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VMware's Memory Management and VM Density Advantages Really Stand Out Against Microsoft Hyper-V

"Sharing" is good!

DON'T LOSE YOUR MEMORY!!

VMware vSphere lets customers OVERCOMMIT memory to VMs, allowing them to essentially "share" their unused memory with other VMs.

The REAL reason why VMware has better VM densities…

VMware vSphere provides FOUR proven and production-ready memory management techniques that allow VMs to efficiently "share" memory and reduce wasted resources. Three of VMware's memory management features are even enabled automatically, with no user configuration needed, and one is enabled with a simple vSphere host config setting.

Dynamic Memory, Microsoft's ONE approach to VM memory management is manual and not reliable for production workloads, forcing customers to fully reserve the RAM assigned to each VM. By not being able to overcommit and efficiently "share" memory across VMs, Hyper-V customers simply cannot fit as many VMs on a host when compared to VMware.

VMware's FOUR proven Memory Management techniques are:

Transparent Page Sharing	Memory Ballooning	Memory Compression	Memory Swapping

This is a BIG deal!!! Why is it so important?

Hyper-V customers will be forced to purchase more hardware and licensing (more CapEx) and will have to manage many more hosts and complexities due to their inferior VM density (# of VMs that fit on a host). The benefits of VMware's higher VM density include lower capital (hardware, software) and operational expenses, with easier and centralized VM management that can even automatically balance VMs across hosts via DRS.

What do you need to know about Microsoft's Dynamic Memory and Hyper-V?

1. Both Microsoft and Hyper-V proponents advise customers to ONLY enable it for Test/Dev and select VDI workloads, which is why less than 10% of Hyper-V VMs use this risky feature.
2. Is DISABLED by default and must be enabled and configured on a "PER VM" basis. Requires 7+ steps to enable per VM, plus ongoing manual maintenance, with no top-level or centralized management.
3. Causes severe performance issues and INSTABILITY if configured or managed incorrectly.
4. Only compatible with select applications or operating systems and requires specific Service Packs
5. Hyper-V, by DEFAULT, does a FULL memory reservation for every newly created VM!

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DZ/SC v3

SCENARIO 1 — Why Sharing Unused Memory is Good:

Create a VM and configure it with 32GB of assigned memory, but the VM only ever uses about 12GB of RAM when running.

VMware vSphere

VM configured with 32GB of RAM.

FOUR Memory Management techniques that customers use for production workloads:

- Transparent Page Sharing
- Memory Ballooning
- Memory Compression
- Memory Swapping

All 4 memory techniques are proven for production!

Microsoft Hyper-V

VM configured with 32GB of RAM (without Dynamic Memory).

ONE Memory Management technique that customers do not want to use for production workloads:

- Dynamic Memory

1 memory technique is unproven for production!

How do the FOUR proven VMware Memory Management techniques work?

Transparent Page Sharing	Memory Ballooning	Memory Compression	Memory Swapping
When multiple VMs are running, some of them may have identical sets of memory content. Several VMs may be running the same operating system so the hypervisor can reclaim the redundant copies and keep only one copy, which is shared by multiple VMs in the host's physical memory. Safe page sharing is enabled with a simple vSphere host configuration setting.	When the host runs multiple VMs and the total amount of the free host memory becomes low, ballooning makes the guest operating system on the VM aware of the low memory status of the host and can then free up additional memory for the other VMs.	Reclaims memory by compressing the consumed memory to save space. This is actually similar to when you compress (ie, zip) a file or document to save space.	At VM startup, the hypervisor creates a separate swap file for the virtual machine. Then, the hypervisor can directly swap out guest physical memory to the swap file, which then automatically frees host physical memory for other virtual machines. We even support putting swap files on SSD so that the performance penalty is minimized.

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SCENARIO 2 — The Impact of Memory Overcommit:

Take that same VM, configured with 32GB of assigned memory, that only uses about 12GB of RAM when running, and see how many of those VMs will fit on a host server with 128GB of RAM.

