

IT'S A VIRTUAL WORLD AFTER ALL – PART I

Why You May Already Own Your Next Computer

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Is there a virtual computer in your future? Though you may not yet know what a virtual computer is or how one works, you likely will be working with a virtual computer in the very near future. As such, this series of articles is devoted to acquainting you with virtual computers and their benefits, how to build and deploy a virtual computer, and how virtual servers provide a very cost-effective strategy for improving the return on your investment in information technology. In the first installment of this series, we will explore exactly what a virtual computer is, the benefits of working with virtual computers, and the technology required to create and implement virtual computers.

WHAT IS A VIRTUAL COMPUTER?

First things first – what is a virtual computer? A virtual computer uses virtualization software and selected hardware components to create an emulated or *virtual* environment. Virtual computer technologies enable one physical computer – known as a *host* – to run multiple operating systems and related applications simultaneously. As such, one host may have several virtual computers – known as *guests* – loaded and running at the same time independently of the others; each of the guests may have different operating systems, if so desired. For example, a physical computer might have **Windows Vista Ultimate** loaded as the host operating system; in addition, that same physical computer might have a virtual computer with **Windows XP Professional** installed and running. And, system resources permitting, additional virtual computers – each with its own operating system – may be loaded and running simultaneously.

THE BENEFITS OF VIRTUAL COMPUTERS

Benefits to virtualization are many and significant. Five of the more notable are listed below.

- Virtualization assists in transition from one operating system to another. Many companies have deferred migrating from previous versions of the Windows operating system to Windows Vista. One of the most commonly-cited reasons for staying put with a previous version of Windows is the potential for application incompatibilities with Vista. Though most of these incompatibilities have been resolved and this issue is now more perception than reality, virtualization effectively removes application incompatibility with Vista as a reason for not upgrading and obtaining the benefits of the new operating system. More specifically, Vista could be the host operating system while XP could be installed in a guest virtual computer. Any applications that are not yet Vista compatible could be installed on the XP guest, while all Vista-compatible applications could be installed on the host.
- Virtualization provides a highly-effective testing environment. Users and technology professionals desiring to test different configurations of operating systems as well as

applications could load the desired operating systems and applications in a virtual computer and adjust various configuration options inside the virtual computer without fear of compromising the host computer.

- Virtualization de-couples the decision of which operating system to run from which applications to use. For example, one of the more popular virtualization applications is **Parallels**, which allows Windows operating systems to be installed on **Macintosh**-based hosts. As such, someone desiring to use a Macintosh computer may do so and still have access to Windows-based applications through a Windows-based guest virtual computer loaded on a Macintosh-based host.
- Virtual computers potentially reduce the amount of time required to equip and deploy applications on host computers. For instance, suppose a company has just purchased fifty new laptop computers and wishes each of these computers to be equipped in exactly the same fashion. A virtual computer could be created with all of the desired applications and settings included; then, that virtual computer could simply be copied and pasted to the remaining computers, drastically cutting the amount of time required to deploy the laptops to end users. Further, should any of the computers ever require maintenance or replacement, an updated virtual computer could simply be “pushed” to each of the physical computers.
- Virtual servers can be deployed to reduce the number of servers in use in an organization, *with no decline in performance*. Instead of separate physical servers for each major application or service, multiple virtual servers can be deployed on one physical server, thereby taking advantage of the estimated 80% to 90% unused capacity of many physical servers. Additional benefits of virtual servers include potentially improved load-balancing and maintenance capabilities, better utilization of existing storage capacity, and streamlined backups.

TECHNOLOGY REQUIRED FOR VIRTUALIZATION

What technology is required to create virtual computers? Fortunately, many of the common tools used in creating virtual computers are free of charge and readily downloadable. For instance, Microsoft’s **Virtual PC 2007** and **Virtual Server 2005** are both free and can be downloaded from Microsoft’s web site. Though not free, **VMWare’s Workstation** is available for a modest investment of \$189; however, there is no charge for VMWare’s **Server** application. Other key providers of virtualization software include **Linux XEN**, **KVM**, and **Lguest**.

