SCALABLE STORAGE FOR MISSION CRITICAL APPLICATIONS

Best Practices for Microsoft
Today’s IT Challenge—The Balancing Act Between Cost and Value

Organizations need a **flexible IT environment** that supports both dimensions

**Business Requirements vs. Resource Reality**

**REDUCE COSTS**
- Consolidation
- Create economies of scale through standardization
- Reduce IT costs

**DELIVERING VALUE**
- Deliver innovation
- Enable flexibility
- Ease of use
- Information access
The Private Cloud…Why Now?

IT infrastructure
• Complex
• Inefficient
• Inflexible

IT budget
• 70% maintenance

IT BUDGET DILEMMA

Source: Fortune 100 customers.
Building the Bridge to the Private Cloud

Today’s IT World

of increasing complexity, inflexibility, and cost of traditional IT environments

THE Bridge

THE Journey

The Private Cloud

of fully automated and virtualized data centers

UNPRECEDEDENT LEVELS OF EFFICIENCY, CONTROL, AND CHOICE
Journey to the Private Cloud

<table>
<thead>
<tr>
<th>IT PRODUCTION</th>
<th>BUSINESS PRODUCTION</th>
<th>IT AS A SERVICE</th>
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<tbody>
<tr>
<td>Virtualized Percent</td>
<td>Virtualized Percent</td>
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<tr>
<td>15%</td>
<td>30%</td>
<td>50%</td>
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- Development, test, and IT-owned applications
- Mission-critical applications
- Run IT as a business
Infrastructure Requirements for Your Virtual World

• Storage infrastructure requirements
  – Efficiency
  – Simplicity

• Flexible
  – Supports file, block, and object

• Meets application demands
  – Automatic storage tiering

• Out-of-the-box integration
  – Hyper-v, System Center, data protection
  – VMware
EMC VNX for Virtualized Applications

• High availability for virtual environments
  – Five-9s (99.999 percent) availability

• Ease of management
  – Easy to use tools with wizards for VMware and Hyper-V

• Flexible
  – NAS, FC, FCoE, and iSCSI I/O
  – Tiered storage for high performance AND high capacity—Flash, SAS, and NL-SAS
  – Fully Automated Storage Tiering (FAST) with ability to dynamically adjust to changing performance requirements

• Integrated data protection
  – Local and remote backup of physical and virtual servers
Infrastructure Optimized for Virtualization

Seamless virtualization experience and acceleration

Storage administrator

EMC Unisphere

Manage storage and VM resources in unison

Control offload functions and integrated replication

VAAl* offload

vCenter Server integration

Virtual server administrator

10X Less net I/O

More VMs Faster response

Manage storage and VM resources in unison

Control offload functions and integrated replication

* VAAI = VMware vStorage APIs for Array Integration

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Beginning the Journey...Where to Start

- Analyze, assess, and plan
  - Find opportunities for consolidation
  - Ensure workloads will be a fit
  - Inflexible

- Use Microsoft Assessment and Planning (MAP) toolkit
  - Identify hardware for virtualization using Hyper-V
  - Detailed assessment for server utilization and recommendations for server consolidation

- VMware Capacity Planner is another valuable tool
The Journey Begins with Microsoft Exchange

• Pretend that you are doing it physically...but just do it virtually
  – Architect for the application, not for virtualization

• Refer to support policies, recommendations, and best practices

• Deploy VMs with similar roles on separate hosts
  – MBX VMS in same DAG should not co-locate
  – Spread your content-addressed storage (CAS) around
  – Deploy with fixed disk VHD
  – Scale up and scale out
Dynamic Capacity Provisioning
Increase storage utilization and buy up to 5x less storage

TRADITIONAL STORAGE
Full/Over-Provisioned

5000 Exchange users x 5 GB Mailboxes

25 TB

People overbuy unused capacity all the time

DYNAMIC CAPACITY
Thin Provisioning

5000 Exchange users x 1 GB Mailboxes

5 TB

Instead, only allocate space when data is created, written, and pay as you grow
Delivering Predictable Quality of Service
Example: Performance and EMC FAST Cache

