



Education

Server and Storage Virtualization with IP Storage

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Storage Consolidation with IP Storage

This session will appeal to IT managers, administrators and architects interested in the benefits and deployment considerations available with IP Storage for virtual server environments.

This presentation provides an introduction to virtual server environments, with a focus on capabilities and IT benefits. It then explores the complementary storage virtualization capabilities available with IP storage solutions today.

Particular emphasis is given to application and server provisioning, data protection and recovery, and configuration flexibility. Finally it illustrates typical deployment benefits with reference to real-world case studies.

- Virtualization defined
- Server virtualization benefits
- Challenges for consolidated storage in virtual server environments
- iSCSI-based SANs for virtual server environments
 - ◆ Typical array capabilities
 - ◆ Connectivity, security & I/O considerations
 - ◆ Backup
 - ◆ Server and application provisioning
 - ◆ Disaster recovery
- Typical deployment scenarios
- Summary

Virtualization Defined

➤ Storage Virtualization

- ◆ The act of abstracting, hiding, or isolating the internal function of a storage (sub) system or service from applications, compute servers or general network resources for the purpose of enabling application and network independent management of storage or data.

Source: SNIA Dictionary

➤ Server Virtualization

- ◆ A method of partitioning a physical server computer into multiple servers that each has the appearance and capabilities of running on its own dedicated machine. Each virtual server can run its own full-fledged operating system, and each server can be independently rebooted.