Host Server

VMware vSphere (using the 4 memory management techniques)	TOTAL RAM AVAILABLE	Microsoft Hyper-V (without dynamic memory)
VM #1: 32GB of RAM Assigned. Only using 12GB of RAM.	128 GB	**VM #1**: 32GB of RAM Assigned. Only using 12GB of RAM. Hyper-V still reserves all 32GB of the assigned RAM.
VM #2: 32GB of RAM Assigned. Only using 12GB of RAM.		
VM #3: 32GB of RAM Assigned. Only using 12GB of RAM.		
VM #4: 32GB of RAM Assigned. Only using 12GB of RAM.	96 GB	**VM #2**: 32GB of RAM Assigned. Only using 12GB of RAM. Hyper-V still reserves all 32GB of the assigned RAM.
VM #5: 32GB of RAM Assigned. Only using 12GB of RAM.		
VM #6: 32GB of RAM Assigned. Only using 12GB of RAM.	64 GB	**VM #3**: 32GB of RAM Assigned. Only using 12GB of RAM. Hyper-V still reserves all 32GB of the assigned RAM.
VM #7: 32GB of RAM Assigned. Only using 12GB of RAM.		
VM #8: 32GB of RAM Assigned. Only using 12GB of RAM.		
VM #9: 32GB of RAM Assigned. Only using 12GB of RAM.	32 GB	**VM #4**: 32GB of RAM Assigned. Only using 12GB of RAM. Hyper-V still reserves all 32GB of the assigned RAM.
VM #10: 32GB of RAM Assigned. Only using 12GB of RAM.		
8GB of RAM left over that could be assigned to another VM		

10 TOTAL VMs
320 GB of assigned RAM
200 GB of overcommitted RAM

10 vs 4
(250%)
VM Density Advantage!

4 TOTAL VMs
128 GB of assigned RAM
0 GB(!!) of overcommitted RAM

Think about it...

In this scenario, the Hyper-V customer would have to purchase and manage 3 TIMES the number of servers for the same number of VMs!

That's a lot more unnecessary CapEx expenditures (hardware, licensing, infrastructure, etc.), space, complexity and management overhead for a "comparable" Hyper-V solution!

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18% VM Density Advantage is all that is needed to offset the cost of purchasing vSphere!

Or think about it like this...

If a Hyper-V host is running 6 VM's, all you would need to do is add 1 more VM to that host to justify the price of vSphere!

6 VM's

Microsoft Hyper-V host server

VM VM VM VM VM VM

6 + 1 = 7 VM's
or 18% better VM to Host Density

VMware vSphere host server

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Anything over 18% is "icing on the cake!"

Don't forget about OpEx!

- 3rd Party Studies have confirmed a 53-81% OpEx Advantage for a VMware hybrid cloud deployment vs Microsoft
- Hyper-V + System Center are notoriously problematic and difficult for IT to manage – especially at scale

All of those VMware intangibles!

- Stability & Reliability with Flexibility & Choice
- More vSphere experts than Hyper-V in the industry
- The VMware SDDC provides a REAL path to a Hybrid Multi-Cloud future and will never be obsolete

18% VM Density Advantage is Easy for vSphere! In some cases, it can be 50% or greater!

Why?

- Hyper-V's "Dynamic Memory" physical memory waste due to incompatibilities
- vSphere has superior and more mature physical resource management (CPU, RAM, Storage, Networking)
- Fewer servers needed for a full HA event due to better resource sharing
- Significantly less complex top-level management for VM's via vCenter

Data Centers are NOT Built on Licensing Alone!

