Session S288993
Virtualizing Exchange 2007:
The Final Frontier?
September 2007

Todd Muirhead, Enterprise TechCenter, Dell
Kong Yang, Virtualization Solution Engineering, Dell

Some or all of the features in this document may be representative of feature areas under development. Feature commitments must not be included in contracts, purchase orders, or sales agreements of any kind. Technical feasibility and market demand will affect final delivery.

Introduction

Microsoft Exchange 2007 Behavior On ESX Server Virtual Machines Are Not Well Understood

- How does Exchange 2007 profile differ from Exchange 2003?
  - 64-bit
  - New server roles: Mailbox, Client Access, Hub Transport, Unified Messaging, and Edge Transport
  - Other new features such as CCR, administrative tools
- How will these features affect an Exchange 2007 VM?
  - More memory utilization and features means that the performance profile could change.
  - The new server roles offer opportunities to virtualize the different roles.
  - Where to start?

Stages of Virtualization Adoption

Stage One: Evaluation / Test and Dev

- Introduction to virtualization
- Use of single server or small farm for test and development

Stage Two: Virtualization of Some Production Level Apps / Consolidation

- An initial set of “good candidates” for virtualization
- Farm of servers is used to support load-balancing, high availability, and easy maintenance

Stage Three: Extend Virtualization

- Virtualize more applications to extend same advantages as seen in earlier stages

Typical Application “Good Candidates” for Virtualization

Characteristics

- Low utilization
- Low I/O
- Running on old hardware

Examples

- Test and development servers
- Domain controllers
- DNS servers
- Intranet application servers
- Anything running on Pentium Pro servers!

Exchange 2007 – The Final Frontier?

Exchange 2007 Is a Demanding Application

- 64-bit, high I/O, large RAM, and large disk
- Not the first application that should be virtualized
- If Exchange 2007 can be virtualized, then other demanding applications can be candidates as well

Reasons to Virtualize Exchange 2007

- Want to leverage virtualization infrastructure already in place for other apps
- Take advantage of increased administrative flexibility
- Exchange 2007 server roles can be considered separately
  - Mailbox, Hub Transport, Client Access, Edge, Unified Messaging

Exchange 2007 – The Final Frontier?

Reasons not to Virtualize Exchange 2007

- Not officially supported by Microsoft[1]
- Easier-to-virtualize applications still exist in environment
- Requirement for a very large number of users per server

1 When considering the deployment of Microsoft Exchange Server 2003 on a virtualization platform such as VMware ESX Server, please refer to support.microsoft.com/kb/897615 for information about the Microsoft support policy for their applications running in non-Microsoft virtualization software.

Where to start with Exchange 2007 VMs?

Capacity Planning and Reference Architecture

- Starting Point: Dell Physical Reference Architecture for Microsoft Exchange 2007[1]
- Evaluate four major subsystems: CPU, Memory, Disk and Network
- Analyze Exchange 2007 VM Behavior under load

Exchange 2007 VM Behavior

- How will VMotion be affected?
- Can I run other VM types with Exchange 2007 VMs?
- How does VMware HA perform with Exchange 2007 VMs?

