

Clustering and Virtualization: Reliability and Availability

Virtualization: Doing More With Less

As the current economy indicates, businesses from all sectors are looking for ways to 'do more with less'. Server consolidation, uptime requirements, and the desire to reduce server complexity, redundant parts, and a simpler footprint are among the new trends in server management.

Virtualization is the current industry buzz, and is worthy of serious discussion for nearly every business that has more than one server.

Simply put, virtualization allows you to run multiple operating systems on one piece of hardware. For many businesses, either because of limited budget, space, or power constraints, this is an excellent way to maximize hardware resources.

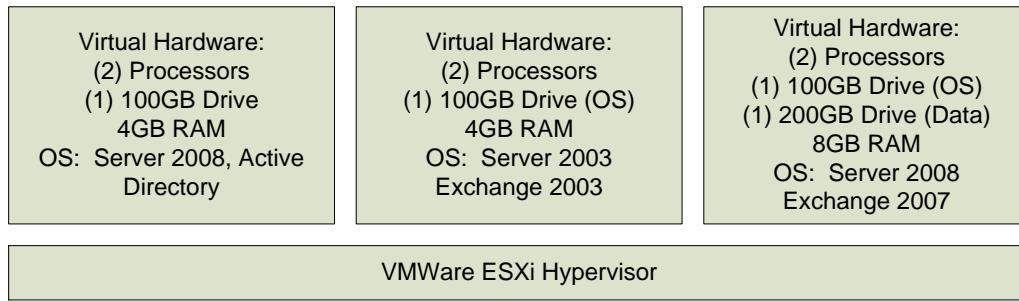
Currently, there are three major virtualization players, and numerous smaller projects. The big three are VMWare, Microsoft's Hyper-V, and Citrix XenServer.

VMWare

VMWare (<http://www.vmware.com>) is the longest-running and probably best-known of the bunch. Introduced in the late 90's as VMWare workstation, VMWare now has extended into an enterprise-level virtualization platform. With features such as automatic load balancing, "VMotion" for moving server images while running, and support for multiple platforms (Windows, Linux, and Unix), VMWare is a solid player.

VMWare's ESXi approach loads a "hypervisor" before any operating system. The hypervisor is small, and allocates the desired resources to a virtual machine:

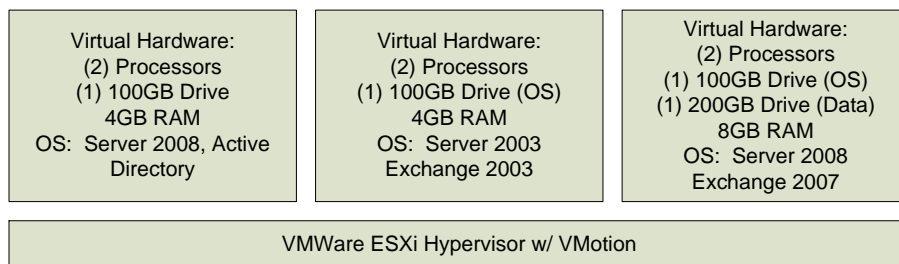
Fig. 1: VMWare Virtualization Architecture



Example Hardware:
 (4) quad-core processors
 (5) 300GB drives
 16GB RAM
 (4) 1GB Ethernet

As resources expand or load increases, VMWare can add more physical hardware to balance the load:

Fig. 2: VMotion hardware load-balancing



Example Hardware:
 (4) quad-core processors
 (5) 300GB drives
 16GB RAM
 (4) 1GB Ethernet