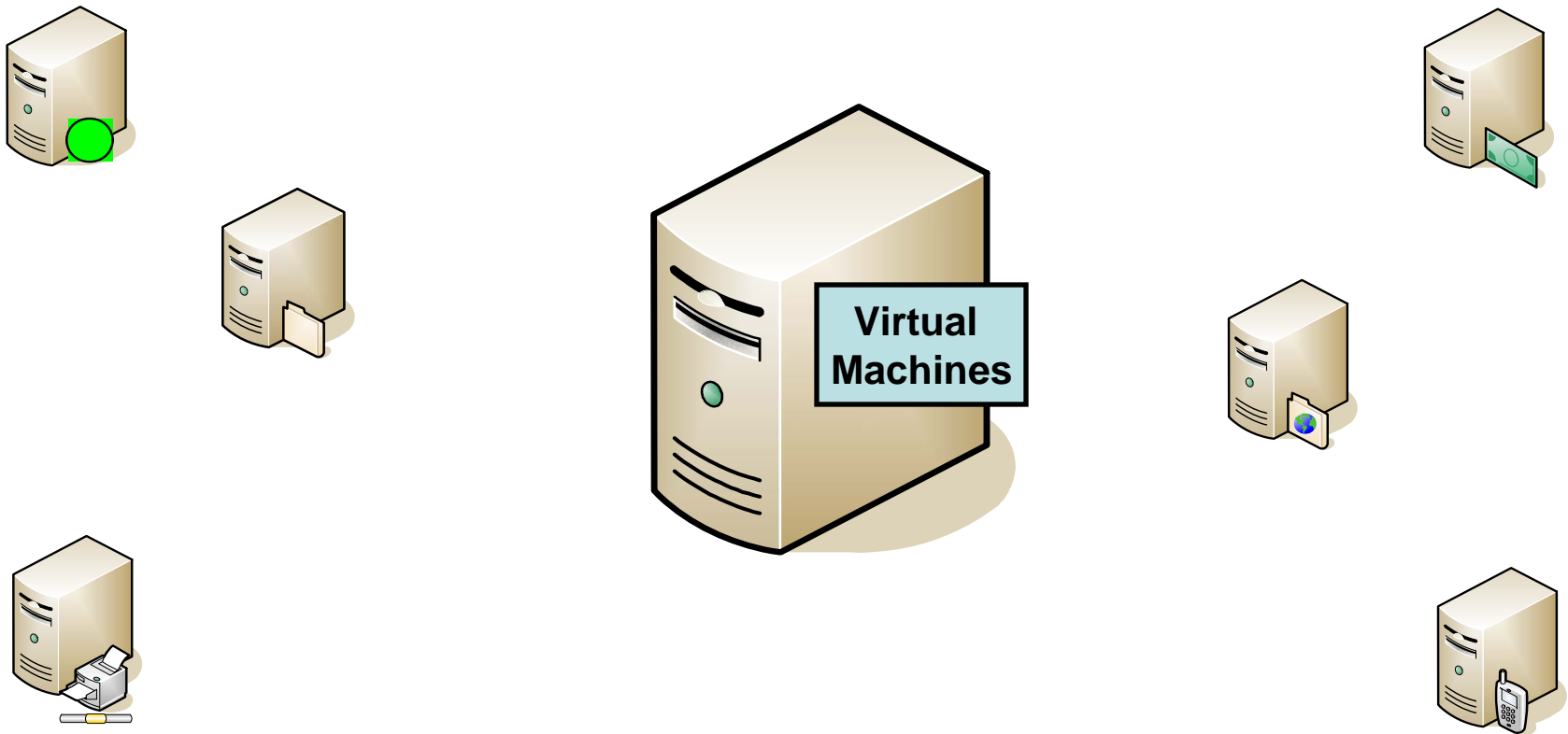
Source: Wikipedia

Benefits of Server Virtualization

- **Server Consolidation**
 - ◆ Reduced number of servers
 - ◆ Dramatically improved CPU utilization
- **Physical Infrastructure Cost Reduction**
 - ◆ Reduced hardware cost and complexity
 - ◆ Reduced data center footprint, power and cooling
- **Improved Operational Flexibility & Efficiency**
 - ◆ Reduced administrative overhead
 - ◆ Greatly simplified server and application provisioning:
- **Increased Application Availability**
 - ◆ Elimination of planned downtime
 - ◆ Fast recovery from unplanned outages
- **Improved Business Continuity:**
 - ◆ Consolidated backup and restore
 - ◆ Simplified disaster recovery

Typical Deployment

**Reduce cost by virtualizing server hardware.
Customers typically consolidate 8 – 32 physical systems onto a Virtual Server.**

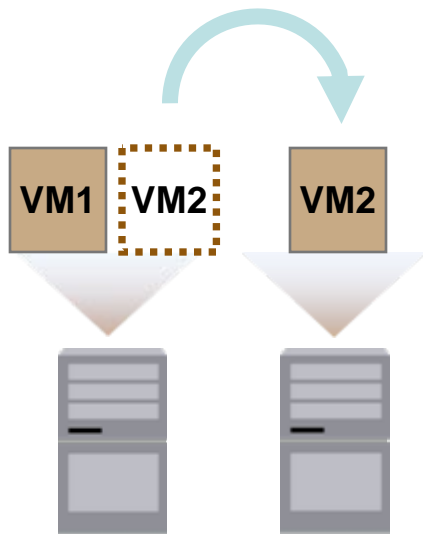


Virtualization Increases Demands on Storage

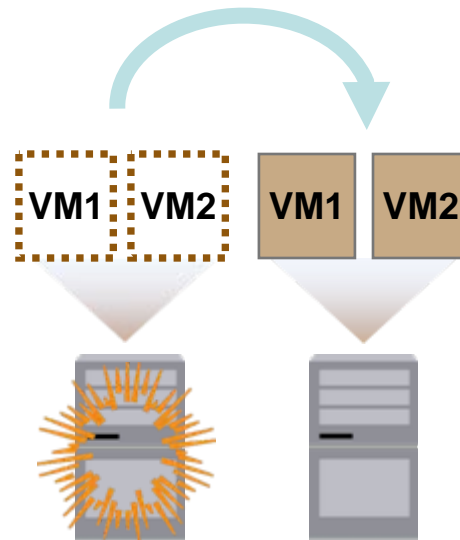
	Before Server Virtualization	After Server Virtualization
Number of applications per server	1	10+
Number of physical servers	10+	1
Number of apps down on storage failure	1	10+
Data lost on dual-disk failure	1x	10x
Backup data volume	1x	10x
Meeting backup window	Tape feasible	Need disk-to-disk
Provisioning	Slow/complex	Can be simple

The full benefits of virtual server features are only enabled through the use of networked storage

