

THREE MUST HAVES FOR THE VIRTUAL DATA CENTER

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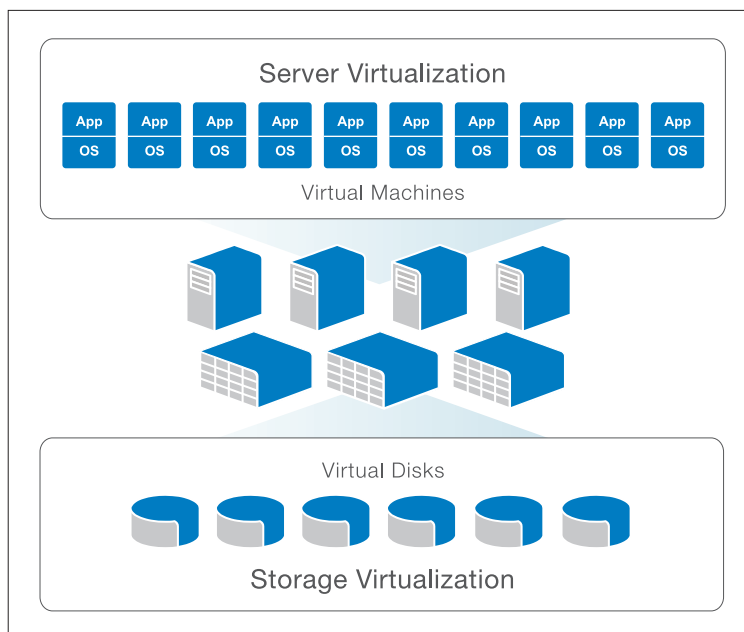
EXECUTIVE SUMMARY

Traditionally, data centers have attempted to respond to growth by adding servers and storage systems dedicated to specific applications, business functions, customers, and geographic locations. Over time, the result has been a complex, inflexible infrastructure that is difficult and costly to manage.

To solve these problems, organizations are turning to virtualization technologies. The benefits of virtualization are well understood: it helps reduce capital and running costs; it allows organizations to be more flexible and nimble in response to market changes; and, as every environmentally-aware CIO knows, helps reduce the data center's carbon footprint through lower power and cooling requirements.

Server virtualization, which enables several applications to run independently on a single physical server, is an important first step toward achieving a virtualized environment.

However, server virtualization is just half the story. Data center managers need to combine server virtualization with advanced storage virtualization in order to achieve the full benefits that are available to them. It is only with the support of an advanced storage platform that can easily provision storage for multiple servers, automatically classify and migrate storage to the appropriate tier and provide continuous data protection that organizations can achieve the full promise of a virtual data center.



Data Center Virtualization: *Combine server virtualization with storage virtualization to create an on-demand data center.*

Server Virtualization is the First Step Toward a Virtual Data Center

The fundamental technique for consolidating IT resources is virtualization. Virtualization creates a pool of servers, storage, and other infrastructure resources that applications can share. Because applications in a virtualized environment draw from the resource pool without specifying the type of processor, memory, or storage required, the IT department gains the flexibility to choose the best underlying components.

Meanwhile, the availability of new tools to manage virtualized infrastructures can enhance the reliability and availability of IT services while boosting IT staff productivity.

Server virtualization can help increase IT flexibility and reduce equipment and labor costs by consolidating applications and workloads onto fewer physical servers. Rather than using five separate physical servers for five distinct applications, enterprises can employ virtualization software to run all five applications on the same physical server.

Server virtualization offers several important advantages, but to realize the full benefits of server virtualization, data center managers must overcome significant storage challenges. In many data centers, those challenges arise because storage is directly attached to servers and cannot be shared beyond the physical server.

Virtualizing Storage on a SAN is Next

Storage area networks (SANs) enable servers to share centralized resources but virtualizing storage on a SAN is only the first step. Traditional SAN offerings can experience some of the same stumbling blocks as direct attached storage in a virtualized environment. In fact, some of the shortcomings of direct attach storage and traditional SANs are actually exacerbated by server virtualization. When virtualized server environments are coupled with traditional storage, it is more difficult for administrators to tailor storage requirements for each application.