1. www.dell.com/downloads/global/solutions/Dell_Exchange_2007_Advisor.pdf

Sizing Exchange 2007 VMs

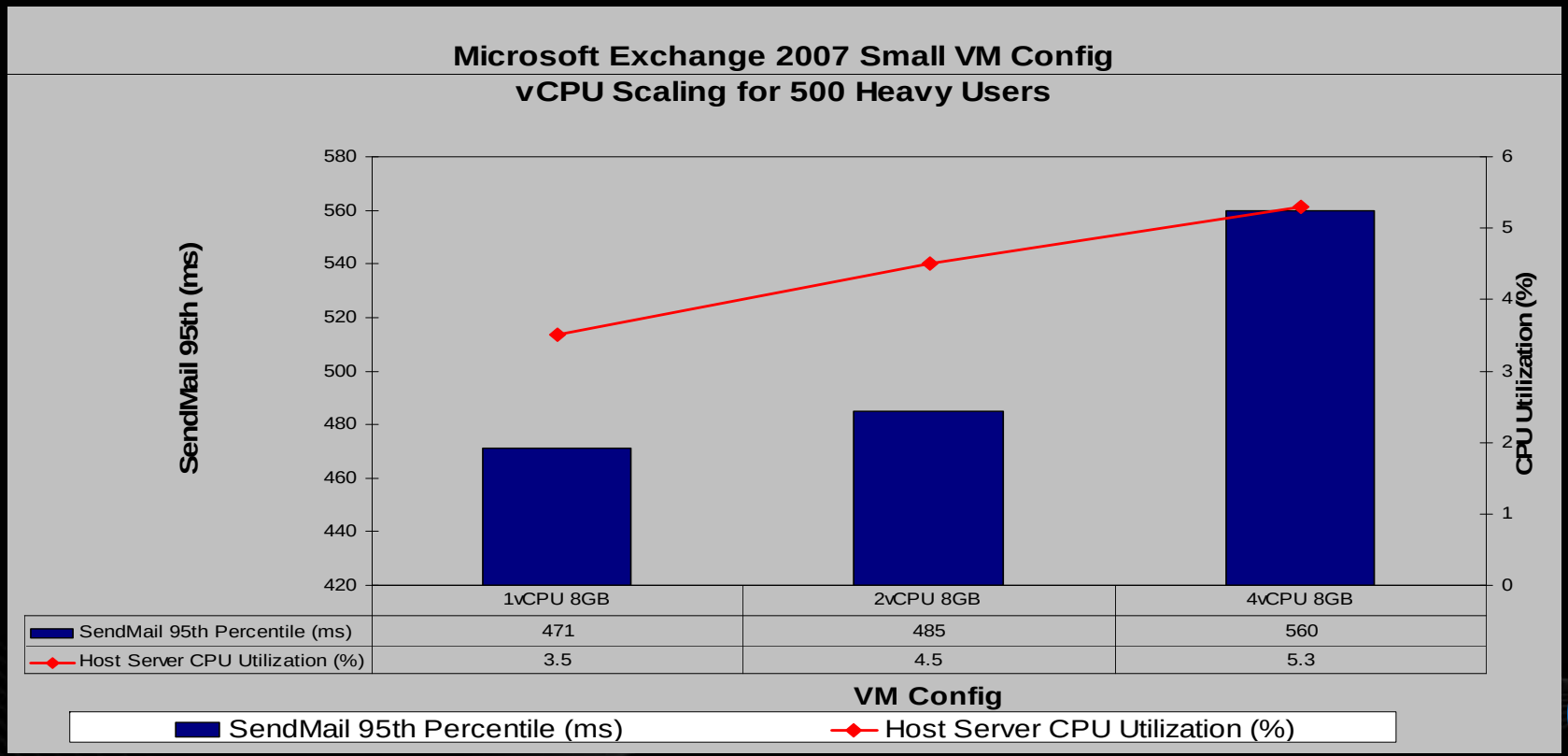
- Small, medium, and large VM configurations[1]
  - Physical server specifications
    - Dell™ PowerEdge™ 2950
      - Two quad-core 2.33 GHz Intel® Xeon ®
      - 16 GB RAM
    - DELL / EMC CX3-80 – RAID 1/0 for data and logs

	Small	Medium	Large
Users	500	1,000	2,000
RAM	8 GB	8 GB	16 GB
Data Disks	4	8	16
Log Disks	2	4	8
vCPU	1 to 4	1 to 4	1 to 4
vNIC	1	1	1
Storage Groups	4	8	16

1. www.dell.com/downloads/global/solutions/Dell_Exchange_2007_Advisor.pdf

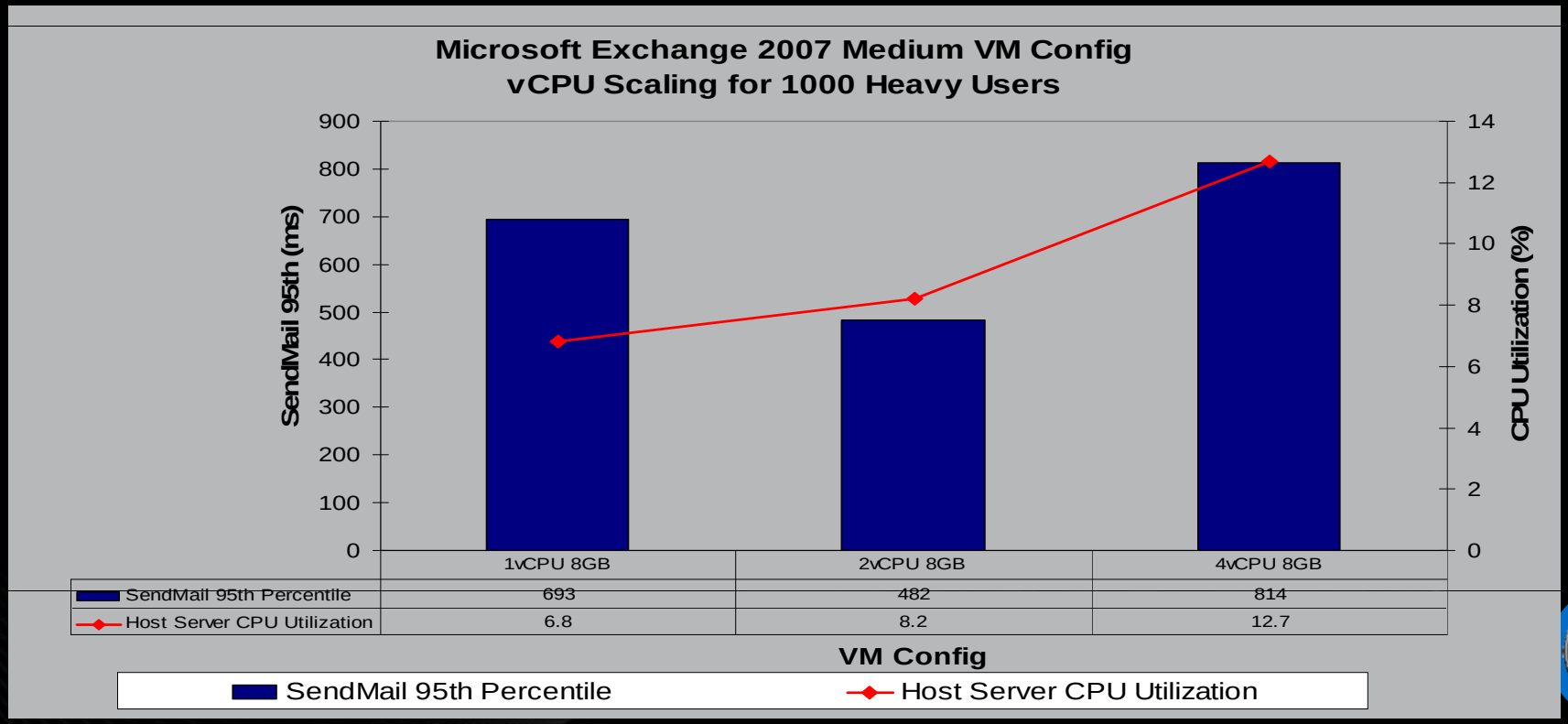
vCPU Scaling Test Results for 1VM @ 500 Users