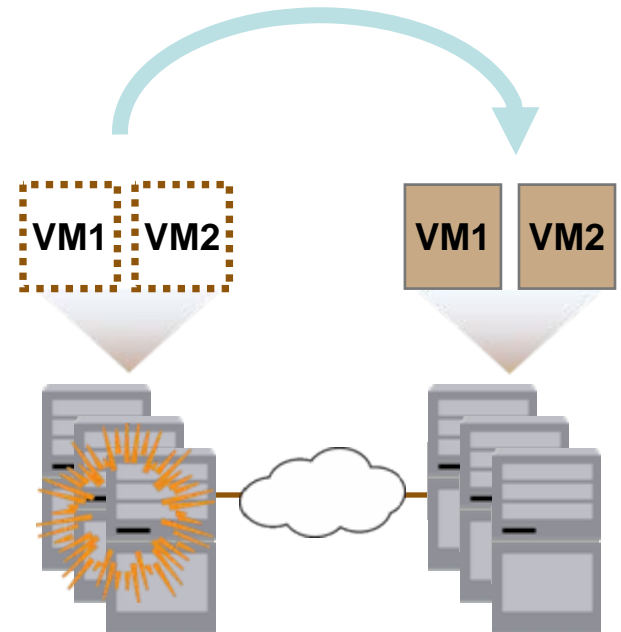
Move VMs on the Fly

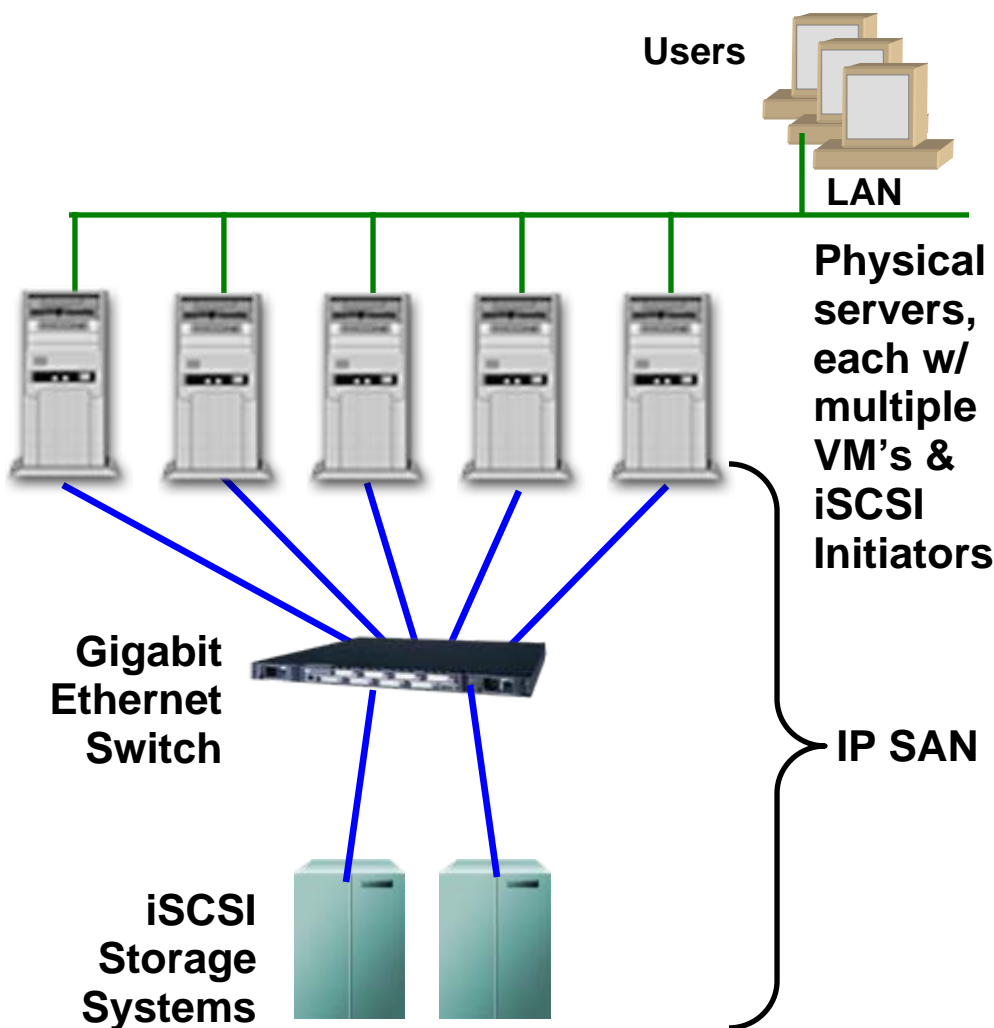


Simple VM Failover



VM Failover upon Site Failure





➤ Standard SAN storage

- ◆ Block storage access
- ◆ Supports all apps
- ◆ Transparent migration from direct attached storage

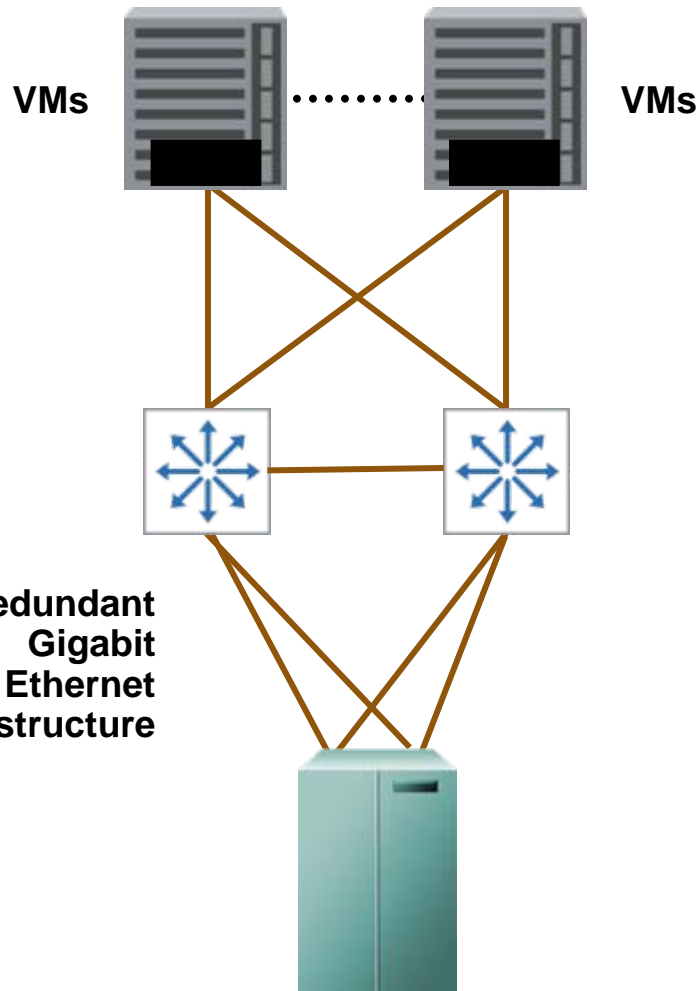
➤ Lower TCO than FC

- ◆ Low host connection cost
- ◆ Less costly infrastructure
- ◆ Easier to manage

➤ Solid complement for virtual server environment

- ◆ Flexible I/O configs
- ◆ Highly scalable
- ◆ Highly available storage
- ◆ Robust storage virtualization features
- ◆ Can be managed by app or server admins

Host Systems



Connectivity:

- ▶ Gigabit Ethernet (10Gb emerging)
- ▶ Jumbo frames (recommended)
- ▶ Link aggregation (bandwidth)
- ▶ Host or target TOE card
- ▶ Separate storage multipathing