- Microsoft wants to make this a licensing-only conversation, which it very much is NOT! Think about TCO!
- The VMware SDDC requires up to 88% less customer OpEx spend vs the equivalent Microsoft solution
- NSX and VSAN can reduce TCO even more when compared to Microsoft's Software Defined Networking and Storage Spaces Direct equivalents. These are first-gen technologies that have inferior capabilities and will only increase TCO due to their inferior scalability

"Proven VM density for Hyper-V remains less than vSphere, typically requiring more hardware."
"more complex to manage... multiple management tools and complex HA setups... too complex for most users."
—Gartner, March 2015

Prove this cost advantage for yourself RIGHT NOW @ http://vmware.com/go/tcocalculator

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The following real-world examples explain the impact of Dynamic Memory in common scenarios

GREAT EXAMPLE #1: Apps don't like Dynamic Memory

When a VM with Dynamic Memory starts up, it will report that it has only the allocated amount of RAM, not the full amount that can be assigned. That will cause apps that expect to see the full amount of RAM to fail. For example, a software installer that requires 4GB of RAM on a machine for the install will see that a VM with Dynamic Memory is running with just 1GB after it boots and refuse to complete the installation.

GREAT EXAMPLE #2: What Happens in an HA Event?

If a VMware customer has an HA event (host server goes down), vSphere will automatically reboot the VMs on another host and leverage the 4 memory management techniques to ensure all VMs are available. With Microsoft's Dynamic Memory, Hyper-V will not let a customer power on any more VM's if the host is maxed out on RAM. This leaves the potential for many Hyper-V VM's not being able to be restored or available in an HA event… Yikes!!

GREAT EXAMPLE #3: Azure + Dynamic Memory = $$$$!

There's an interesting phenomenon with Dynamic Memory when taking Hyper-V VM's to Azure. Since VMs with dynamic memory get a default Max RAM setting of 1 TB in Hyper-V, customers who set up Azure Site Recovery to replicate that VM to Azure will be assigned a monster (very large) VM, even though the original VM is much smaller. In this scenario, customers will wind up with a G5 instance, which is Azure's biggest VM with 448 GB of vRAM, at a cost of $8.78 per hour!! In a DR test running for a few days, this would cost over $1,000 for just this one Azure VM, no matter how much RAM the original VM really used! Think about what it would cost to test 10 VM's or 50 VM's or 100?!?

Enabling Dynamic Memory for every VM is called the "Please Fire Me" approach by Hyper-V bloggers!

https://www.petri.com/hyper-v-dynamic-memory-strategies

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Here's What You can Do!

1 Ask Yourself These Key Questions!

- How much time do you spend managing memory and/or thinking about memory management today on vSphere? (Answer is usually none or very little)
- Did you realize that by switching to Hyper-V you will have to buy significantly more hosts (physical servers) and licensing to house the same amount of VMs that you have on vSphere today?

2 Demonstrate the Impact Using Your Own Data

- Ask your VMware account exec to gather current Memory Overcommit information about your vSphere environment via 1 of these 3 methods:

  1. TAM Report Tool 2. Your vCenter 3. vRealize Operations

- Your Over-Commit Data should be compelling (more than 30% Over-Commit). Switching to Hyper-V could sacrifice 75-95% of that, resulting in additional Hosts (physical servers) needed PLUS the additional power, cooling, real-estate, management overhead, complexity and personnel needed to maintain the additional new servers and hardware.

3 Debating Whether to Switch to vSphere from Hyper-V?

- In this scenario it's important to understand that fewer hosts (physical servers) will be needed if you switched to vSphere. Taking advantage of VMware's memory management techniques will enable you to over-commit memory, resulting in a significant DECREASE in CapEx and OpEx spending.
- Ask yourself "Do you realize today that you need more hosts to run your virtual environment with Hyper-V than you would need with vSphere?"
- Go through your SCVMM instances and note how many VMs have Dynamic Memory enabled and disabled. (It's usually disabled for 90%+ of the VMs)
- Add up the amount of Memory configured for the Dynamic Memory "Disabled" and "Enabled" VMs respectively.
- Remember, you are doing a "FULL MEMORY RESERVATION" for any Dynamic Memory "Disabled" VMs. By switching to VMware vSphere, you would need 20-50% less "physical" memory for those VM's. This results in fewer hosts needed, which translates into reclaimed hardware for future growth and greater VM density for your entire environment, as well as budget savings for future projects.

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