- Results of 1, 2, 4 vCPU VM testing in small configuration
  - SendMail 95th response time is below 560 ms.
  - Overall CPU utilization is below 6% on an 8-core PE2950.



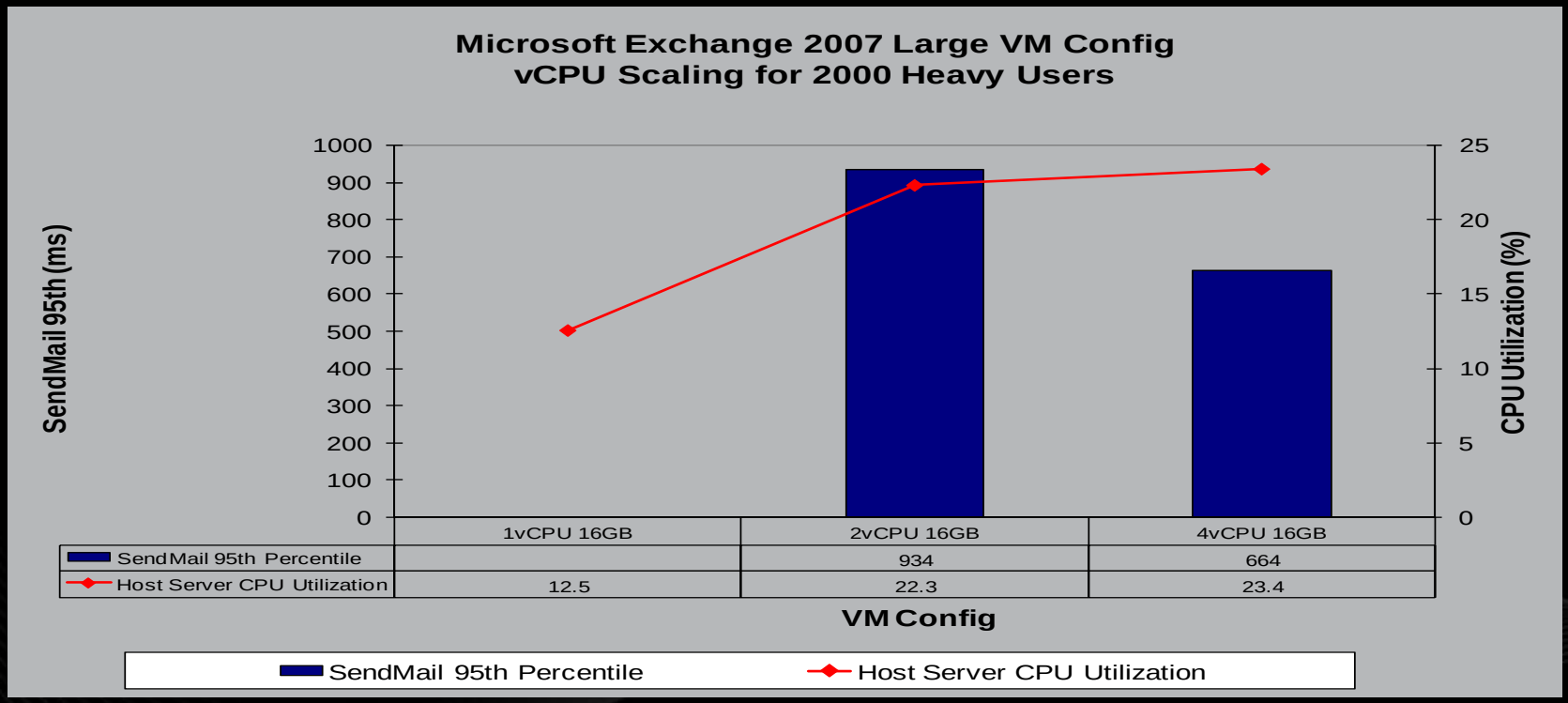
vCPU Scaling Test Results for 1VM @ 1,000 Users

- Results of 1, 2, 4 vCPU VM testing in medium configuration
  - SendMail 95th response time is below 814 ms.
  - Overall CPU utilization is below 13% on an 8-core PE2950.