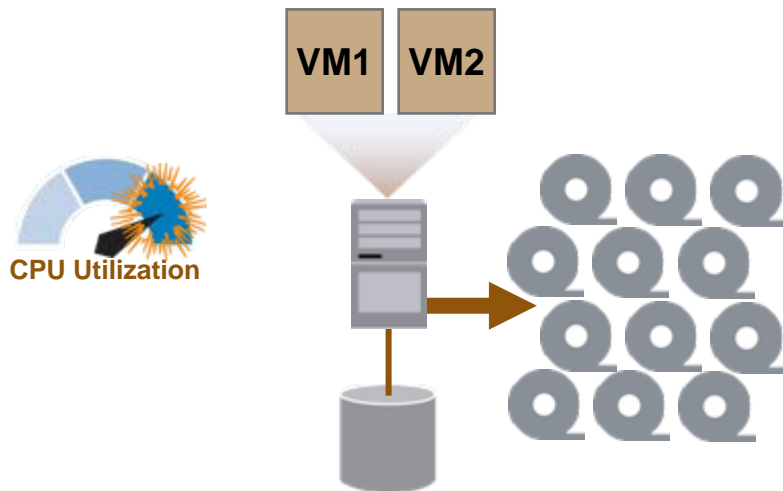
Security, fabric & virtualization

- ▶ Host authentication (CHAP)
- ▶ Private physical network
- ▶ VLANs
- ▶ LUN masking
- ▶ Simple VM to data addressing

- ◆ **Basic storage considerations**
 - ◆ Redundant components
 - ◆ Dual active controllers with failover
 - ◆ RAID (including RAID 10, RAID 50, RAID 6)
 - ◆ SATA drives; FC drives; SAS drives
- ◆ **Storage features**
 - ◆ Network Boot
 - ◆ Multi-path I/O for High Availability
 - ◆ Point in time copies (Snapshot)
 - ◆ LUN cloning
 - ◆ Remote data copy
 - ◆ Asynchronous mirroring
- ◆ **Growth/scalability/configurability**
 - ◆ Capacity
 - ◆ Performance
 - ◆ Host integration

The Problem

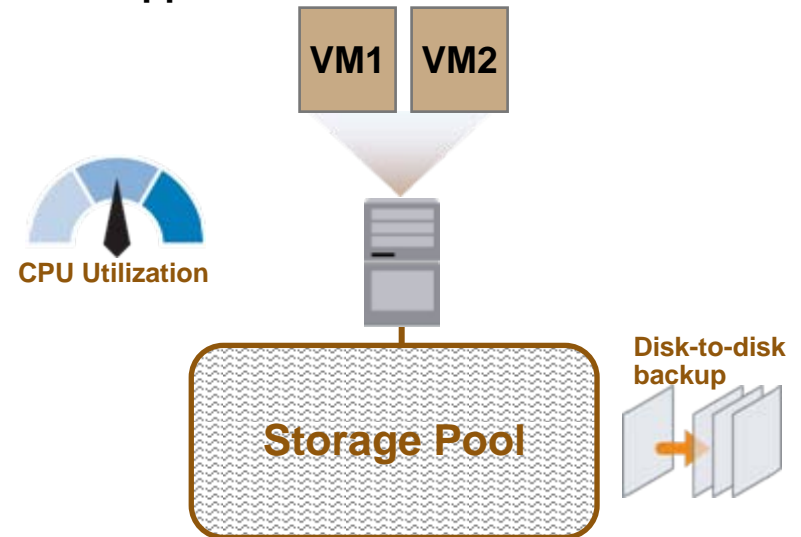
- ▶ High server utilization
- ▶ No spare cycles for backups
- ▶ Tape is slow, complex, & expensive
- ▶ Disaster recovery is very difficult



