Hyper-converged Solutions for ROBO, VDI and Transactional Databases Using Microsoft Hyper-V and DataCore Hyper-converged Virtual SAN

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EXECUTIVE SUMMARY

Microsoft Hyper-V together with DataCore™ Hyper-converged Virtual SAN software represent an appealing and low cost foundation for consolidating compute, storage and networking facilities in small, off-the-shelf x86 servers. The hyper-converged solution reduces complexity, tames management issues and minimizes overall costs associated with supporting a variety of challenging IT environments.

This paper examines how Hyper-V, combined with other Microsoft tools, and DataCore's Virtual SAN technology provides compact, cost-effective, reliable, and manageable solutions for remote office/branch office (ROBO), virtual desktop infrastructure (VDI) and transaction-centric database applications.

ATTRACTIVE HYPER-CONVERGED ALTERNATIVE TO TRADITIONAL APPROACHES

Traditionally, uptime and performance requirements in remote office/branch office (ROBO), virtual desktop infrastructure (VDI) and transactional database workloads required a combination of multiple physical servers and costly external SANs. Separate physical servers have been used to support user/Web interfaces, application logic and database management, compounded by separate networking and storage devices. Organizations have come to understand that deploying separate equipment for each of these functions increases the cost and complexity of the overall environment. It also increases the real estate, power consumption and air conditioning necessary to house them, leading to higher recurring costs.

REDUCE PHYSICAL COMPONENTS USING VIRTUALIZATION SOFTWARE

The first step to address these challenges is migrating the workloads from discrete physical servers into virtual machines. The applications can thus be hosted on fewer, albeit larger, physical systems. Microsoft Hyper-V extends the Windows Server operating system (o.s.), into a hypervisor for this purpose.

For high-availability, a pair or more servers may be placed into a Windows Failover Cluster. When a server needs to be taken down for maintenance or upgrade, its virtual machines can be migrated non-disruptively to another node in the cluster. Should one server fail unexpectedly, the Failover Cluster software resumes the affected workloads on a surviving node.

Shared storage access is necessary for Failover Cluster to migrate and fail-over virtual machine states. In the past, costly external SANs were necessary for this level of uptime, making it impractical for ROBO sites. Today, DataCore Virtual SAN software brings external shared storage functions into the servers using internal disk drives and flash memories. Data is mirrored between nodes to eliminate single points of failure. These new collapsed packages are often described as being "hyper-converged."

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To further facilitate a single-system view across a collection of clustered servers, suppliers have developed sophisticated management tools and hardware enhancements to make their hyper-converged systems easier to provision, operate, while improving overall performance.

Virtualization technology at the compute and storage layer work hand-in-hand to shrink the space and the investment necessary to achieve an agile, flexible, reliable computing environment.

Availability, automation and manage-ment software makes it possible for functions to be distributed across several virtual systems without the need to re-architect applications. When one system gets overloaded, some of its workloads can be re-located to a less busy server without disruption, thereby optimizing system utilization and performance.

Kusnetzky Group Analysts often recommend this approach when advising organizations on how to achieve their goals of reducing complexity and costs.

WHAT BENEFITS WILL MY ORGANIZATION GET? HYPER-CONSOLIDATION AND BIG SAVINGS

Kusnetzky Group Analysts have determined that Microsoft Hyper-V combined with DataCore software better harness the available storage and computing resources found in hyper-converged servers to measurably reduce equipment and substantially shave costs. Some of the benefits of this approach follow:

- More applications can share these systems without contention. Higher virtual machine density per server means that organizations can get away with far fewer servers thanks to DataCore™ Parallel I/O technology. The cost savings are especially important to companies with tens or hundreds of ROBO sites.

- In addition, one can attain faster response from smaller systems, further reducing power, cooling, and floor space; attributes highly valued in latency-sensitive applications that are confined to small closets.

This approach also extends the life of existing systems deferring planned purchases.

WHERE HYPER-V FITS

Hypervisors, also known by the term "virtual machine software" are one of the fundamental elements of hyper-converged systems. They allow multiple complete system images to be hosted on a single physical server. VMware's ESXi, Hyper-V from Microsoft, KVM from Linux, and Oracle's VM hypervisors are fighting for growing stake in this hotly contested market. Hyper-V, available at no additional charge with Windows Server, appeals to many budget strapped organizations. It's also favored among many enterprises that have standardized on Microsoft software to improve levels of integration and contain licensing costs.

WHAT IS THE ROLE OF VIRTUAL SANS?

Hypervisors combined with monitoring and management tools make virtual machine mobility possible. But what's required to make storage equally agile?

DataCore, a key innovator in storage virtualization and software-defined storage, recognized this issue long ago. DataCore Virtual SAN software provides several important data services necessary for hyper-converged solutions. These include:

Pooling of direct-attached disks across server clusters, mirroring data across nodes, caching reads and writes, auto-tiering between flash, SSDs and spinning disks.