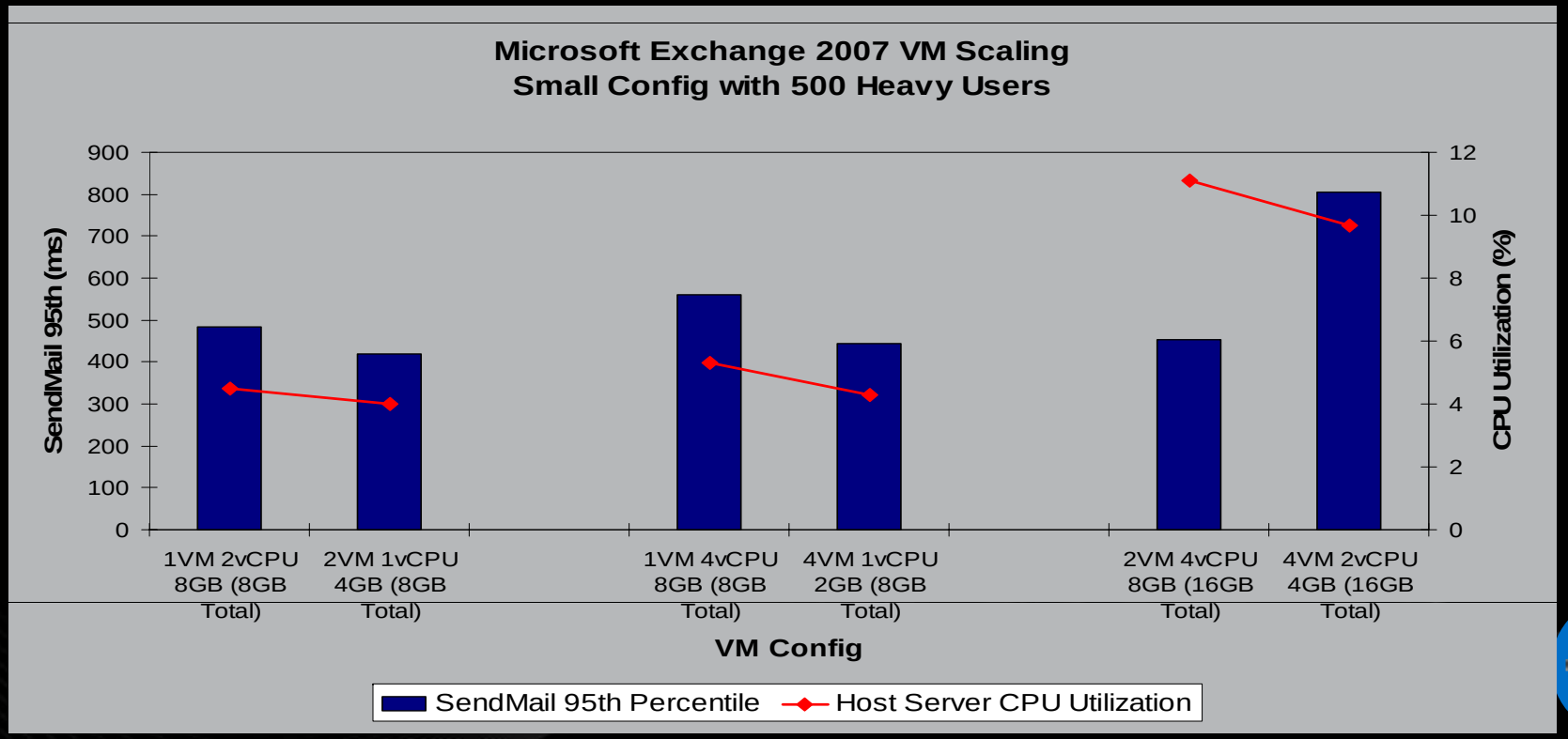
vCPU Scaling Test Results for 1VM @ 2,000 Users

- Results of 1, 2, 4 vCPU VM testing in large configuration
  - 1vCPU 16GB DNF test runs.
  - 95th Response time is below 934 ms.
  - Overall CPU utilization is below 24% on an 8-core PE2950.



