Virtualization Technologies for the Business

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Abstract
There is a new trend of change in today's IT industry. It's called virtualization. In datacenter virtualization can occur on several levels, but the type of virtualization has created this trend change is the operating system offered or server virtualization.
OS virtualization technologies come in two forms. First, there is a software component that is used to simulate a natural machine that has total control of an operating system operating on the host equipment. The second is a hypervisor, a software engine which has total control of machine by eliminating a second operating system.

Keywords: *virtualization technology, virtualization solutions, benefits of virtualization.*

JEL classification: M15

1. Business Case

OS virtualization is a software component that provides the ability to provide physical resources to make them available to more virtual machines at the same time [1].

Regardless of the version used in server virtualization it is ability to run one or more virtual machines that have physical control over a host that allows all kinds of possibilities in the datacenter. With this technology, it is now much easier to create tests, training, or even develops a production environment which then turns them into malleable entities that meet business needs when they arise. For learning, development and testing of such environments, these technologies are particularly useful because it can easily be re-set the initial conditions when a session is completed. It is also easier to create both a secure environment of the desktop and run fewer physical boxes. In addition, virtualization solves most, or all of the problems organizations have with management applications. Virtualization opens vast opportunities in the business continuity.

Analysts can say what they want, but the provision of information technology (IT) is important. As Gartner company's analysts said, more than 70% of IT budgets are spent on infrastructure and in many cases, the figures look even

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worse. In this case, virtualization can be helpful. Move towards virtualization of data centers, regardless of their size, is more than introducing a virtualization engine and conversion of physical servers; requires reducing carbon footprint of their data centers [2]. Data centers are turning to virtualization technologies because the servers generally have a utilization rate between 10-15 % or less they needs power, space and cooling as any other machine and to reduce the number of hard copy [3]. Virtualization hardware provides a high utilization rate then 80% or even more for the same degree of workload by using less hardware and therefore the carbon footprint.

2. Server Virtualization

Today, virtualization technology has evolved and now can be applied to different levels in the data center. In a dynamic data center-one to take full advantage of virtualization valuable proposals there will be the following layers of virtualization:

➢ Server Virtualization is focused on a model of physical partitioning of a system operating in a virtual model and virtual machine. Server virtualization involves two aspects:

○ Software Virtualization running on a virtual operating system virtualization software platform that runs on an existing operating system.

○ Hardware Virtualization running on a virtual operating system software platform that runs directly on hardware without an existing operating system. The engine used to run hardware virtualization is typically referred as hypervisor. The purpose of this engine presence is to provide hardware resources for virtual operating systems.

➢ Storage Virtualization is used to combine physical storage from multiple devices, so that they appear as one single place of storage. Such storage can take many forms: direct attached storage (DAS), network storage (NAS) or storage area networks (SAN), and it can be linked to by several protocols: Fiber Channel, Internet SCSI (iSCSI), fiber channel over Ethernet, or Network File System (NFS). Storage virtualization is not a necessity for server virtualization, one of the key strengths offered by storage virtualization is capacity to rely on assigning a logical unit (LUN) storage of a certain size, and the provision is just as required. If is created a logical unit of storage of 50 gigabytes (GB) and are used only 10GB, only 10GB of actual storage are provided.

➢ Network Virtualization allows control over available bandwidth by dividing it into independent channels that can be allocated to specific resources. For example, the simplest form of network virtualization is a virtual local area network (VLAN), which creates a logical separation of physical network. For example, the use of virtual network layer would leave a perimeter network placed on the same host for other workloads into virtual production conditions without affecting any of the other networks or allow access to each virtual machine.(4)

➢ Management Virtualization is focused on technology that manages the entire datacenter, both physical and virtual, to present a unified infrastructure for service delivery. Management Virtualization is not necessarily performed by a single interface. For example, into large data centers, it may be necessary to execute different services dividing into levels and operations separated from each other. Smaller data centers, may not have staff to share responsibilities, but it should at least ensure that the managers wearing different "hats" when working with different levels of architecture. In fact, two key layers must be separated at any time:

   o Resource Pools (RP) which includes the collection of hardware resources - host servers, racks, cabinets, storage, and network hardware that allow data center infrastructure.

   o Offer Virtual Services or workloads which containing virtual machines (servers and/or desktop) that are client-oriented and provide services to end users.

