Server and Storage Virtualization with IP Storage

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Abstract

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.
  
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

<table>
<thead>
<tr>
<th>Before Server Virtualization</th>
<th>After Server Virtualization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of applications per server</td>
<td>1</td>
</tr>
<tr>
<td>Number of physical servers</td>
<td>10+</td>
</tr>
<tr>
<td>Number of apps down on storage failure</td>
<td>1</td>
</tr>
<tr>
<td>Data lost on dual-disk failure</td>
<td>1x</td>
</tr>
<tr>
<td>Backup data volume</td>
<td>1x</td>
</tr>
<tr>
<td>Meeting backup window</td>
<td>Tape feasible</td>
</tr>
<tr>
<td>Provisioning</td>
<td>Slow/complex</td>
</tr>
</tbody>
</table>
The full benefits of virtual server features are only enabled through the use of networked storage.
IP SAN for Virtual Servers

- **Physical servers, each w/ multiple VM’s & iSCSI Initiators**
  - Users
  - Gigabit Ethernet Switch
  - iSCSI Storage Systems
  - LAN
  - IP SAN

**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
Connectivity & I/O Considerations

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
Typical iSCSI Array Capabilities

- **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

Disk-to-disk Backup

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

Traditional Backup Is NOT Practical

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)

Diagram:
- VM1, VM2, VM3, VM4
- LUN1, LUN2, LUNn
- Golden Images: OS1, OS2, ..., OSn
- Golden Images: APP1, APP2, ..., APPm
- Data

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Simple, Rapid, and Reliable DR

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

Primary Site

Synchronous or asynchronous mirroring

VM1  VM2  VM3

DR Site

VM1  VM2  VM3

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Case Study

**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.
Case Study

- **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
**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**
Q&A / Feedback

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

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