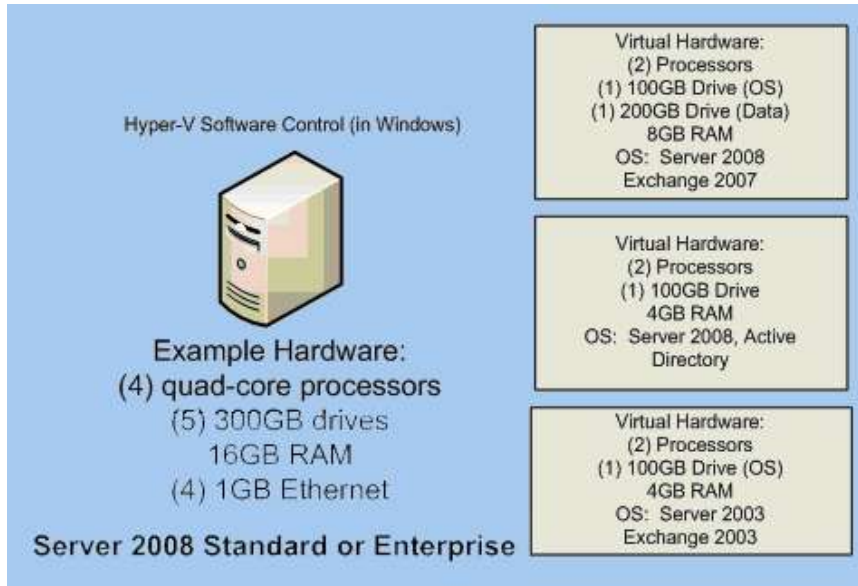
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This allows for great flexibility in uptime, server maintenance, and expandability. Servers can be added to VMotion, while virtual servers can be moved at will, without downtime or server rebuilds.

Microsoft Hyper-V

Introduced with Windows Server 2008, Hyper-V is Microsoft's answer to virtualization. Running on top of Server 2008 (with or without the GUI), Hyper-V allows Server 2008 to run virtual machines as well. Hyper-V will be attractive for customers with existing Windows installations, who need to either add another server, or migrate older hardware onto new platforms. Hyper-V supports Windows platforms, as well as Novell/Suse Linux. More Linux distributions may be added later. The comparatively low cost of Hyper-V vs. VMWare or XenServer will make it an ideal choice for many smaller businesses.

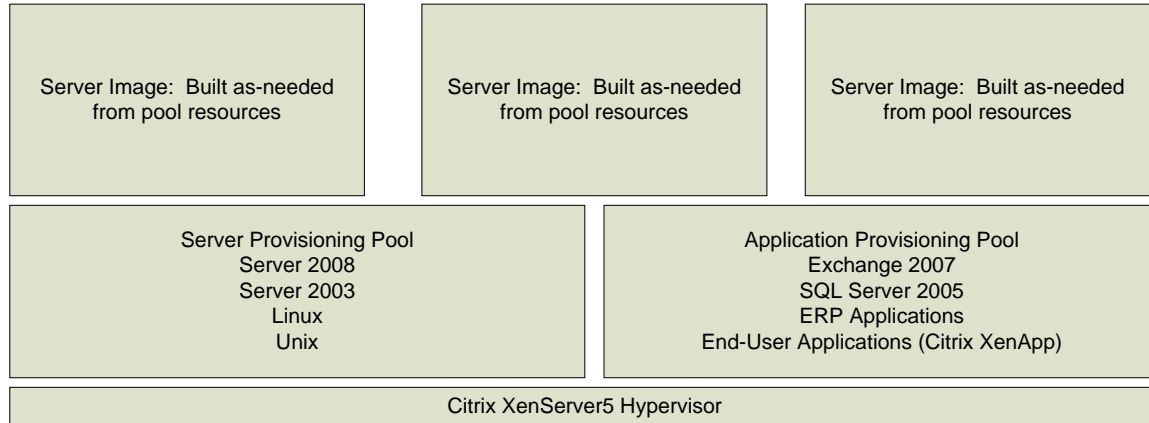
Fig 3.: Microsoft Hyper-V Virtualization Architecture



Citrix XenServer

Citrix Systems, long known for their application virtualization work with Metaframe Server, Presentation Server, and now XenApp, has moved their work into the virtualization space. Along with a Hypervisor approach similar to VMWare, Citrix uses server streaming as well, which allows for multiple 'base' images to be modified with application images. This way, for example, a Standard Server 2008 image can quickly be streamed the changes required for an Exchange 2007 server. This allows for a small number of 'master' images to be maintained, while allowing for great flexibility in application deployment and management.