- Multiple two-hour jetstress performance tests on four building blocks
- Over 75% more jetstress IOPS achieved with a small amount of FAST Cache enabled (10% of 200 GB)
Virtualized Exchange 2010 Design Guide

Solution Components

- Cisco UCS B200 servers hosting 32,000 Exchange 2010 mailboxes
- Replication provided by native Exchange Database Availability Groups (DAG)
- Virtualization of all Exchange roles using Microsoft Hyper-V
- Exchange Thin Provisioning LUNS provided by EMC unified storage

Exchange 2010 Key Learnings

• Proven mailbox server design
  – Use a building-block, modular approach
  – Predictable performance for all mailbox servers

• Validated performance
  – Test results show that the VNX5700 storage array can be an excellent platform to house Exchange 2010 mailboxes

• EMC FAST Cache for Exchange 2010
  – Can be considered when I/O is the driving factor for spindle requirements and not space
  – Can increase Exchange I/Os performance on VNX platform with large capacity drives (NL-SAS)
  – Should also be considered as a global cache on the VNX platform and shared with other applications—not just Exchange

• Simplified storage management with Unisphere
Simplified, Automated Management is Key to Quality of Service

• Automation becomes a key part of leveraging standardized infrastructure to:
  – Streamline operations
  – Reduce operating costs
  – Enable you to shift your focus from technology management to business innovation
Leverage Management Dashboards
Example: Instant insight with Unisphere

- Navigate all common tasks through an easy-to-use dashboard
- View detailed reports of how resources are being used
- Visually drill down to individual components
- Enlist community help when solving problems
EMC Storage Integrator (ESI) Providing Simplified Management for Windows

- Storage provisioning for Windows Servers
- Application-aware storage provisioning
- Windows MMC based
- Agent-less architecture
- Supports VMAX, VNX, VNXe, CX4, and NS series
  - Block and file support

Easy-to-use MMC Snap-ins for the Server/Application Admin
Windows Server—Storage Provisioning

• Easy-to-use wizards for end-to-end provisioning of both block and file storage
  • Create disk wizard
  • Connect disk wizard
  • Create shared folder
  • Mount shared folder
SharePoint Provisioning—Today
Multiple points of management for provisioning

- Look up best practices
- Array management tools
- Windows Server Manager
- Failover Cluster Manager
- Hyper-V Manager
- SQL Sever Management Studio
- Share Point Admin Console
Remember, this traditional approach requires three administrators who may work in different departments. So there is a cross-department dependency, which would have an associated lead time.
The Journey Continues with SQL Server and SharePoint

- Virtualize the data center
  - Identify what isn’t a fit
  - Design goal—end users don’t know if it is physical or virtual

- Several benefits
  - Reduce power and cooling
  - Easier Management
  - Simplify HA and BC/DR

Mission-critical applications
The Journey Continues with SQL Server and SharePoint

• Follow Microsoft best practices for SQL Server and SharePoint
• Use “perfmon” to identify intensive SQL workloads and deploy appropriately
• Design back-end to support workload (IOPS)
• Create separate dedicated networks for public traffic, Hyper-V management operations, and storage connectivity
• Continue to place database and log files on separate spindles for performance and recovery purposes
General Performance Considerations

• Cost of virtualization: important to consider
  – CPU-intensive vs. I/O-intensive operations
  – Number of VMs

• Be wary of over-commit
  – Extremely important for efficient resource utilization
  – Extremely useful for virtual desktop environments
  – Must be approached very carefully in application server environments

• Monitor resource utilization on the host servers
  – CPU load/memory utilization/I/O load
  – Dynamic memory (SP1) can allow an increase in the number of VMs/servers
Maintain Performance in a Virtual World

Older approaches are inefficient for virtualized workloads

Aggregating Mechanical Drives
Using a lot of spindles for IOPS results in low capacity utilization

Better utilization... but $$$

Flash Drives
Flash drives are faster than mechanical disks—but expensive
Maintain Performance in a Virtual World
Automatic data optimization

Fully Automated Storage Tiering (FAST) for virtual pools

Self-optimizing storage pools
- All data activity is constantly tracked
- High activity data moved to Flash drives
- Low activity to cost-effective disk
- Applications get best response time possible for data
Virtualizing SQL Server with Hyper-V

