Prerequisite Knowledge

• Familiar with basic virtualization terminology and concepts
• Familiar with basic Exchange terminology, concepts, and server roles

Level 300
What We Will Cover

• Windows Server 2008 R2 Hyper-V
• Exchange Virtualization Deployment Best Practices
• Hyper-V Live Migration
• Exchange Virtualization Support Guidelines
Microsoft Virtualization: The Best Choice for Microsoft Server Applications

**Microsoft Server Applications Built for Windows**

*Built-in Virtualization with One-stop Support*

*Large Partner Ecosystem*

Increased Deployment Options

**Complete Management Solution**

*Deep Application Knowledge*

*Physical & Virtual Management*

*Cross Platform and Hypervisor Support*

**Low Cost Complete Solution**

*A comparable solution can cost up to six times more†*

*Lower Ongoing Costs*

Virtualization-Friendly Licensing

*Only available with Microsoft Virtualization*

†Based on a comparison of Microsoft® System Center Server Management Suite Datacenter with VMware® vSphere Enterprise Plus with VMware vCenter Server. Assumes a five host configuration, 2 processors on each host, 2 years support costs for both products, and no operating system costs included. The Microsoft solution can use either the free Microsoft Hyper-V Server 2008 R2 hypervisor or an existing Windows Server 2008 R2 hypervisor. Based on Microsoft estimated retail prices and published VMware prices available at [https://www.vmware.com/vmwarestore](https://www.vmware.com/vmwarestore) as of 08/04/2009 for purchases in the United States. Actual reseller prices may vary.
Hyper-V: Hardware Strategy

• Should I use scale-up or scale out?
Windows Server 2008 R2 Hyper-V

• Built on the foundation of Hyper-V in Windows Server 2008
• Improved performance, scalability, power
  – Processor feature support
  – I/O improvements & flexibility
  – Networking offloads
• New Features like live migration and CSV
Hyper-V: Root Sizing

- Plan for 1GB+ memory reserve for the management OS in the root partition
- Plan for one dedicated NIC for management purposes
- Plan (ideally) for one dedicated NIC for live migration
- Separate LUN’s/Arrays for management OS, guest OS VHD’s and VM storage
  - Management OS and VHD LUN’s should employ RAID to provide data protection and performance
  - Challenge for blades with 2 physical disks
Hyper-V: Guest Configuration

- Fixed VHD’s for Virtual OS
  - Need to account for page file consumption in addition to OS requirements
    \[ \text{min} \ 15\text{GB} + \text{VM Memory Size} = \text{Minimum VHD size} \]

- Per VM Disk requirements must take into account space for additional files used by Hyper-V
  \[ \text{CAS} = \text{OS VHD Size} + (\text{VM Memory Size}) \]
  \[ \text{HUB} = \text{OS VHD Size} + (\text{VM Memory Size}) + \text{Queues} \]
  \[ \text{MBX} = \text{OS VHD Size} + (\text{VM Memory Size}) + \text{DB’s} + \text{Logs} \]
VM Placement

- Use common sense when placing VMs
- Deploy VMs with the same role across multiple roots
- Do not deploy MBX VMs in the same DAG on the same root server
Exchange Virtualization Deployment Recommendations
Deployment Recommendations

- Exchange application is not ‘virtualization aware’
- Core Exchange Design Principles Still Apply
  - Design for Performance, Reliability and Capacity
  - Design for Usage Profiles (CAS/MBX)
  - Design for Message Profiles (Hub/Edge)
- Virtualization Design Principles Now Apply
  - Design for Performance, Reliability and Capacity
  - Virtual machines should be sized specific to the Exchange role (EDGE, HUB, CAS, MBX, multi-role)
  - Hosts should be sized to accommodate the guests that they will support
Edge / Hub Transport Server

- Physical Deployment Guidance:
  - Recommended Maximum - 12 Processor Cores
  - Memory Sizing - 1GB per Processor Core
  - Processor Core Ratio to MBX –
    - 1:5 (with A/V) and 1:7 (without A/V)