➢ Desktop Virtualization. Allow virtual machines to be based provisioning desktop systems. Desktop Virtualization has many advantages including the ability to centralize desktops spread, reducing administrative costs allocated, since centralized desktop users accesses them through a variety of small devices or that are not necessary to be managed.

3. Models of Server Virtualization

There are two models of virtualization for server virtualization. First, virtualization software is often used to start projects virtualization technologies because it relies on simple and often free technology, but is less efficient because they require a host operating system support (OS). This underlying host operating system also requires resources and, therefore, will have an impact on the functioning of virtual machines running on top of it. For this reason, organizations will not use this model unless it is for testing or development.

It is good that software to be used in production only if the services can be offered offline for long periods of time through virtual machines, without affecting service quality and customer satisfaction. Few organizations have this level of flexibility of their network services. In addition, running a virtualization product on the existing operating system makes all virtual machines subject to the update of the host operating system. If necessary reset, all virtual machines will also be restarted. It is not the best scenario.

Therefore, the second model should be used when is moving towards the production of hardware virtualization layer. In this case, the hypervisor code will be integrated directly into the hardware and simply provides host server hardware for virtual machines running on it and consumes very little of physical resources of the host, leaving as many as possible virtual machines running on it. In addition, because the host does not actually include an operating system normally does not require patches, or at least does not require patching and updates at the same rate as operating systems running in virtual machines. This minimizes the impact that has hypervisor on the computers that host. For this reason, hardware virtualization, is the most recommended to use for serious virtualization serves.

There hypervisors that does not need an operating system and simply can run from firmware or a universal serial key (USB). VMware is not only a supplier who provides a hypervisor integrated in server hardware host. This level of integration offers the opportunity to create a new model host server without disk using only RAM, CPU and network resources to host virtual machines.

Server virtualization is still popular in most different virtualization technologies, and for good reason. Think of the tens of thousands of servers operating at 10% capacity, and that would be good because many of them are used to 5% of capacity. All over the world, each of these servers is designed to full power, requiring all of the cooling needs and the entire space of a data center. When they are properly configured to run as virtualized servers, the same physical server can run more than ten virtual machines, servers and desktops. Each virtual machine can provide the same services as a physical machine, but does not need its own power, does not generate its own heat and does not need its own physical space.

In fact, each virtual machine is nothing but a series of files that are stored somewhere on a disk. When a physical instance of a server is converted to a virtual instance - is converted P2V (physical to virtual) - physical machine is transformed into a series of files in a folder. Once in this state, may be moved from one server to another, can be closed, restart, and stand in hibernate and all that was possible before, without being significantly affected performance.

4. Desktop Virtualization

The same technology that enables server virtualization can also virtualizes desktops. Desktop virtualization centralizes spread of desktop so as to obtain total control over them, leaving users to rely on a variety of terminals - thin computing devices, unmanaged PCs, public PCs or private PCs. Users can access the company's desktop infrastructure through Remote Desktop Connection (RDC). There is an important difference between desktop virtualization and presentation virtualization, known as server-based computing, namely that in the presentation virtualization, users need to share their desktop with other users connect to the server. In the desktop virtualization, each user accesses their desktop, limiting the potential impact of applications they need with other sessions on other desktops. By include the virtual desktops applications is obtained a guarantee that if something unwanted happens in a virtual desktop this will not affect other desktops running on the same server.