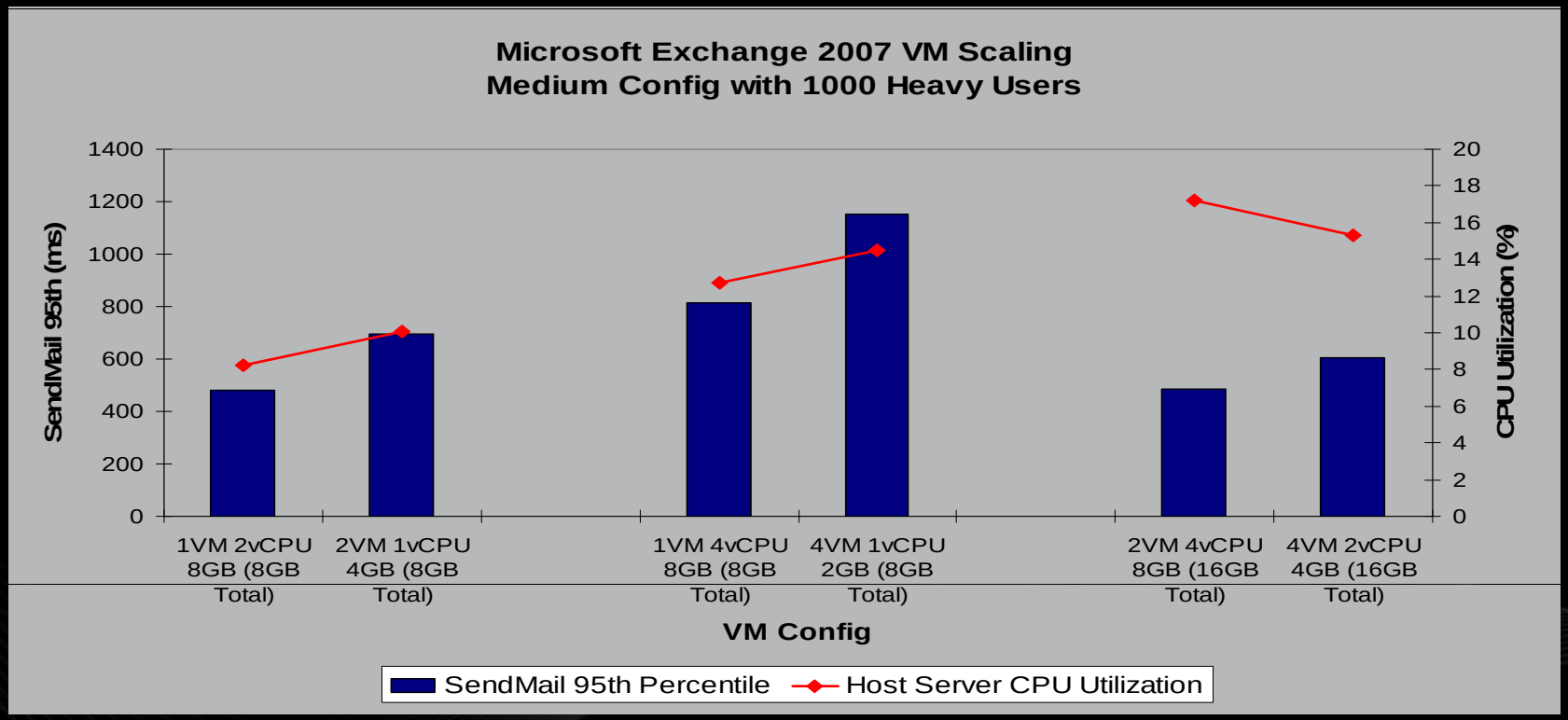
Number of VMs Testing Results

- How does performance of single large VM compare to multiple smaller VMs in small configuration?
  - 2 VMs with sufficient vCPU and memory resources performs best.