- Tested SQL Server 2008 on Fibre Channel SAN to measure performance
Virtualizing SQL Server with Hyper-V

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- Similar performance between physical and virtual with Hyper-V pass-through
Virtualizing SQL Server with Hyper-V

- Tested SQL Server 2008 on Fibre Channel SAN to measure performance
- Similar performance between physical and virtual with Hyper-V pass-through
- Using Flash drives to extend cache (FAST Cache) resulted in significant performance gains
Virtualizing SharePoint with Hyper-V

- Hyper-V with Failover clustering of all servers
- MetaLogix StoragePoint moved 92% of aged content to cost-effective disks
- Tiered data on a single SAN to service all workloads
- Increased usable capacity without impacting performance
VMware vStorage APIs for Array Integration (VAAI)

- Intelligent offload of storage function to array
- Accelerates VM deployment, clone, snapshot, and Storage VMotion
- Included with all EMC platforms to improve the speed of common VMware tasks
Leverage Existing Management Tools

Example: EMC integration with Microsoft System Center—Virtual Machine Manager (VMM)
Protect Applications and Data
Integrated operational and disaster recovery

EMC RecoverPoint for Microsoft

- Exchange and SQL Server integration
- Dynamic synchronous and asynchronous replication
- Lower bandwidth costs with integrated WAN deduplication
- DVR-like recovery of replicated data to any point in time
- Support federated and clustered applications with automated failover

Protect Microsoft Applications across Hyper-V or VMware Virtual Environments
Granular Recovery for Microsoft Applications

- Daily backup → Daily recovery points—from tape or disk
- Snapshots → More frequent disk-based recovery points
- Any point in time → All recovery points
- Significant point in time

**RecoverPoint**

Significant points in time:
- Database checkpoint
- Pre-app patch
- Post-app patch
- Database checkpoint
- Quarterly close
- Any user-configurable event

Any point in time:
- Daily backup
- Snapshots
- RecoverPoint

Daily backup:
- Yesterday
- 24 hours
- Midnight
- Now
VNX Data Protection—It’s All About the Apps
Unified replication with the VNX Total Protection/Efficiency Pack

- Local and remote data recovery with **DVR-like roll-back**
- Restore individual or multiple virtual machines with a **single click**
- End-to-end visibility—analyses and reporting
- Define and enforce **custom RPOs and SLAs** across virtual infrastructure
- Automated failover and failback
- Integrated software suites
- Proven reference architectures
High Availability for Hyper-V and vSphere
Optimize data paths for maximum application availability

**EMC PowerPath/VE**

- Optimize load balancing to eliminate I/O bottlenecks
- Provide dynamic path failover and recovery
- Automate path diagnostics
- Integrate with Microsoft and VMware
  - Windows SCOM and Microsoft Management Console
  - vCenter Server (Virtual Storage Integrator and Update Manager)

**APPLICATIONS**

- All channels are active and optimized for load balancing

**EMC and non-EMC storage**
Final Steps to the Private Cloud

- Policy driven
  - Manage outcomes, not elements

- Automated and fluid
  - Lower cost
  - Better reliability
  - Workflow orchestration

- Chargeback for usage
  - Run IT as a business
Summary

• The journey to implementing a cloud solution will be unique for each environment, no two scenarios are the same

• Virtualization is the key to realizing the benefits of a private cloud

• Implement a customizable, dynamic, virtualized environment that is both scalable and highly available

• A successful cloud solution leverages technologies from many vendors—there is no single solution

• Enjoy the ride, these are exciting times
Why EMC for Your Journey?

- EFFICIENCY
- CONTROL
- CHOICE
Wrap Up

NEXT STEPS
Think more clearly about the cloud with EMC Consulting

EMC OFFERINGS
Infrastructure, applications, access

EMC STRATEGY
Virtualize, standardize, automate, optimize, federate
EMC = efficiency, control, and (most importantly) choice

CLOUD COMPUTING
Transform the data center and deliver IT as a Service
Thousands of private clouds, hundreds of public clouds
THANK YOU