The underlying DataCore Parallel I/O technology is credited with achieving world-record price-performance, most input/output operations per rack unit, as well as fastest response in the prestigious SPC-1[1] benchmark – the gold standard for comparing storage solutions.
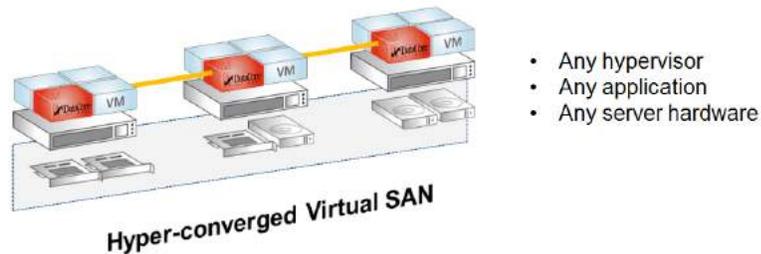

- Any hypervisor
- Any application
- Any server hardware

Hyper-converged Virtual SAN

Figure provided by DataCore

THREE COMMON USE CASES

Let's examine how this combination of technology in a small package can be beneficial in several different use cases including ROBO, VDI and transactional database applications.

MAKING REMOTE OFFICES/BRANCH OFFICES MORE EFFECTIVE

Enterprises face a number of challenges when dealing with ROBO needs. IT solutions must be installed, patched and periodically upgraded. There are ongoing needs for administrative and operational support. Important data must be backed up regularly and the environment must be made secure to prevent unauthorized or malicious use.
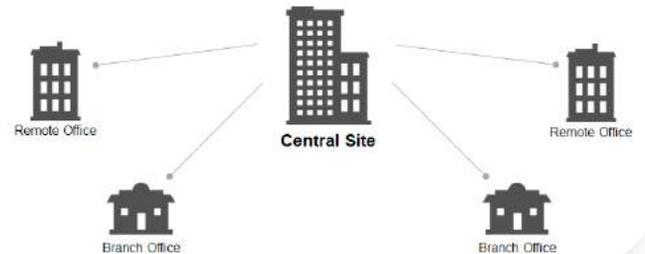
Since ROBOs often have no IT staff on site, enterprises need compact (think data closet rather than data center), easy to stand up and provision solutions and easy management tools. Once systems have been installed, the most desirable approach is allowing IT administration to be done remotely from central sites.

Virtualized solutions, that is solutions based upon workloads and workload components being installed in virtual machines, are often selected as a way to address these objectives.

Updates can be applied centrally and then downloaded to target machines in ROBO data closets. So, no IT staff members will be forced to go to these remote sites. Furthermore, all administrative, operations and support functions can be done remotely making

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[1] http://www.storageperformance.org/results/benchmark_results_spc1_top-ten

management simpler. Virtualized solutions can also improve overall security. The remote systems can be "locked down" and only accessed using secure remote tools.

DataCore Hyper-converged Virtual SAN software combined with its ability to support cached and parallel IO can make these compact system configurations used for ROBO operations perform better, be more reliable and make the workloads more highly available in the smallest possible footprint.

Hyper-V and DataCore Virtual SAN technology working together can improve ROBO effectiveness while reducing complexity and hardware costs.

VDI CAN TAME THE HERD OF DESKTOP DEVICES

Another place the combination of Hyper-V and DataCore Virtual SAN offer significant improvements in performance, availability and manageability is virtual desktop environments (VDI). In a VDI environment, desktop workloads are encapsulated into virtual machines and users remotely access these workloads. This approach leads to reductions in administrative and operational costs. It also improves overall levels of security since the actual workloads execute in local, regional or enterprise data centers rather than on the users' own laptop or desktop computer.VDI offers reduced operational support costs because the workloads themselves, the operating systems, the data are all centralized. This makes the desktop environments easier to manage, backup, and recover in the case of user error. Furthermore, once the workloads are encapsulated into virtual machines, they can be easily moved from one server to another or from one data center to another to improve performance or to address a hardware or software outage.

The IT support staff can be centralized as well which can reduce the number of staff people necessary. It is no longer necessary for IT staff to reside in each branch or department.

Hypervisors make it possible for a number of desktop workloads to share the same host rather than requiring each individual to use a heavily configured PC or Laptop. Instead, users need only low-cost, locked down thin clients to for their monitor, keyboard and mouse.

DataCore Virtual SAN software makes it possible for IO performance to be aligned with business needs and objectives without the enterprise having to deal with separate local or remote storage that is in the departmental, regional or enterprise data centers.

This technology offers a number of important benefits such as allowing high performance applications to execute well in a virtual environment; Absorbing I/O from boot storms that occur when people turn on their systems at the same time at the beginning of the day; and accelerating data-centric application performance as well. This technology directly addresses enterprise concerns about network and storage capacity that has been a long-time inhibitor to VDI adoption and makes it possible to deploy low cost end points without local storage. This last point, by itself, makes VDI attractive to enterprises in the government, financial services and healthcare markets.

TRANSACTIONAL DATABASE SYSTEMS CAN ENJOY THE BENEFIT OF A HYPER-CONVERGED ENVIRONMENT

Enterprises have been reluctant to deploy latency-sensitive transactional database applications in virtual environments. They are concerned that the overhead of virtual machines would "get in the way" of good performance.The combination of Hyper-V and DataCore Virtual SAN software addresses this issue and makes it possible to reduce storage complexity without requiring special storage or network equipment. It also makes it possible for many functions to share the same physical system while still performing well.

Among the key benefits, workloads can access storage locally without incurring network latency. The combination provides the manageability, availability, reliability, and performance needed to satisfy enterprise requirements.

S U M M A R Y

Compact, low-cost, hyper-converged systems built on standard x86 servers using Microsoft Hyper-V hypervisor and DataCore Virtual SAN software are particularly well suited for ROBO, VDI and even latency-sensitive transaction processing databases. Kusnetzky Group Analysts have determined that these scenarios will greatly benefit from equipment consolidation, faster performance, and easier administration, while significantly reducing costs.