managing SAN Volume Controller with TPC

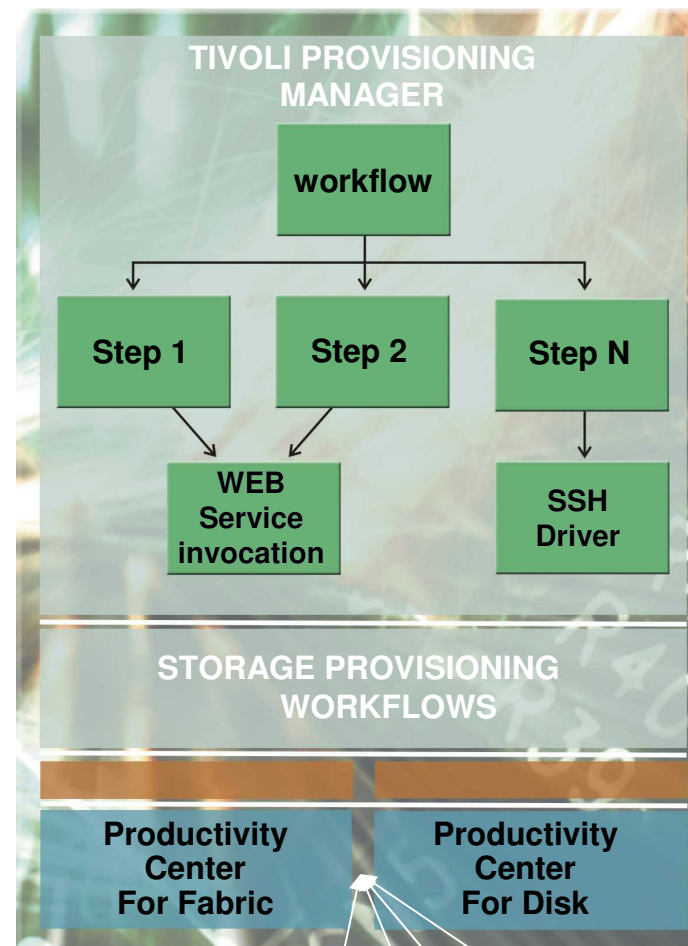
- Users can set thresholds for predefined performance metrics
 - Total Virtual Disk I/O Rate (I/O per sec per I/O group)
 - Total Virtual Disk Transfer Rate (MB per sec per I/O group)
 - Total Managed Disk IO Rate (I/O per sec per Mdisk group)
 - Total Managed Disk Transfer Rate (MB per sec per Mdisk group)
- Events can be sent to an SNMP manager or Tivoli Event Console
- Topology view shows SVC mDisk and maps to physical storage



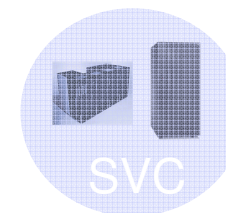
- Reporting on vDisk – mDisk and Storage Volume Names

TotalStorage Productivity Center & Advanced Provisioning

- IBM TotalStorage Productivity Center with Advanced Provisioning provides storage capacity provisioning for:
 - DS8000 Series
 - DS6000 Series
 - ESS
 - DS4000 Series
 - SAN Volume Controller
 - SAN Fabric



Through automated storage workflows driven by Tivoli Provisioning Manager





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SAN Volume Controller Supported Environments