Fig 4: Citrix XenServer Architecture



Example Hardware:

(4) quad-core processors

(5) 300GB drives

16GB RAM

(4) 1GB Ethernet

Server 2008 Standard or Enterprise

Any of these approaches allows for excellent use of server resources, allows for standardization of hardware in a datacenter, and allows administrators and systems engineers the ability to plan for the future and to give more reliable uptime.

Clustering Technology: Non-Stop Availability

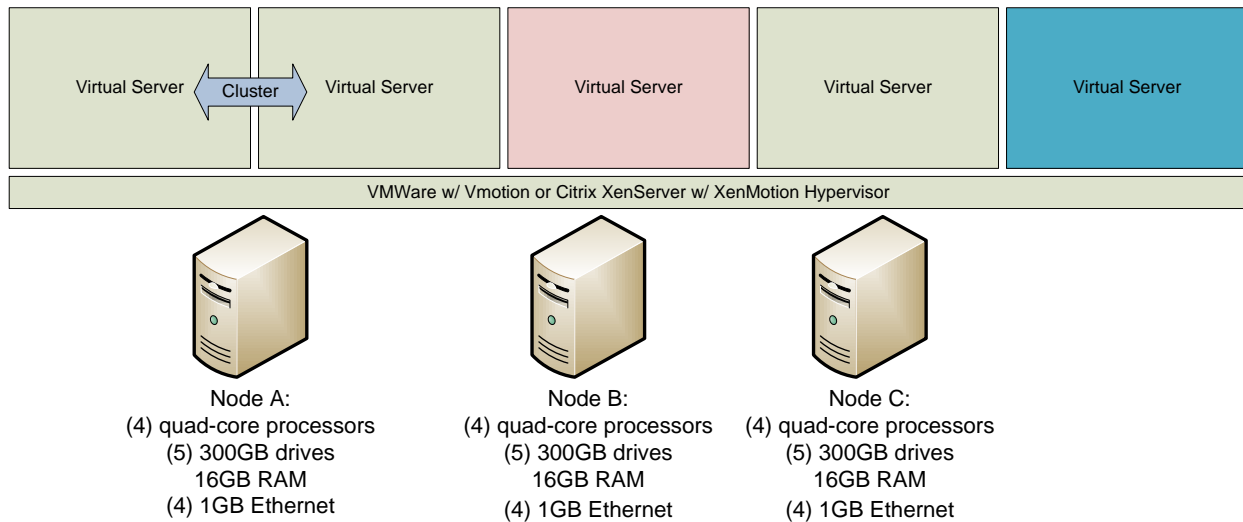
Clustering? What is that? Clustering is a term for a system where at least two servers work together to maintain maximum uptime for business-critical applications or services. Typically, businesses will cluster critical database servers (SQL Servers), email servers (Exchange servers), or web servers (IIS Services).

Focusing on Microsoft, the clustering services included provide for 'failover' clustering, or what is considered an active-passive cluster. The clustering service sends a 'heartbeat' between all the cluster nodes, and if the active node fails to respond, the cluster 'fails over'

to the passive node. The failover can also be manually initiated for testing purposes, or to upgrade other nodes in the cluster.

Virtualization has made radical changes in clustering. VMWare's VMotion and Citrix XenMotion allows for multiple hardware platforms running the hypervisor to dynamically and automatically move server loads as required. This enables not only fault-tolerance, but also provides dynamic hardware load-balancing. Both technologies can be used to support an environment where uptime is mandatory.

Fig 5: Load Balancing and Clustering on a Hypervisor



In this example, the VMotion/XenMotion hypervisor will assign virtual servers to the nodes based on processor, memory, and disk utilization, on the fly, with no loss of connectivity. It is transparent to the end-users. Also, any of the nodes may be shut down for maintenance. If Node B is disabled, for example, the hypervisor will move the virtual servers to Node A and Node C for operation. When Node B is brought back online, the hypervisor will again redistribute the load among all the nodes.

Virtualization is the most important change in the IT landscape in recent years. Instead of a plethora of purpose-built servers, virtualization, when planned properly, allows for a proactive, dynamic IT infrastructure, ready for the next challenge the business faces.

Submitted by Davitt Potter, Network Engineer for Golden West Technologies