Traditional Backup Is NOT Practical

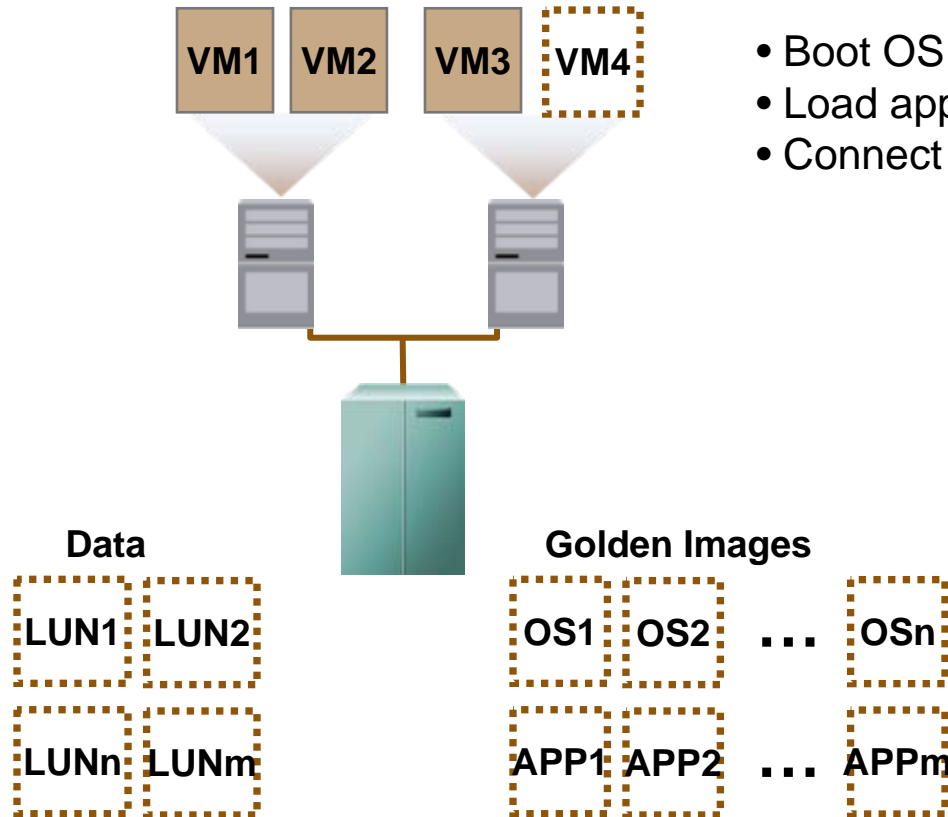
Disk-to-disk Backup

- ▶ Servers run apps, not background processes
- ▶ Instantaneous backup (snapshot)
- ▶ Fast recovery
- ▶ Low storage overhead
- ▶ Application consistent



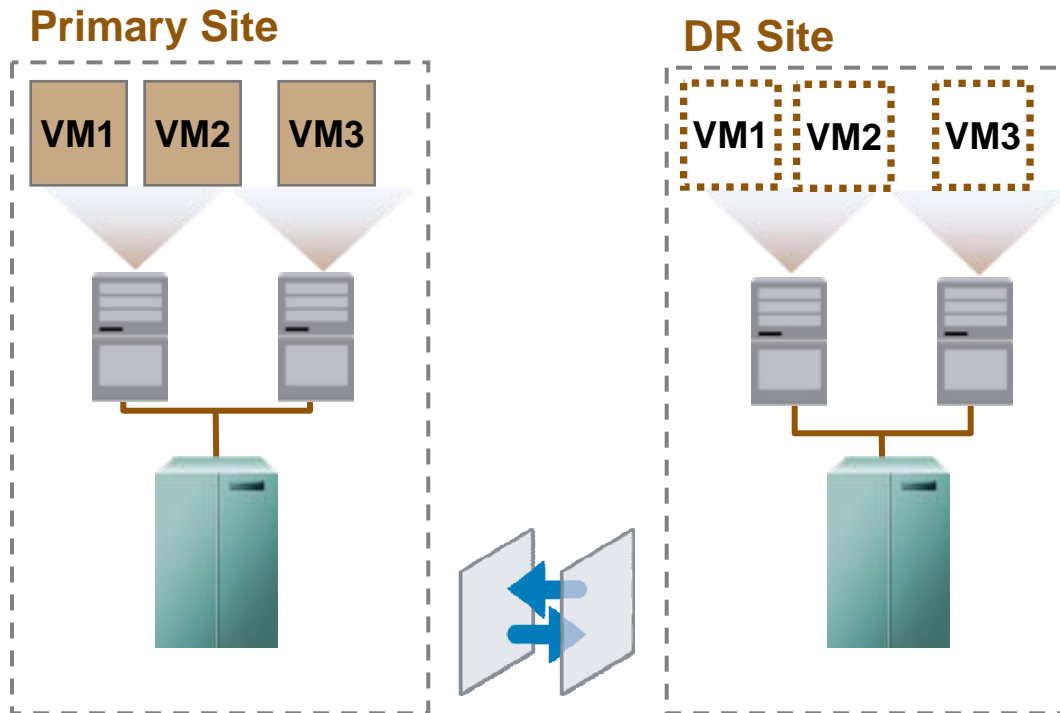
Fast, Affordable, and Simple Backup and Restores