- Virtual Deployment Guidance:
  - Recommended Maximum – 4 Virtual Processors
  - Memory Sizing - 1GB per Processor Core
  - Standard VM = 4 VPs + 4GB
  - Standard VM Ratio = 1 HUB VM : 5 MBX VMs
  - To accommodate peak I/O (e.g. processing queue) locate Transport DB + Logs on separate spindles
Client Access Server

- Physical Deployment Guidance:
  - Recommended Maximum - 12 Processor Cores
  - Memory Sizing - 2GB per Processor Core
  - Processor Core Ratio to MBX – 3:4

- Virtual Deployment Guidance:
  - Recommended Maximum – 4 Virtual Processors
  - Memory Sizing - 2GB per Processor Core
  - Standard VM = 4 VPs + 8GB
  - Standard VM ratio = 3 CAS VMs : 4 MBX VMs
CAS / HUB Multi-Role Server

- Physical Deployment Guidance:
  - Recommended Maximum - 12 Processor Cores
  - Memory Sizing – 2 GB per Processor Core
  - Processor Core Ratio to MBX – 1:1

- Virtual Deployment Guidance:
  - Recommended Maximum – 4 Virtual Processors
  - Memory Sizing – 2 GB per Processor Core
  - Standard VM = 4 VPs + 8GB
  - Standard VM Ratio = 1 CAS/HUB VM : 1 MBX VM
CAS / HUB Multi-Role Server

- 8 cores
- 16 cores
- 24 cores
Mailbox Server

- Physical Deployment Guidance:
  - Recommended Maximum - 12 Processor Cores
  - Memory Sizing - 4GB + 3-30MB per mailbox

- Virtual Deployment Guidance:
  - Recommended Maximum – 4 Virtual Processors
  - Memory Sizing - 4GB + 3-30MB per mailbox
  - Standard VM = 4 VPs + 16-24GB (adjust for number of mailboxes and database cache for send/receive profile)
Mailbox Server Guidelines

- Database Cache requirements are the same for physical and virtual deployments

<table>
<thead>
<tr>
<th>Total Send + Receive (75k message size)</th>
<th>Database Cache Per Mailbox (MB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3</td>
</tr>
<tr>
<td>100</td>
<td>6</td>
</tr>
<tr>
<td>150</td>
<td>9</td>
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<tr>
<td>200</td>
<td>12</td>
</tr>
<tr>
<td>250</td>
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<tr>
<td>300</td>
<td>18</td>
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<tr>
<td>350</td>
<td>21</td>
</tr>
<tr>
<td>400</td>
<td>24</td>
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<tr>
<td>450</td>
<td>27</td>
</tr>
<tr>
<td>500</td>
<td>30</td>
</tr>
</tbody>
</table>
## Mailbox Server Guidelines

- Virtual Processor ≠ Logical Processor
- Hypervisor and the Virtualization Stack consume CPU
- Reduce recommended mailbox count by ~10%

<table>
<thead>
<tr>
<th>Total Send + Receive (75k message size)</th>
<th>Users Per Core Physical MBX Role</th>
<th>Users Per VP Virtual MBX Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>1000</td>
<td>900</td>
</tr>
<tr>
<td>100</td>
<td>900</td>
<td>810</td>
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<td>400</td>
<td>360</td>
</tr>
<tr>
<td>400</td>
<td>300</td>
<td>270</td>
</tr>
</tbody>
</table>
Mailbox Storage Configuration

- Virtual SCSI (passthrough or fixed disk)
  - Recommended configuration for database and log volumes
- iSCSI
  - Recommend the iSCSI initiator is configured on the host and disk presented to guest as passthrough
  - Dedicated NIC (not bound to virtual network switch)
  - iSCSI initiator on the guest is supported but need to account for reduced performance (no jumbo frames)
Exchange 2010 High Availability

• Database Availability Group (DAG)
  • A group of up to 16 Exchange Server 2010 Mailbox servers that provide automatic database-level recovery
  • Uses continuous log replication and a subset of Windows Failover Clustering technologies
  • Can extend across multiple datacenters/AD sites

• Benefits of Exchange Native Data Protection
  • Protection from database, server or network failure
  • Automatic failover protection and manual switchover control is provided at the mailbox database database level instead of at the server level.
  • Support for up to 16 copies, support for lag copies
Host Based Failover Clustering