Think of what can be done with virtual desktops by placing them in virtual instances on a server or remote access in a closed and virtual environment as virtual desktop it provides online. Administrators can use them to test patches and service packs implementation, can be support in multi – system environments, can provide training for end users and technicians alike, or simply provide controlled environments. When testing or training was completed, the virtual machine just resets back to its original state. Desktop virtualization can lead to a pretty good

time saving compared to the cost of managing distributed systems across the infrastructure. If already exist desktops, they can be converted to unmanaged devices, because all that is necessary to physical workstations are three things:

➢ An operating system, which can be anything from Windows XP to Vista or above. The operating system must be debugged and updated, what should be done anyway.

➢ Adequate protection against viruses, another element that must be managed if there are still physical desktops.

➢ Be a Remote Desktop Connection client

That is all. No additional software or other items needed in the system. The management of these terminals is more efficient than the implementation and maintenance of hundreds of applications running on them.

If a company can afford, it would be better that all desktops to be transformed into virtual desktops. Virtual desktops updating themselves, they don't have exactly internal software and are much more manageable than physical desktops. Each desktop system removed will reduce the power consumption of 650 kilowatt hours per year.

There are other reasons for the transition to virtual desktops. Here are some:

➢ It can be create a company's standard block for remote access to unmanaged PCs.

➢ With the centralization of desktops by server virtualization it is possible to set PCs company image while users are allowed to run on physical desktop. This provides a standard, centralized configuration and happy users, because they can do whatever they want on unmanaged PC.

➢ Can be created PC images on the limited time. If the organization customary to hire staff seasonal or temporary, temporary PC images can be generated that will disappear once it no longer need them. Temporary employees can work even on their home PCs, because they have everything they need by accessing organization image as a RDC client, which is part of every Windows installed by default.

➢ The information can be secure by keeping desktops in the data center. Because it can provide control of PCs through remote access, any data generated by computer image are stored in the data center. This provides complete control over the organization's intellectual property.

➢ Can be encapsulated complex, precision applications by isolating them from each other. For example, employees should use several different security levels for access to information organization.

➢ Desktop virtualization can provide a new way to migrate to new operating systems. Most do not move to newer operating systems like Vista because it needs to update the terminal, but when a new operating system is running in the virtual environment, no changes are needed because a RDC client only needs to update desktop. This simplifies the transition to virtual desktops.

➢ Desktop virtualization is also a valuable model for testing and development, because, like any machine server virtualization, the record supports "undo" and can be easily generated when needed.

For move to a centralized desktop environment, all you need do is generate a virtual image core and then replicated in all other images from this raw and standard configuration. From now on, users can rely on any terminal to access their virtual PC image, even through firewalls.

5. Applications Virtualization

Last key virtualization layer that resembles the most with server virtualization is virtualization software. Virtualization software creates separation within the operating system software with a special layer of virtualization. In this regard, virtualization applications like most with server virtualization software, because is required an operating system to work. The advantage it offers application virtualization is that fully protects the operating system of any changes that can make applications during installation. That's because when it prepared an application virtualization for applications virtualization is not used in the installation process which companies are traditionally, but only operational status of this application or anything necessary to make a functional application on operating system. Therefore, applications of application virtualization can simply be copied X times on a terminal because, it is not necessary to install. They provide a powerful model for distributed application management. Applications virtualization also provides support for building application.

There are many suppliers of application virtualization solutions:

Streaming application virtualization technologies:

➢ Microsoft Application Virtualization (called SoftGrid) enables delivery of applications that are never installed and are provided dynamically on demand. Microsoft Application Virtualization can be implemented on desktops, laptops, or terminal server. Microsoft Application Virtualization is a core component of the Desktop Optimization Pack for Software Assurance. For more information, see: http://technet.microsoft.com/en-us/appvirtualization/.

➢ Citrix XenApp (formerly Citrix Presentation Server) is a Windows application delivery and virtualization presentation. For more information, see: www.citrix.com/english/ps2/products/product.