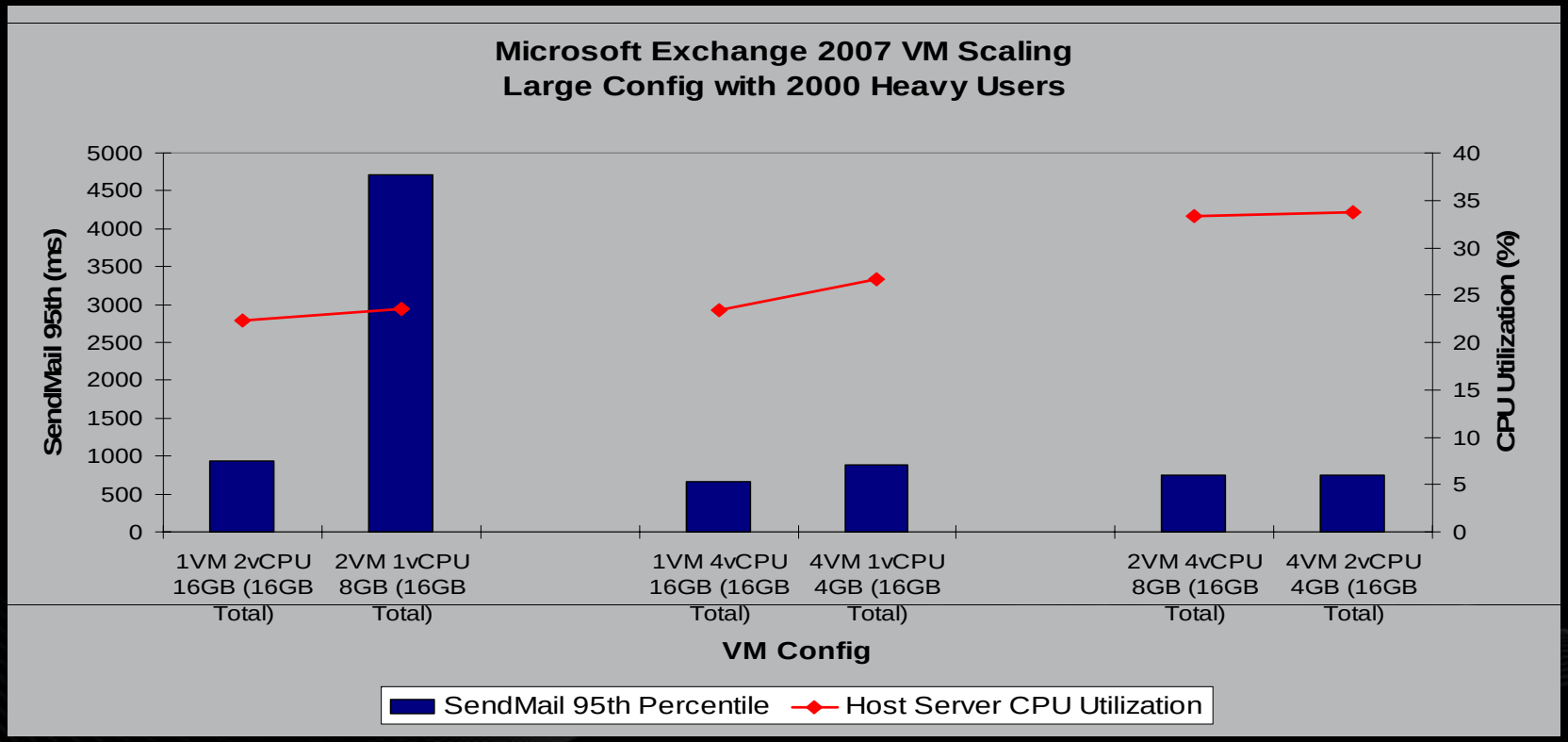
Number of VMs Testing Results

- How does performance of single large VM compare to multiple smaller VMs in medium configuration?
  - 1 VM with sufficient vCPU and memory resources performs best.



