

# **EXC07: Exchange Virtualized or Exchange Physical Where Do I Put those Bits?**

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# Who is Michael B.?

- Remember the B! 😊
  - And yes, that really is my name!
- Long-time Exchange guy
  - Since 1996 and Exchange 5.0
- Eight year Exchange MVP
- Consultant and migration expert
  - Exchange, Active Directory, System Center

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# Agenda

- The Short Version
- Scaling Up or Out
- Individual Role Recommendations
- High Availability
- Virtualized Active Directory

# The Short Version: #1

- Virtualization is supported for all Exchange roles
- This now includes Unified Messaging
  - The Hyper-V server where UM is installed must have no oversubscription of virtual processors (i.e., allocated virtual processors should match physical processors)
  - UM requires four virtual processors

# The Short Version: #2

- All roles (including Database Availability Groups) that are virtualized may be part of failover clusters or load-balanced clusters
  - However, virtualization technologies that provide failover services are not allowed to interfere, in any way, with Windows clustering technologies
    - So, vMotion and Live Migration are OK
    - Quick Migration is not
      - Suspend, move, resume

# The Short Version: #3

- **Virtualization:**
  - Allows better usage of underutilized resources
  - May reduce power and AC consumption
  - May reduce space usage
  - May improve service availability
- **CAS, Hub, Edge are considered prime candidates for virtualization**
- **MB and UM require planning**

# The Short Version: #4

- **Not supported**
  - Snapshots, differencing/delta disks
  - Virtual processor/physical processor core ratios greater than 2:1
  - Applications running on the root virtual machine (excluding antivirus, backup, management software, and so on).
- **Use Hyper-V Best Practice Analyzer**

# Server Core

- The overall disk and memory requirements for server core are far less than a full installation
  - Server core is recommended for the root partition on Hyper-V server
  - Remote management using Hyper-V MMC
  - With no IE and no Explorer, server core requires less patching
  - Reduced attack surface

# Server Scaling

- **Scale Up**
  - Use bigger servers to consolidate resources
- **Scale Out**
  - Use more/smaller servers to add resources
- **Generally speaking scale up mailbox servers and scale out everything else**
- **Hardware is cheap. Even good hardware.**
  - Don't skimp, you'll regret it later

# Server Scaling: #2

- Virtualization allows for simple resource reallocation
  - On physical h/w, you've got what you've got
  - Upgrades (physical resource reallocation) is expensive (downtime, h/w, people time)
- Excepting only CAS, Exchange is self load balancing
  - Need external LB for incoming HTTP, SMTP

# Server Scaling: #3

- High Availability configurations often define when and how to scale
  - How many active mailboxes on a MB
  - How many active PF on a MB
  - How many concurrent connections on a UM
  - How many incoming/outgoing connections on a HT/ET
  - How many OWA/IMAP/POP3/EAS/EWS/OA connections on a CAS

# Memory Sizing

- Memory for virtual servers should be sized using the same process as that for physical servers
  - Dynamic Memory isn't supported
  - Memory overcommitment isn't supported
- Exchange requires that it have full control over all memory assigned to a server (whether VM or physical)

# Memory Sizing: #2

- Many (most?) of Exchange performance improvements have:
  - Come at the cost of increased caching (i.e., memory) and x64 (> 4GB)
  - Not much increased processor utilization
- Without lots of memory, Exchange performance begins to degrade quickly
- Exchange's caching functions make efficient use of avail. memory

# Disk Storage

- Every Exchange VM must be allocated space on the root VM for the OS partition
- Fixed size VHDs are recommended
  - Less important on Server 2008 R2 than before
- Microsoft recommends a minimum of 15 GB for the boot OS VHD, 50 GB is better
- Specific server role sizing outside our discussion

## Disk Storage: #2

- You should have separate disk volumes for OS and VM data
- Server 2008 R2 has a maximum of 2 TB in size for a VHD
- When allocating space – don't forget log files! They can be significant in size.
- For HT – the message queue can be big
- For MB – Mailbox, TLog, Content Index

# Disk Storage: #3

- Many types of storage are supported
  - Direct Attached Storage (DAS)
    - SATA, eSATA, PATA, SCSI, USB, SAS, FireWire
  - Storage Area Network (SAN)
    - iSCSI, FC, SAS technologies
- SAN may provide features that DAS cannot
- Network Attached Storage (NAS) is not supported

# Disk Storage: #4

- Support for DAS in Exchange 2010 is greatly improved (includes pass-thru)
  - Disk I/O reductions (up to 50% vs. 2007, 90% vs. 2003)
  - Optimizations for SATA. I/O is optimized
  - Automatic page patching
  - Support for “just a bunch of disks” (JBOD)

# Disk Storage: #5

- **iSCSI**
  - Required by Hyper-V clusters
  - May be pass-thru or fixed
  - Virtual SCSI is much faster than virtual IDE
  - Best practices
    - **Dedicated a NIC for iSCSI traffic**
    - **Enable jumbo frames on your network**
    - **Use TCP offloading to the NIC**
    - **Configure iSCSI initiator on the root**