➢ Symantec Software Virtualization Solution Pro (SVS) is an application virtualization platform that works through local filter system. Pro Edition includes a streaming component (formerly called Appstream) and probably provides the most advanced streaming platform on the market. For more information, see: www.symantec.com/business/products/.

Virtualization applications that did not need additional software:

➢ VMware ThinApp (formerly Thinstall) encapsulates the applications from the operating system and between them, eliminating the costly testing and conflicts from applications to malfunction. It's just accessed a file like. msi or. exe to implement a virtual system environment, including registry, DLLs, various li-

braries, without any further installation of additional programs or applications underlying the operating system. For more information, see: www.vmware.com/products/thinapp/?hl=en&rlz=&q=thinapp&meta.

➤ InstallFree Bridge provides an independent platform that creates a "bridge" between the transparent virtual applications and operating system, protects the operating system of any changes to applications. For more information, see: www.installfree.com/pageload.aspx?page=products_bridge.html.

As seen, only two suppliers, InstallFree and VMware offers solutions that do not require the previous existence of additional software on the target desktop. That issue actually released any constraints of applications and makes them fully portable. If solutions are chosen without or not additional software or virtualization applications depends on the needs of each. In most cases, implementation of additional software is not a problem and provides a better measure of control over the virtual applications to solutions without additional software.

There are several advantages of virtualization applications. Traditional software installations penetrate operating system and alter its configuration. Finally, managed or unmanaged systems become fully transformed and unrecognizable.

For this reason, many companies continually recreate over time desktops and reset them, bringing them to the known configuration. Application Virtualization protects the operating system by any changes and ensures completely safe environments. And most importantly, any application that has been virtualized can run on any version of Windows. That's because virtualization software layer manages all interactions between an application and the virtual Windows. Once an application has been virtualized, there no needs to be repackaged every time when operating system is change. At least for this reason, application virtualization is one of the most powerful IT technologies that adopted it.

As can be seen, virtualization has a significant impact on servers, desktops and applications. For servers, virtualization enables hardware consolidation, increased environmental impact on servers and provides the best model for business continuity. For desktops, virtualization enables the centralization, data protection and provides a secure desktop environment. Finally, virtualization provides the only model that companies should use it for system management of distributed applications. The challenge for companies is to know how to bring together the three layers of virtualization in a consistent implementation in order to get as much of each technology.

6. On Demand Computing

Companies cover the deficit of resources in terms of computing power, storage, access to the Internet through access to IT services. Virtualization enables this through access to:

Infrastructure as a Service – IaaS. It offered a consumer IT resources such as processing, storage and networking in order to run different operating systems and applications. Examples include IBM Bluehouse infrastructure

services, VMware, Amazon EC2, Microsoft Azure Platform, Sun ParaScale, cloud storage, and more. Infrastructure services adequately addressed the problem of data center equipment by providing, when necessary IT resources. In addition, because virtualization techniques are commonly used (IaaS) can be achieved cost savings through more efficient use of resources and

Software as a Service – SaaS. The user is able to use software from the supplier. This application runs under a cloud computing platform, network and generally is available through a network interface such as a Web browser.

7. Virtualization Solutions

Virtualization vendors operating systems abound, but three major suppliers have taken over the market:

1. Citrix offers several different virtualization technologies and aims to extend its offer for the entire scope of virtualization. XenServer comes in four variants. Express Edition is a free version of the product. Standard Edition is the basic version, which offers at least two virtual services at once. Enterprise also comes with the ability to store the hardware and run unlimited virtual services. Platinum Edition provides dynamic provisioning of both virtual hosts and the services. Citrix offers version (OEM)'s a hypervisor that comes built-in server hardware. Citrix offers also XenDesktop desktop virtualization and XenApps for application virtualization.