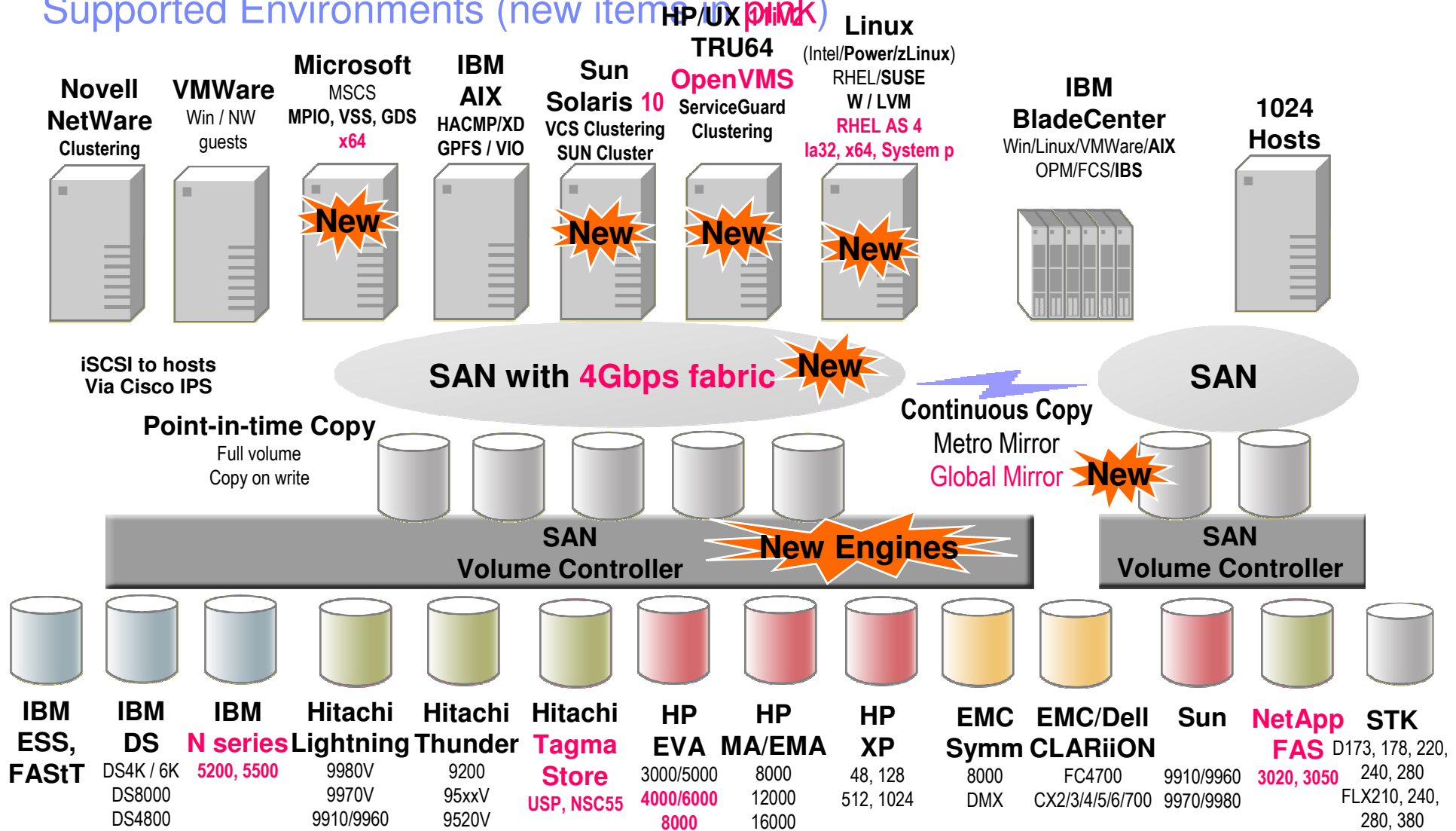


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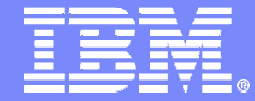


System Storage SAN Volume Controller Version 4.1

Supported Environments (new items in pink)



IBM ESS, FASTT	IBM DS DS4K / 6K DS8000 DS4800	IBM N series 5200, 5500	Hitachi Lightning Thunder 9980V 9970V 9910/9960	Hitachi Thunder 9200 95xxV 9520V	Hitachi Tagma Store USP, NSC55	HP EVA 3000/5000 4000/6000 8000	HP MA/EMA 8000 12000 16000	HP XP 48, 128 512, 1024	EMC Symm 8000 DMX	EMC/Dell CLARiiON FC4700 CX2/3/4/5/6/700	Sun 9910/9960 9970/9980	NetApp FAS 3020, 3050	STK D173, 178, 220, 240, 280 FLX210, 240, 280, 380
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Conclusion



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Key Requirements for Virtualized Disk Storage

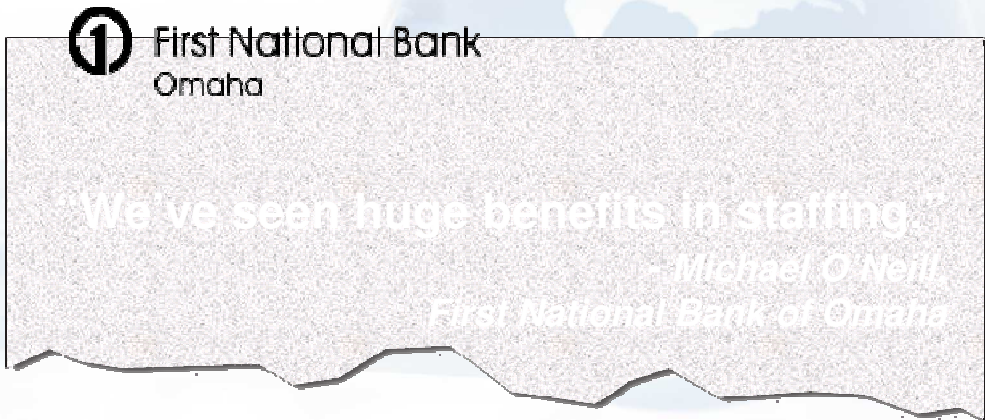
With over 2000 clients to date, SAN Volume Controller delivers ...

- Retain existing investments
- Implement with minimal disruption to applications
- Enable phased implementation



Virtualization is Real

- Storage virtualization: talk turns to action
 - Better utilization
 - Lower costs
 - Improved availability
- Four years' experience in deploying network-based virtualization systems
- Rapid adoption demonstrates attractiveness of solutions
 - 2,000 SVC clients world-wide managing over 15PB of data



SAN Volume Controller Value



Reduces the cost and complexity of managing storage

Creates tiers of storage and enables multi-vendor strategies

Improves business continuity

Change storage without interrupting applications

Improves storage utilization

Manage storage as a business resource, not as separate boxes

Improves personnel productivity

Manage a single storage resource from a central point

Delivers high availability and performance

Demonstrated over three years' experience



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