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THE HYPER-CONVERGENCE EFFECT: DO VIRTUALIZATION MANAGEMENT REQUIREMENTS CHANGE?

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WHITEPAPER

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There is no doubt that virtualization has impacted the entire data center and changed the fundamental way that we provide IT services to our end-users. Virtualization has spawned many new trends and really shifted the focus of data center computing from physical hardware to intelligent software. VMware® is leading the charge of this shift and what began as trying to make the most efficient use of compute resources through intelligent features built into vSphere™ has now shifted to networking and storage.

This fundamental change has resulted in the birth of the software-defined data center where the focus has shifted from implementing intelligent physical hardware to having the intelligence move up the stack into the virtualization layer. This move has also resulted in a new type of hardware platform which brings the hardware components closer together using software-defined storage that runs on the hypervisor. In this paper we will explore this latest trend in virtualization, hyper-convergence, and the impact it has on how we implement, manage, and monitor our virtual infrastructures.

THE HYPER-CONVERGENCE TREND IN VIRTUALIZATION

If you're involved with virtualization, there is no doubt that you have heard the word hyper-convergence mentioned somewhere. To understand what hyper-convergence is all about as it relates to virtualization let's look at the factors that have resulted in us getting there. The typical virtualization model years ago consisted of deploying a hypervisor (vSphere) running on many physical servers, connecting them to a physical network using many NICs and also connecting them to a shared storage array (SAN/NAS). This model saw the physical resources that a host requires divided up into separate physical devices all interconnected over a network. It also split up the intelligence and control planes so they were not centrally managed or very well integrated. The hypervisor was good at managing compute and memory resources, storage arrays were good at managing storage resources, and network switches were good at managing network resources. Using APIs, VMware tried to bring the separate physical resources closer together, but they still lived under multiple roofs.

Converged infrastructure was the next step forward which brought physical resources closer together and tried to optimize them to work more efficiently. It also tried to unify the management of disparate devices together so virtual and physical resources could be managed together. Typically these types of systems were delivered as a complete rack solution with servers, storage (SAN/NAS), networking and software all pre-configured and optimized for a specific number of virtual machine workloads. It's important to note that while converged systems tried to bring the different hardware components closer together they still exist as distinctly separate from each other and are not physically unified. These systems were typically larger scale and aimed at large enterprise customers.

More recently, converged infrastructure has spun off into hyper-converged infrastructure which has more of a compact and scaled-out deployment model. Where converged infrastructure had a large scale "in a rack" type of footprint, these types of systems are a smaller scale "in a box" type of footprint. Hyper-converged systems typically feature multiple physical servers running together in a single appliance. Another big difference with hyper-converged systems is the shift to using software-defined storage that runs as a virtual storage appliance (VSA) on each server and uses local server disk to create a virtual SAN that can be used on all servers. As these systems are smaller scale with a building block scalable deployment model which eliminates the need for a physical SAN, they are aimed at SMB and smaller enterprise customers.

Hyper-converged systems are designed to be turn-key and easy to deploy with minimal interaction required to get a virtual infrastructure up and running quickly. By using VSA type storage which tightly integrates server resources with storage resources, it mostly eliminates the need for having storage expertise that you typically need to manage a separate SAN/NAS array and storage infrastructure. Hyper-converged systems truly unify both the virtual and hardware components into a single entity that can be managed as an entire system rather than multiple different components.

So what's driving this new trend towards hyper-convergence? As software-defined storage is a key component in hyper-converged systems, the emergence of more scalable, mature, and robust software defined storage solutions like VMware VSAN™ has rapidly increased the growth of the hyper-converged product segment. VMware has played a big part in promoting hyper-converged systems with their introduction of their EVO: Rail hyper-converged appliances that allow vendors to deliver complete hyper-converged systems powered by VMware VSAN.

VMware is leading the charge towards hyper-convergence, but is this something customers are wanting and what are the benefits? If you look beyond the converged hardware and at the benefits hyper-converged systems deliver, the main benefit is the simplified deployment model. Just like with any new purchase in your home like a grill, toy, or furniture that has some assembly required before you can begin using it, assembling a virtual environment can be time-consuming and frustrating at times. With hyper-converged systems everything is already mostly assembled and ready to go. This can be attractive to customers that have no desire to try and build out a virtual environment and want the best possible time to value from virtualization.

HYPER-CONVERGENCE IMPACT ON MANAGEMENT

While hyper-convergence simplifies hardware deployment with its "everything in a box" approach, how does this impact the management of a virtual infrastructure? With its unified hardware architecture the management of the physical infrastructure is typically easier as the hardware is supplied by a single vendor and most vendors provide plug-ins to manage the hardware from within vCenter™ Server. Additionally, the storage component is easier to manage as VMware VSAN is integrated into the hypervisor (ESXi™) and all management is from within vCenter Server. But what about the virtualization environment as a whole, are management requirements really any different with a hyper-converged system than they are with a traditional virtual environment?

There is a lot more to managing a virtual environment than just focusing on the physical hardware and hypervisor which is the primary focus of hyper-converged systems. Hyper-convergence makes deployment a lot easier, but it doesn't necessarily make the typical management pain points go away or become easier. Certain aspects of management may become easier, but that doesn't always translate into an overall management miracle cure that will magically make all your pain points disappear.