2. Microsoft offers a range of virtualization technologies across the scope of virtualization, with additional products (www.microsoft.com / virtualization). Microsoft now offers Virtual Server 2005 R2 SP1 and Virtual PC 2007, which are free, but both are products of virtualization software. Enterprise-class hypervisor is part of Windows Server 2008 and will run only on x64 hardware. Microsoft also offers Microsoft Application Virtualization Application virtualization, Terminal Services presentation virtualization, and made some purchases to cover and desktop virtualization.

3. VMware offers the best designed products with full range of tools for server virtualization and desktop. Offers VMware Server, which is another free virtualization software product, VMware Workstation, and Virtual Infrastructure, which is a complete platform based on the ESX Server hypervisor. VMware was the first vendor who offers a burned in hypervisor ESXi server hardware and made available in addition to a host server. VMware also offers Virtual Desktop Infrastructure (VDI) for desktop virtualization and application virtualization Thin App.

Running any of these suppliers enables virtualization products to any environment, whether it learning, testing, development or production. And what is even better is that each of these providers offer free versions of their instruments and allow virtualization projects without high costs.

Oracle (Oracle VM), Novell (Xen), Red Hat (Xen), IBM, Sun (xVM), Virtual Iron and others offers its own hypervisor, which can be confusing if you try to imagine what tool to use. Stay to these three suppliers where possible. It may not be possible because some providers will not support applications running on

hypervisor competitors. For example, Oracle will only support applications that are executed on the Oracle VM. Microsoft has a policy of support of "best effort" for their products running any version of a hypervisor, whether or not theirs.

Conclusions

IT managers were forced to face issues such as time limits and limited budgets, while the demand of electricity, cooling and maintenance of equipment is increasing. At the same time a greater number of servers mean more time, more money and people.

Today, data center configuration at the company level is suboptimal. The need to isolate applications from each other and resolve peak loads forced the data centers to be over - accessed. This has led to increased IT spending for the purchase of hardware, software licenses and server management. It is normal for a company to seek a solution to consolidate these servers, improve utilization and at the same time to isolate the execution of applications and environments to address workload peaks.

Virtualization technology addresses these issues. Whether its server virtualization and resource supply on demand, virtualization seems to be natural. Virtualization solutions can help companies to:

➢ Server consolidation and better use

➢ Providing resources on demand by scaling the number of virtual machines / applications.

➢ Reducing the number of servers needed for data retrieval by clustering, typically from 2 * N servers to N +1 servers.

➢ Smooth migration jobs / processes to servers with almost zero downtime allow smaller companies to share between production servers and development environments without compromising the security settings of production.

➢ Continuity of historical applications to assist older operating systems, while new applications running on newer operating systems on one physical server share.

➢ Facilitate the use of computing resources using grid computing.

Hosted virtual machine architecture seems to be better designed than other solutions. Implementation in data centers to VMware Server product, Virtuozzo and Virtual Server can greatly reduce total cost of owner. Open Source products like Xen and Denali are a challenge for hosting model, if we consider that these solutions are more scalable and very low virtualization overheads. Changes hardware / processor made by Intel Vanderpool and AMD Pacifica can change the situation, making them even more suitable for rapid adaptation of virtualization technologies.

Under these conditions virtualization benefits are:

➢ Development of Intelligent IT

➢ More efficient use of electricity

➢ Reducing energy consumption ¬ Reducing the need to purchase hardware and upgardurilor

➢ Storage safer, faster, and the possibility of restoration

➢ Reduce IT overheads

- ➢ Simplify IT Management
- ➢ Using Thin clients
- ➢ Remote access to a server Provisioning.

At the same time there are also disadvantages of virtualization:
- ➢ Need powerful machines for virtualization
- ➢ Virtualization can be a problem for a company's core activities
- ➢ Applications of virtualization are not always possible.

Virtualization can certainly contribute to economic benefits in terms of hardware and reducing personnel costs, but in some cases may increase the cost of software license and server applications to model the cost of virtualization software. A prudent approach would be to assess the total cost and benefit of taking into account all three aspects (cost of hardware, software and personnel) before deciding virtualization.

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