An application might benefit from a particular server interface, drive technology or speed, RAID configuration, or snapshot schedule. But in a virtualized server environment with direct attached storage, all of the applications running on the physical server are forced to use the same storage, with the same storage characteristics. Traditional SANs do not provide a solution. Instead they offer only a limited number of volumes which are not enough to accommodate each of the large number of applications that can run on a virtualized server.

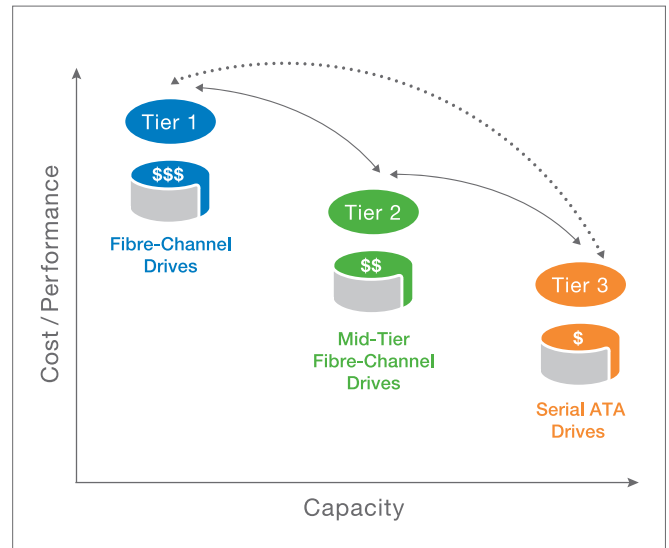
Three Must-Have Technologies to Complete the Virtual Data Center

To take full advantage of server virtualization, and create a true virtual data center, IT departments need a holistic storage solution that allows fully shared resources, easy and automated storage classification and migration and complete data protection.

Must Have #1: Automated Tiered Storage

The complexity of managing SANs is amplified by the use of multiple storage classes. Most enterprise SANs have a combination of faster (expensive) and slower (economical) storage to provide several price/performance options for data in an effort to optimize costs. But managing a multi-class SAN can be labor intensive and administrators need to analyze data usage and manually migrate data to the most cost-effective storage or risk leaving unused data on fast, expensive storage.

In order to create a high performance and cost-effective virtual data center, storage solutions must be capable of optimizing the use of multiple storage classes by tracking usage and automatically moving data between storage classes based on pre-defined rules. Frequently used data can remain on faster storage, while less-frequently used data can be automatically pushed to slower, more economical storage, without the need for administrator intervention. Automatically moving inactive data off high-performance drives frees up spindles to increase performance across all virtual servers accessing the shared disks.



Optimize Performance and Cost: *Dynamically place blocks of data on the preferred tier of storage.*

Must Have #2. Thin Provisioning

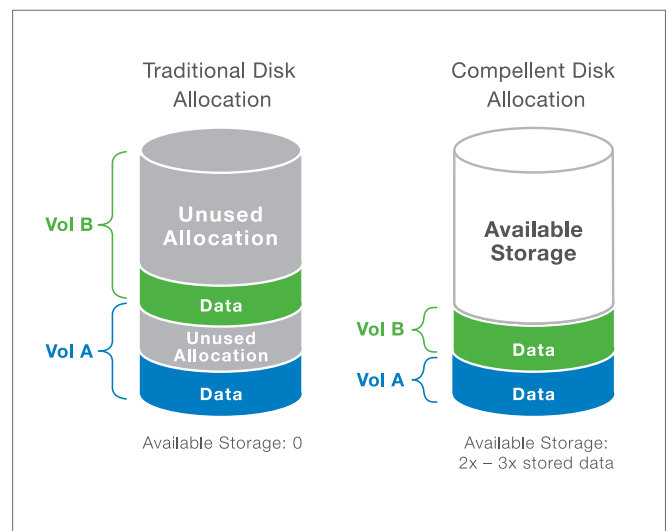
By pre-allocating disk space, as required in traditional SAN implementations, storage is underutilized. Administrators are often reluctant to purchase and allocate storage in smaller increments as allocating storage can be a complex and time-consuming process that interrupts availability. Adding virtual servers into the mix only exaggerates the problem.