So do the requirements for management in a hyper-converged virtual environment really change? Not really, we still need to manage and monitor pretty much all the same components that we do in a traditional virtual environment. After all, hardware is still hardware, whether it is all crammed together in a single box or spread out onto multiple physical components. The hypervisor is still the same ole hypervisor, VMs are still VMs, and the applications they run are no different and have no idea that they are running on a hyper-converged system.

You know the impact that hyper-convergence has on hardware, but a virtual infrastructure encompasses the entire computing stack from the bare physical hardware all the way down to inside the VMs and the applications they run. Management and monitoring needs to occur at all levels of the computing stack, this includes inside the VMs which vCenter server and hardware management tools typically have no insight into. What is needed for this is a management tool that can see through all layers of the computing stack, including the guest OS and applications—thereby converging management into a single tool. This provides you the winning combination of hyper-convergence at both the hardware level and management of your virtual environment as a whole.

REQUIREMENTS FOR A COMPLETE VIRTUALIZATION MANAGEMENT SOLUTION

No matter if a virtual infrastructure is hyper-converged, converged, or not, the requirements for an effective virtualization management and monitoring solution remain unchanged. Virtual environments have unique challenges and requirements that do not exist in traditional non-virtualized environments. If you try and manage a virtual environment as you would a physical one, you will run into problems as the virtualization layer changes everything.

Virtualization is essentially a game of smoke and mirrors. The hypervisor tricks virtual machines into thinking they have exclusive hardware access as guest operating systems are not designed to share server hardware. At its core, virtualization is all about sharing physical hardware resources with many guest VMs to maximize resource efficiency. While this can make the most effective use of your resources, it also introduces new and unique challenges, and as a result management and monitoring becomes more complicated. Further, understanding the relationship of resources across the various computing layers becomes very important.

Because of this resource sharing model virtualization essentially becomes a strategic game where resources must be balanced. VMs require all 4 resource types (compute, memory, storage, and

network) to run their workloads and a shortage of any one resource will create a bottleneck which will impact performance and limit VM density. When virtual machines are all fighting for limited host resources you need to ensure that you not only have enough resources available, but that you also prioritize their usage. Staying on top of resource consumption is one of the most important tasks in a virtual environment, if you don't, you risk losing the game.

Another important requirement for a virtualization management solution is the ability to have visibility across the computing layers from the apps inside a VM, through the virtualization layer to the physical hardware. Because virtualization masks the view from inside a guest VM to the physical hardware, it is important to get viewpoints at all layers, so you can follow the relationship of what occurs from each layer to be able to more effectively monitor and troubleshoot resource bottlenecks. When you lack the proper visibility into all areas of your virtual environment the risks are greater than in a traditional environment as even little things can have big impacts.

All in all, focusing on the big picture in your virtual environment is just as important as focusing on the components and layers that are part it. From growth to capacity to performance, maintaining a smooth running virtual environment requires effective monitoring of resources and the ability to interpret data so you can act on it. Having a proper virtualization management solution can make this task a much easier one and also ensures that you are looking at the right information so you can make informed decisions.

HOW SOLARWINDS CAN HELP ELIMINATE THE PAIN OF VIRTUALIZATION MANAGEMENT

A big challenge with management and monitoring is that there is a lot of data and numbers across a lot of different areas that require you to make some sense out of them. In a virtualized environment you cannot afford to be reactive to any problems that occur; being proactive is what is needed to avoid problems and the key to that lies in having a comprehensive virtualization management tool that can provide complete VM to hardware coverage. That tool also has to be capable of displaying information in an easy to understand manner so you are not overwhelmed with information and can see the important information that you need to know.

SolarWinds® Virtualization Manager is the tool you need to achieve this; with Virtualization Manager you don't need to go digging for resource information to try and decide what is relevant or not. Built-in, customizable dashboards provide you with easy to understand, at-a-glance insight into performance, capacity, configuration, and usage of your virtualized infrastructure.

Tight integration with SolarWinds Server & Application Monitor and Storage Resource Manager provides you with end-to-end monitoring and application specific infrastructure views that simplify troubleshooting and performance management. You can also drill-down into the storage layer supporting a specific virtual machine—all the way from VM to spindle.

Virtualization Manager delivers integrated VMware vSphere capacity planning, performance monitoring, VM sprawl control, VDI performance monitoring, configuration management, and chargeback automation—all in one surprisingly affordable product that's easy to download, deploy, and use.

Whether you decide to deploy a hyper-converged virtual infrastructure or not, your management needs still must be met and you should consider converging your virtualization management as well. SolarWinds Virtualization Manager exceeds the requirements that a virtualization management solution must deliver and can help any virtual infrastructure. Download a free fully functional trial today and you can start monitoring your VMs in less than an hour—see for yourself that management of a virtual environment does not have to be painful and difficult.

ABOUT THE AUTHOR

Eric Siebert is an IT industry veteran, author and blogger with more than 25 years of experience, most recently specializing in server administration and virtualization. Siebert has published books, including his most recent, Maximum vSphere from Pearson Publishing and has authored training videos in the Train Signal Pro series. He also maintains his own VMware information web site, vSphere-land.com, and is a regular blogger and feature article contributor on TechTarget's SearchServerVirtualization and SearchVMware web sites. Siebert has presented at VMworld in 2008 and 2010 and has been recognized as a vExpert by VMware in 2009 and 2010.

ABOUT SOLARWINDS

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