# VM Locations

- Exchange HA provides even more flexibility
  - Deploy role servers across multiple physical servers
  - Never deploy multiple members of a DAG on a single root
  - Never deploy all CAS or HT on a single root
  - DO determine workload requirements for the Exchange VMs and distribute the VMs across the available servers

# Mailbox Server Guidelines

- **Should consider the MB server first**
  - Tends to define the # of other server roles
  - Mailbox storage requirements
  - Mailbox size requirements
  - Mailbox profile requirements
  - Deleted item retention
  - Calendar version logging
  - LoadGen / JetStress for configuration validation

# Mailbox Server Guidelines: #2

- Existing Exchange companies looking to virtualize should ensure that they understand the user profile(s)
  - Messages received per day
  - Messages sent per day
  - Messages retained vs. deleted
  - Average primary mailbox size
  - Average archive mailbox size
  - Concurrency

# Mailbox Server Guidelines: #3

- Existing Exchange companies can obtain most information via MMC and via Performance Monitor
- Non-Exchange companies should use whatever methods are available to them
- Also include:
  - Growth (# mailboxes, mailbox size, msg cts)
  - Cached vs. Online Outlook
    - Doesn't apply to Office 365

# Transport Server Guidelines

- **Edge and Transport**
  - Message tracking logs
  - Protocol logs
  - Mail queue database
  - Connectivity logs
  - Agent logs
- **Exchange 2010 SP1 requires a minimum of 500 MB free space**
  - RTM requires 4 GB free space

# Transport Server Guidelines: #2

- Back Pressure
- Mail queue database
  - ESE DB just like mail DB
  - Circular logging enabled by default
  - Size of mail.que defined by size of queued mail (d'oh!) including shadow transport
  - Very busy transport servers may require mail.que and associated logs to be on separate physical paths

# Transport Server Guidelines: #3

- Can consider putting logs on OS VHD (if large enough) and mail.queue on a separate data VHD (on another LUN)
- **Processor recommendations**
  - 1:5
  - One transport core for each five mailbox cores
  - Plus whatever is required for HA
  - HA requires a minimum of two HT per AD site

# CAS Guidelines

- CAS in Exchange 2010 is far more significant than earlier releases
  - All client interaction (excepting only PF) goes through CAS
    - OWA / EAS / OA / EWS / IMAP / POP / blah
  - RPC Client Access Arrays (MAPI Array)
  - Core requirement vs. mailbox cores is 3:4
    - So 8 cores of mailbox is
    - $8 * 3 / 4 = 6$  cores of CAS

# Combined CAS + HT Guidelines

- Often makes sense to combine CAS & HT
- HT is I/O intensive
- CAS is processor intensive
- Both like lots of memory
- Core requirements vs. mailbox cores:
  - 1:1
- However, for HA you still need a minimum of two CAS+HT servers

# UM Server Guidelines

- Requirements for a UM server are based on the number of concurrent calls and generation of Voice Mail Previews. Call happen when:
  - A user leaves a voice mail message
  - An Outlook Voice Access user accesses their Exchange 2010 mailbox
  - A user uses the Play on Phone feature to listen to their voice messages

# UM Server Guidelines: #2

- More calls, more server resources
- Use Performance Monitor and Get-UMActiveCalls
- Pretty much always scale out with UM
  - 40 concurrent calls with VMP
  - 65 concurrent calls without VMP
- Generally target 100:1 for planning
  - Mailboxes:Concurrent-Calls

# UM Server Guidelines: #3

- Based on prior performance guidelines:
  - With VMP, you can support 4,000 users per UM server
  - Without VMP, you can support 6,500 users per UM server
- Obviously, processor speed has an impact
- Higher level of concurrent calls has a major impact

# HA for Mailbox

- Requires Windows Server Enterprise or Windows Server DataCenter
  - Based on Windows Failover Clustering
  - Uses heartbeat, network, and the cluster DB
  - Up to 16 copies in or out of AD site
  - Log shipping (file based or packet based)
  - Supports automatic failovers
  - Supports scheduled switchovers
    - Both known as \*over

## HA for Mailbox: #2

- Site resiliency complicates HA planning
- Additional namespaces may be necessary (especially if active mailboxes are in both sites)
- Site \*overs will likely require DNS changes or GLBS
- In general users should be connected to their “closest” mailbox server
- See the mailbox spreadsheet

# Virtualizing Active Directory

- Exchange has a huge dependency on AD
- Most AD servers used by Exchange need to also be GCs
- When virtualizing Exchange, it is common to also virtualize AD
- Just like Exchange, AD HA should depend on replication servers
  - Don't restore AD from a backup unless you are doing authoritative restores

# Virtualizing Active Directory: #2

- Unlike Exchange, AD replication doesn't require Windows Server Enterprise
- Domain controller memory requirements:

User per domain in a site	Minimum memory requirements per domain controller
1–499	512 MB
500–999	1 GB
> 1,000	2 GB

- More memory may lead to better perf.
- With enough memory, AD will cache the entire NTDS.DIT

# Presentation Availability

- You can download the slides from here:
- [http://www.devconnections.com/updates/LasVegas\\_Fall11/Exchange](http://www.devconnections.com/updates/LasVegas_Fall11/Exchange)

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