Data center managers need to consider a virtualized storage solution in which there is no need to pre-allocate drive capacity to volumes before that capacity is used. This approach, also called thin provisioning, can dramatically increase storage utilization while reducing the need to over-provision capacity in anticipation of future growth.

Thin provisioning enables immediate volume creation for any number of virtual servers without wasting storage capacity. Administrators can create a virtual volume for each virtual server without pre-allocating the capacity upfront.

For example, an enterprise might create ten virtual machines on a single physical server. Each of those virtual machines might require 1 TB of storage. With Thin Provisioning, administrators can present ten virtual storage volumes, 1 TB each, for use by ten unique virtual servers based on only 1.5 TB of physical capacity. Each application has access to the full amount of storage it needs. If and when the enterprise actually requires more storage capacity, it can simply add storage capacity while applications remain online.

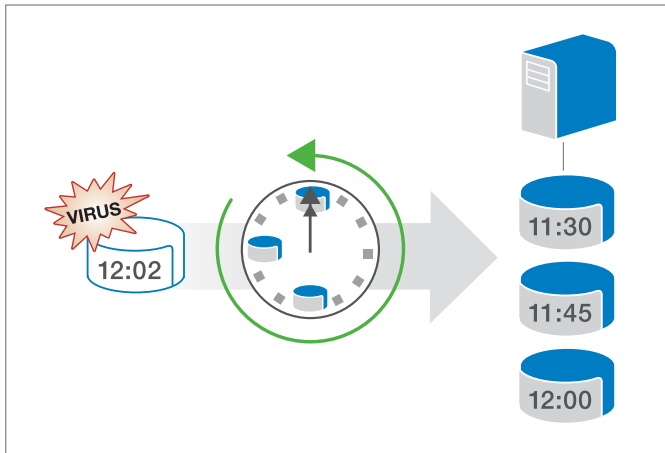
This approach allows administrators to improve overall storage utilization, reduce hardware costs and control rapid capacity growth that can be exacerbated by the addition of virtual servers.



Improve Utilization and Simplify Provisioning: *Create storage for virtual servers without wasting physical capacity.*

Must Have # 3. Space-Efficient Snapshots and Boot from SAN

Data protection can present challenges for typical SANs. For data centers that employ RAID storage, the cost of adding storage capacity is significantly increased by RAID overhead. When storage is pre-allocated to specific applications, much of that expenditure will be for allocated but unused space. Creating data snapshots protects data against loss or corruption but mirrored SANs and snapshots that require full volume clones can increase these costs even further.



Instant Recovery: Roll back time to a previously known state for fast, accurate recovery.

Space-efficient snapshots do not require full volume clones during the creation or recovery process and consume negligible storage for mapping. This efficient use of storage, compared to other SANs, means many more snapshots can reside in a given amount of physical storage. Creating a high number of snapshots can enable IT departments the ability to recover any virtual server within seconds.

These snapshots can also be used to help administrators test new applications and service packs, efficiently support server Boot from SAN operations, and virtually eliminate backup windows on production systems.

The Result: Automated Virtualization for the New Data Center

By combining a feature-rich SAN that includes a full range of storage virtualization capabilities, thin provisioning, automated tiered storage and continuous snapshots, administrators can create a complete data center virtualization solution.

A CASE STUDY IN SERVER AND STORAGE VIRTUALIZATION:

For gm2 Logistics, a warehousing and logistics company headquartered near London, a virtual server and storage platform is key to ensuring that about 740 tons of paper products are delivered to more than 1,350 customers on time every day.

After virtualizing numerous servers using VMware, gm2 Logistics deployed two Compellent Storage Center storage area networks (SANs) at its two central distribution centers located 135 miles apart.

By virtualizing both its server and storage environment, gm2 Logistics can easily scale applications and storage with minimal disruption to its business.

Virtualization has also enabled gm2 Logistics to reduce its data center footprint by more than a third. This in turn has led to greater power and cooling efficiencies—a huge win for a company committed to reducing the environmental impact of its business processes.

To achieve this reduction while increasing performance and availability, gm2 Logistics boots physical and virtual servers from the SAN. The ability to use VMware in conjunction with the Compellent SAN to provision servers from one environment to another means that downtime is absolutely minimized.

As a result of its holistic approach to virtualization, gm2 Logistics is in a better position to meet its future data requirements as advanced applications evolve.

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