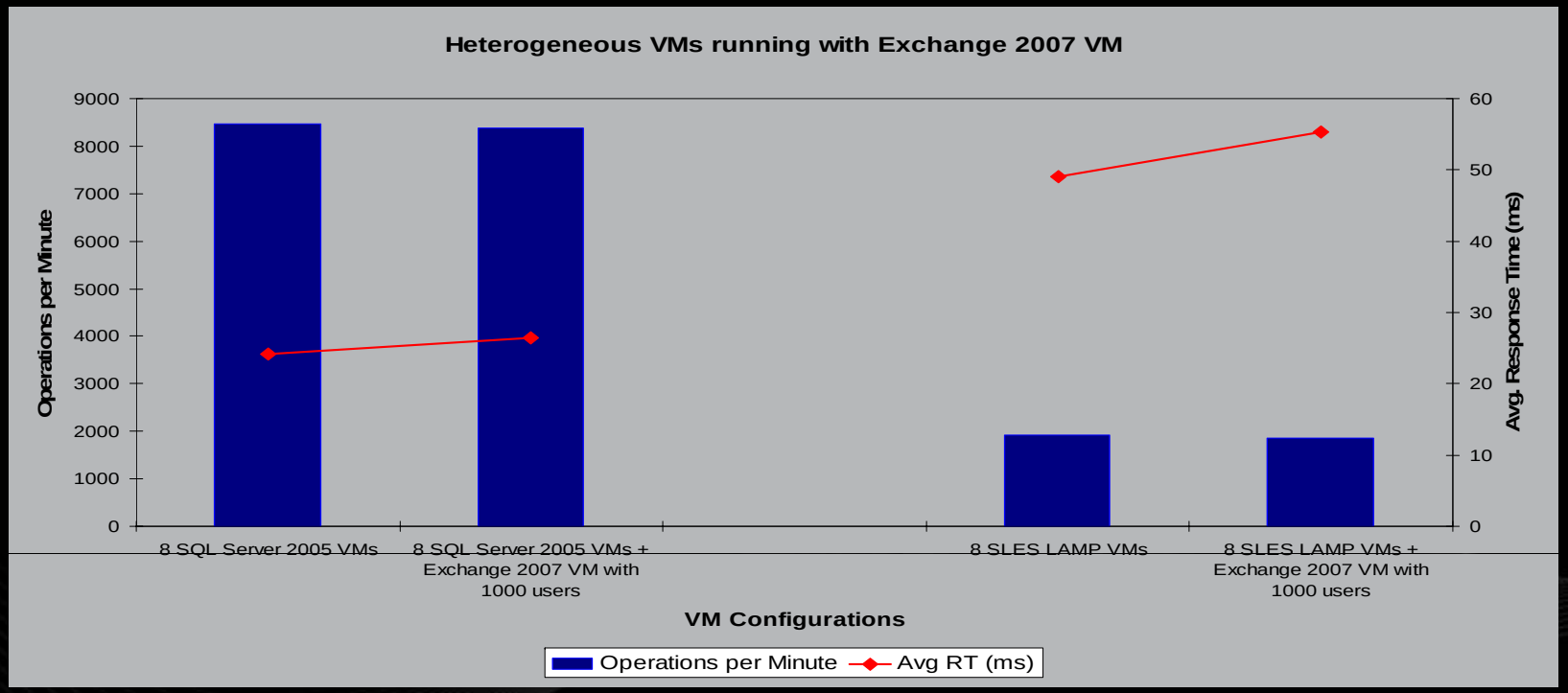
Number of VMs Testing Results

- How does performance of single large VM compare to multiple smaller VMs in large configuration?
  - 1 VM with sufficient vCPU and memory resources performs best.



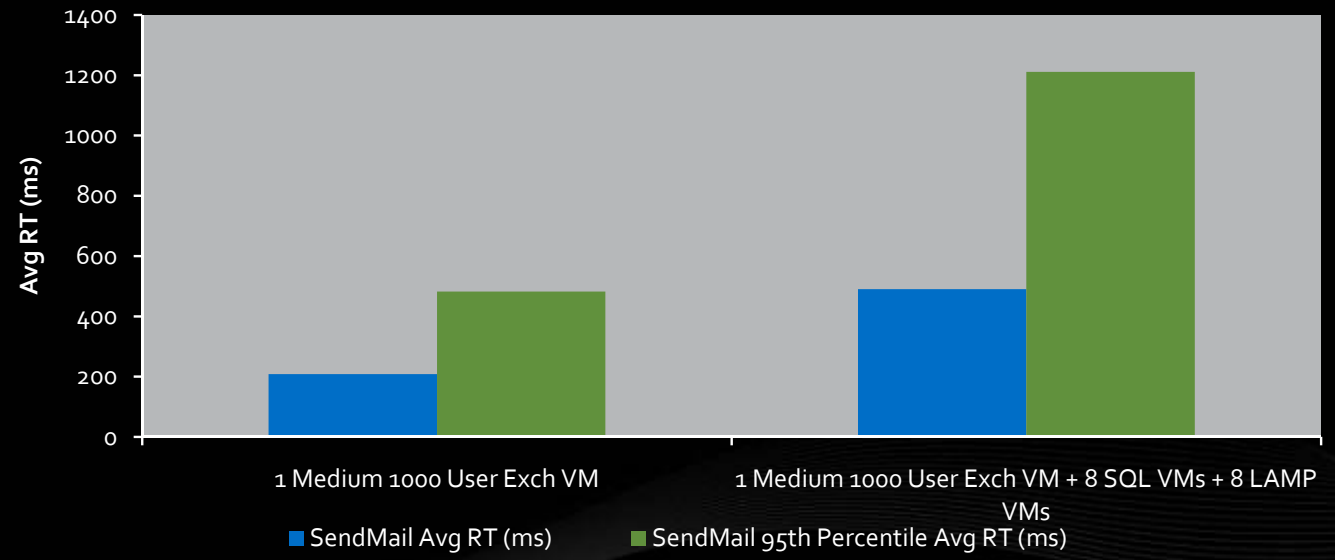
Heterogeneous VM Testing with Exchange 2007 VMs

- What is the impact to different types of VMs running on the same server as a Microsoft Exchange 2007 VM?
  - Tested by running Exchange VM alongside SQL Server and SLES LAMP VMs.
  - SQL and LAMP VMs overall performance decreased by 1-2%; Avg RT increased less than 10ms.



Heterogeneous VM Testing with Exchange 2007 VMs

- What is the impact to the Exchange 2007 VM with other VMs running on host server?
  - Exchange VM impacted more than the SQL and LAMP VMs.
  - 95th percentile response time increased from 482 ms to 1211 ms.
  - Exchange VM Contribution to host server CPU utilization: 8.2% alone increased to 19.7% CPU utilization with other VMs running.



VMotion With Exchange 2007 VMs

- What happens to large heavily loaded VMs when moved?
  - Complete 10 VMotions during a 2 hour period of Exchange 2007 activity and record VMotion time and VM behavior.
  - From Virtual Center, VMotion completes in all cases but Load Generator shows some skipped tasks in the 1k user case and terminates in the 2k case.