From a hardware perspective, virtualization requires no specific additional hardware other than that already installed on the host. However, from a practical perspective, virtualization is likely not a viable alternative on older computers with little RAM available. More specifically, a minimum of 2 GB of RAM is typically recommended for a host computer.

Perhaps the most significant issue associated with virtualization is that of licensing the guest operating systems and applications. As a general rule, from a licensing perspective treat each virtual computer as you would a physical computer. As such, each guest operating system and each application installed on a guest typically requires a separate, legal license. Be sure to check with the provider of your guest operating systems and applications regarding specific licensing issues and questions, including whether a license can be legally transferred from an existing physical computer to a virtual computer.

SUMMARY

In the first installment of this series, we have introduced the concept of virtualization, provided a synopsis of the many potential benefits associated with virtualization, and summarized the major technology requirements surrounding virtualization. By now it should be clear that virtualization is a technology that is easy to deploy, offers tremendous benefits to companies of all sizes, and requires only minimal investment. Accordingly, it is no small wonder that your next computer may actually be a virtual computer. In next month's installment, we will learn how to create and deploy a virtual computer – don't worry, it is *much* easier to do than it sounds!

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IT'S A VIRTUAL WORLD AFTER ALL – PART II

Building Your First Virtual Computer

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Written for Microsoft MPAN Newsletter

Last month we introduced the concept of virtualization, provided a synopsis of the many potential benefits associated with virtualization, and summarized the major technology requirements surrounding virtualization. Based on that discussion, it should be clear that a – perhaps many – virtual computer is in your future. Along these lines, you may be now thinking about the steps involved in building your first virtual computer. Relax, it's really pretty easy; in fact, following the steps outlined below will ensure that your first foray into the world of virtual computers is successful.

INSTALLING YOUR VIRTUALIZATION SOFTWARE

The first step involved in creating a virtual computer is to obtain and install your virtualization software. As discussed last month, there are many good virtualization software applications available, including Microsoft's **Virtual PC 2007** and VMWare's **VMWare Workstation**. In this discussion, we will review the steps for installing Virtual PC 2007.

Virtual PC 2007 is available for downloading at no charge from www.microsoft.com/downloads. Simply download the file and then double-click on it to install Virtual PC 2007 on your computer. The process is very straightforward and should be completed in a matter of a couple of minutes from the time you begin the download until the time the installation is completed. Nonetheless, if you need detailed instructions – including system requirements to run Virtual PC 2007 – you will find those on the page from which you download Virtual PC 2007. Once the virtualization software is installed, you are ready to proceed to creating your first virtual computer.

CREATING A VIRTUAL COMPUTER

To initiate the process of creating a virtual computer, open Virtual PC 2007 and click **New** on the **Virtual PC Console** to launch the **New Virtual Machine Wizard**. Like all wizards, this one has been designed to guide users through what otherwise could be a tedious and confusing process; fortunately, the New Virtual Machine Wizard provides excellent guidance, even for non-technical users. The first step in the wizard is to specify that you want to create a new virtual machine. Next, specify a name for the new virtual machine; be sure to make this something that is meaningful and descriptive to you. After specifying a name for the new virtual machine, the wizard prompts you to specify the operating system that will be installed in the virtual machine. Notably, this process does not install the operating system; you will perform that step later. Rather, this step is used to generate default answers for other questions asked by the wizard. After specifying the operating system to be installed, the wizard recommends the amount of Random Access Memory (RAM) to be allocated and gives you the option of changing the recommended settings. Generally, the minimum amount of RAM that should be allocated to a virtual machine is the same amount that would be installed as if the computer were a physical computer instead of a virtual computer. If you make a choice regarding RAM and later wish to change that choice, you can do so by editing the virtual computer's configuration file. After indicating the amount of RAM to be allocated to the virtual computer, you are prompted as to whether the virtual

computer will use an existing virtual hard disk or a new virtual hard disk; as this is your first virtual computer, you will need to create a new virtual hard disk and tell the wizard how much space should be allocated. Upon reaching the last screen of the wizard, click **Finish** and your first virtual computer will be created. All that's left now is to install the operating system and you will be ready to run your new virtual computer.