- **Host Based Failover Clustering HA**
  - Using Host Based Failover Clustering and automatically failing VMs to an alternate cluster node in the event of a critical hardware issue (virtualization platform independent)

- **What you need to be aware of:**
  - Not an Exchange Aware Solution
  - Only protects against server hardware/network failure
  - No HA in the event of storage failure / data corruption
  - Trend is larger mailboxes = larger database sizes = longer time to recover from data loss = DAG
  - Not supported for MBX VMs that are members of a DAG
Hyper-V Live Migration

- Technology in Windows Server 2008 R2 that allows you to move running VMs from one Hyper-V root server to another Hyper-V root server without disruption of service or perceived downtime
Live Migration process

1. Initiated via in-box cluster UI, SCVMM, PowerShell

2. VM State/Memory Transfer
   a) Create VM on the target
   b) Move memory pages from the source to the target via Ethernet

3. Final state transfer and virtual machine restore
   a) Pause virtual machine
   b) Move storage connectivity from source host to target host via Ethernet

4. Un-pause & Run

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Blue = Shared Storage (FC, iSCSI)
Yellow = Networking
Green = Live migration networking (1Gb or better)
Hyper-V Storage with CSV

Hyper-V high availability and migration scenarios are supported by the new Cluster Shared Volumes in Windows Server 2008 R2

Benefits:
- Technology within Failover Cluster feature
- Single consistent name space
- Compatible: NFTS volume
- Simplified LUN management
- Multiple data stores supported
- Enhanced storage availability due to built in redundancy
- Scalable as I/O is written directly by each node to the shared volume
- Transparent to the VM
Live Migration and Exchange 2010

- Physical Computer Maintenance
  - Operating System/Application Updates
  - Hardware Maintenance
- Rebalancing Workloads
  - Dynamic Redistribution of VM’s to optimize workload on physical hardware
- Green IT
  - ‘Off Peak’ Virtual Machine Consolidation
Live Migration - Rebalancing

- Live Migration can be used to move VMs between root servers to achieve more equitable distribution of load across root servers.
Live Migration – Green IT

- Live Migration can be used to consolidate VMs on fewer host servers on evenings and weekends to reduce power and cooling costs during ‘off peak’ periods.

Note: Live Migration is currently not supported for the mailbox server role in a DAG.
Support Guidelines

- **TechNet is the single source:**
- **SVVP Support Policy Wizard is a great tool:**
- Always confirm SPW results with our TechNet article
- Check back for updates
- Clarifications published frequently
Supportability Quick Reference
Exchange 2010

• Supported
  • Root: Hyper-V or any virtualization platform in SVVP
  • Guest:
    • Exchange 2010
    • Windows 2008 SP2 or R2
    • Mailbox, Client Access, Hub Transport, Edge roles
    • Meets basic Exchange system requirements
    • Storage is fixed VHD, SCSI pass through, or iSCSI

• Not Supported
  • Combination of Exchange Mailbox HA (i.e. Mailbox servers in a DAG) and any host/hypervisor-based clustering or migration technologies (e.g. Microsoft Live Migration, VMware V-Motion, etc.)
  • Snapshots, differencing/delta disks
  • Unified Messaging role
  • Virtual/logical processor ratio greater than 2:1
  • Applications running in root partition (excluding AV)
Session Summary

- Virtualization can provide significant value and result in reduced TCO for Exchange deployments.
- Virtualization doesn’t change Exchange design requirements from an application perspective, but there are some key things to be aware of when virtualizing Exchange.
For More Information...

• Windows Server 2008 R2 Hyper-V

• Windows Virtualization Team Blog
  http://blogs.technet.com/virtualization

• Infrastructure Planning and Design Guides for Virtualization

• Microsoft Virtualization Solutions

• Exchange Server 2010 Guidance

• Exchange Team Blog
  http://blogs.technet.com/exchange
Questions and Answers

- Submit text questions using the “Ask” button.
- Don’t forget to fill out the survey.
- For upcoming and previously live webcasts: www.microsoft.com/webcast
- Got webcast content ideas? Contact us at: http://go.microsoft.com/fwlink/?LinkId=41781
Your potential. Our passion.