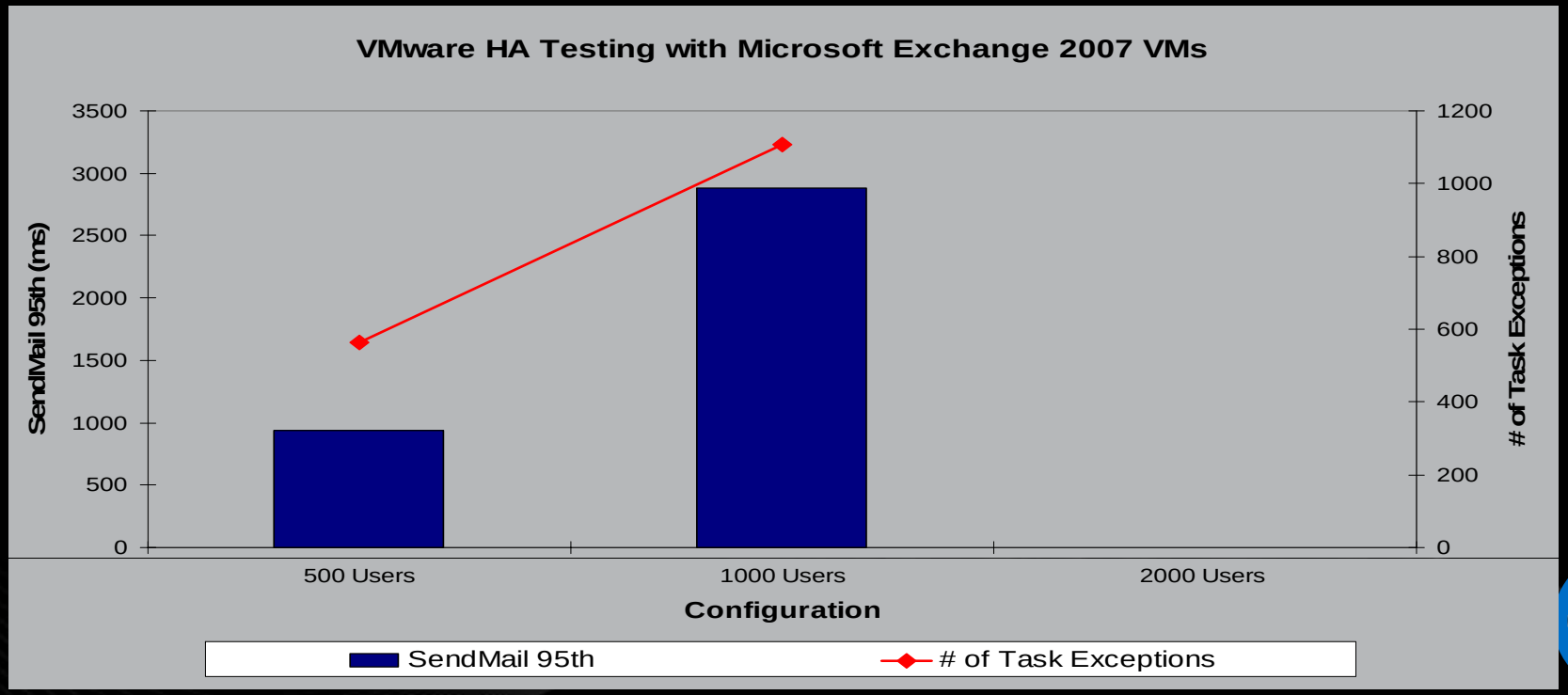
	Small	Medium	Large	Large
Users	500	1000	2000	2000
# of VMs	1	1	1	4
RAM per VM	16GB	16GB	16GB	4GB
vCPU	4	4	4	4
VMotion Times	3-5 Minutes	4-6 Minutes	10 Minutes	3-5 Minutes
Skipped Tasks	No	Yes	N/A	No
Task Queue > 5000	No	No	Yes	No

VMware High Availability with Exchange 2007 VMs

- How does VMware high availability function with Exchange 2007 VMs?
  - Testing VMware High Availability
    - Remove power from host ESX server that has the Exchange 2007 VM handling Load Generator tasks.
    - VMware HA brings the VM online on another ESX Server.
    - Observe and record the down time and the behavior after the VM comes online.

Testing High Availability with Exchange 2007 VMs

- Results from Testing VMware HA
  - The Exchange 2007 VM had a downtime of a few minutes.
  - 500 users had 563 exceptions; 1000 users had 1106 exceptions; 2000 users did not recover.



Summary of Observations for Exchange 2007 VMs

- Best Practice for Exchange 2007 in a VM
  - Utilize Dell Exchange Reference Architecture for sizing RAM, storage, and network
  - The number of vCPUs per VM depends on the number of users to be supported
    - Small – 1vCPU, medium – 2vCPU, large – 4vCPU
  - Exchange 2007 VM does not greatly affect overall performance of other VMs; but its overall performance was impacted.
  - VMware HA was effective in bringing small, medium Exchange 2007 VMs back online from a simulated host server failure.
  - VMotion of the Small Exchange 2007 VM was successful.
    - Larger Exchange 2007 VMs require more investigation

Conclusions

- Microsoft Exchange 2007 fully capable in VI3
- Stacking multiple, small Exchange VMs improves VMotion, HA capabilities
- Design Exchange 2007 VMs from physical reference Architecture
  - Ensures basic quality of service for storage and network subsystems
  - Provides tuning of CPU/memory through resource allocation in VI3

Questions?

Session S288993

Virtualizing Exchange 2007: The Final Frontier?

Todd Muirhead and Kong Yang

Dell Inc.

For more information …

www.dell.com/vmware

www.dell.com/techcenter

www.delltechcenter.com