Server and Application Provisioning



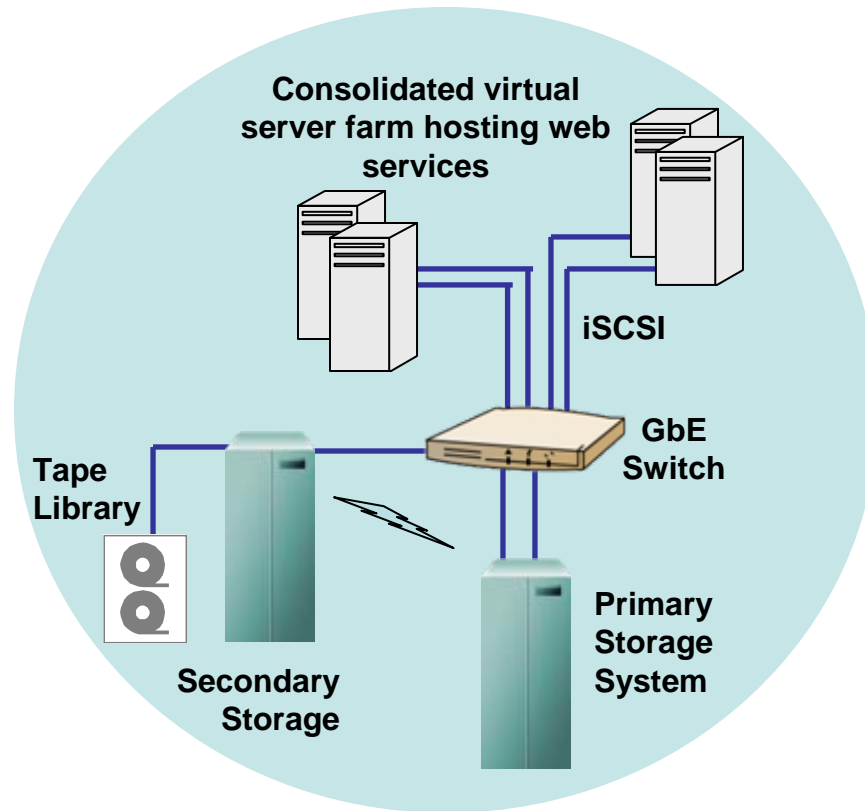
- Boot OS image from golden image store
- Load apps and config files
- Connect to appropriate data store(s)

Simple, Rapid, and Reliable DR



**Synchronous
or asynchronous
mirroring**

- ▶ **Practical DR for ALL apps**
- ▶ **Replication of VMs and data**
- ▶ **Replicates changed data only**
- ▶ **Up to the minute**



Application

- ◆ Web hosting services



Pain Points

- ◆ Rapid growth
- ◆ Outgrowing “green” data center
- ◆ Very poor server utilization
- ◆ Disruptive backup process



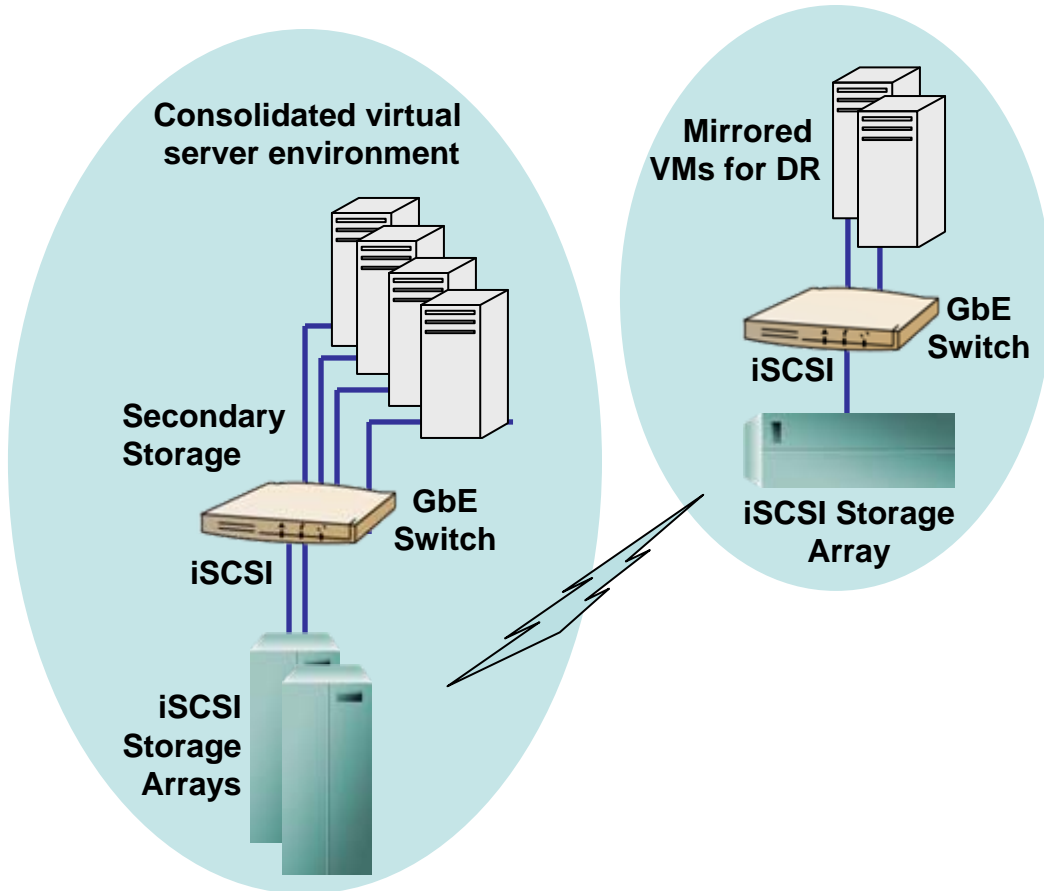
Solution

- ◆ Virtual servers w/ IP SAN
- ◆ Disk-to-disk backup for HA and DR



Benefits

- ◆ Virtual server environment provides the flexibility to host additional clients and increase revenue potential.
- ◆ Server and storage consolidation reduced data center power consumption by 60 percent.
- ◆ Replacement of 120 white box servers with four SMP servers reduced cooling costs and data center footprint.
- ◆ Cost savings and cost avoidance enabled pursuit of additional environmental conservation solutions.



Application

- ◆ *Financial services apps*
- ◆ *SQL Server Databases*
- ◆ *Microsoft exchange*



Pain Points

- ◆ *Rapid sales growth*
- ◆ *Operational efficiency limiting growth*
- ◆ *Limited data center space*
- ◆ *Unreliable DR solution*



Solution

- ◆ *Virtual servers w/ IP SAN*
- ◆ *Async mirroring to DR site*



Benefits

- ◆ *Tripled hardware utilization*
- ◆ *Cut power, cooling and operation costs by 65%*
- ◆ *Accelerated replication and recovery*
- ◆ *Accelerated new project deployment*

Server and Storage Virtualization

➤ Significant benefits

- ◆ Dramatically improved CPU utilization
- ◆ Reduced hardware costs
- ◆ Reduced data center real estate, power and cooling
- ◆ Reduced admin overhead
- ◆ Greatly simplified server and application provisioning
- ◆ Improved application availability
- ◆ Fast recovery from unplanned outages
- ◆ Fast backup and restore
- ◆ Affordable disaster recovery

➤ Enabled by IP Storage solutions today

- Please send any questions or comments on this presentation to SNIA: trackvirtualization@snia.org

**Many thanks to the following individuals
for their contributions to this tutorial.**

SNIA Education Committee

David Dale, NetApp