INSTALLING THE OPERATING SYSTEM AND APPLICATIONS

After the virtual computer has been created, select it from the Virtual PC Console and click the **Start** button to launch it. Because no operating system is yet loaded, you will receive an error message that says "Reboot and Select proper Boot device or Insert Boot Media in selected Boot device". Simply insert your CD or DVD that contains the licensed operating system you wish to install in the virtual computer and reboot the virtual computer to begin the installation of the operating system. To cause the system to reboot, click the Action menu and choose the **CTRL+ALT+DEL** option. The installation of the operating system should mirror the installation of an operating system on a physical computer and, depending upon the system being installed, take anywhere from twenty-five to sixty minutes. Once the installation of the operating system is completed, be sure to update the operating system with any maintenance releases and service packs, just as if you were working with a physical computer. Of course, you should also install anti-virus software and other anti-malware software onto the virtual machine. At this point, you may also want to install **Virtual Machine Additions** and use some form of optimization software such as **vOptimizer** to ensure that your virtual machine experience is performing at peak efficiency, but a discussion of those tools is beyond the scope of this series.

If you have made it to this point, you are ready to install any desired applications into the virtual computer and beginning running them in a virtual environment. To install applications in the virtual computer, "boot" the virtual computer by clicking on the Start button in the console. Once the virtual computer has fully started, then simply insert the application CD into the CD drive and install it as if you were installing onto a physical computer. As with the installation of the operating system, after the application has installed, be sure to update it for maintenance releases and service packs. Congratulations! You just built your first virtual computer and, as promised, it was not nearly as difficult as you might have thought it would be.

SUMMARY

Many potential users of virtual computers are intimidated by what they think will be a cumbersome and technically-challenging process in building a virtual computer. However, reading and following the steps outlined above will help to ensure that your first experience with building a virtual computer is a positive one and that you will begin to experience the many benefits of working with virtual computers almost immediately. The process is simple: download and install the virtualization software, create the virtual computer, and install the operating system and any desired applications. Though additional steps such as optimization can be added, these are purely optional and can always be performed later, as your knowledge of virtualization grows. In next month's final installment on virtualization, we will review how virtual servers can greatly increase your return on investment in technology. Until then, enjoy your summer!

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IT'S A VIRTUAL WORLD AFTER ALL – PART III

The Benefits of Virtual Servers

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The previous two installments in this series provided an overview of virtual computers and how to create your first virtual PC. And while virtual computers at the desktop and laptop level provide tremendous benefits to end users and technology managers alike, for many organizations the real benefits of virtualization begin to accrue when servers are virtualized. In the final installment of this series, we explore the benefits of virtualized servers and how your organization can put this proven concept to use immediately to achieve a greater return on your investment in information technology assets.

WHAT ARE VIRTUAL SERVERS?

Like the virtual computers discussed in the previous two installments, a virtual server is simply a server that is independent of a physical device – in this case, independence is achieved by separating the virtual device from a physical server. Virtual servers are created by installing software such as **Virtual Server**, **Hyper-V** (both from **Microsoft**), **Server**, or **ESXi** (both from **VMWare**) onto existing servers and using these software tools to create emulated server environments. Once the emulated server environment has been created, the appropriate server operating system – **Windows Server 2008**, for example – is installed into the emulated environment and then the virtual server is treated as if it were a traditional, physical server. Thus, server-based applications are loaded and run from a virtual server and data files are accessed from a virtual server just as if these applications and files were hosted on a traditional server.

THE BENEFITS OF USING VIRTUAL SERVERS

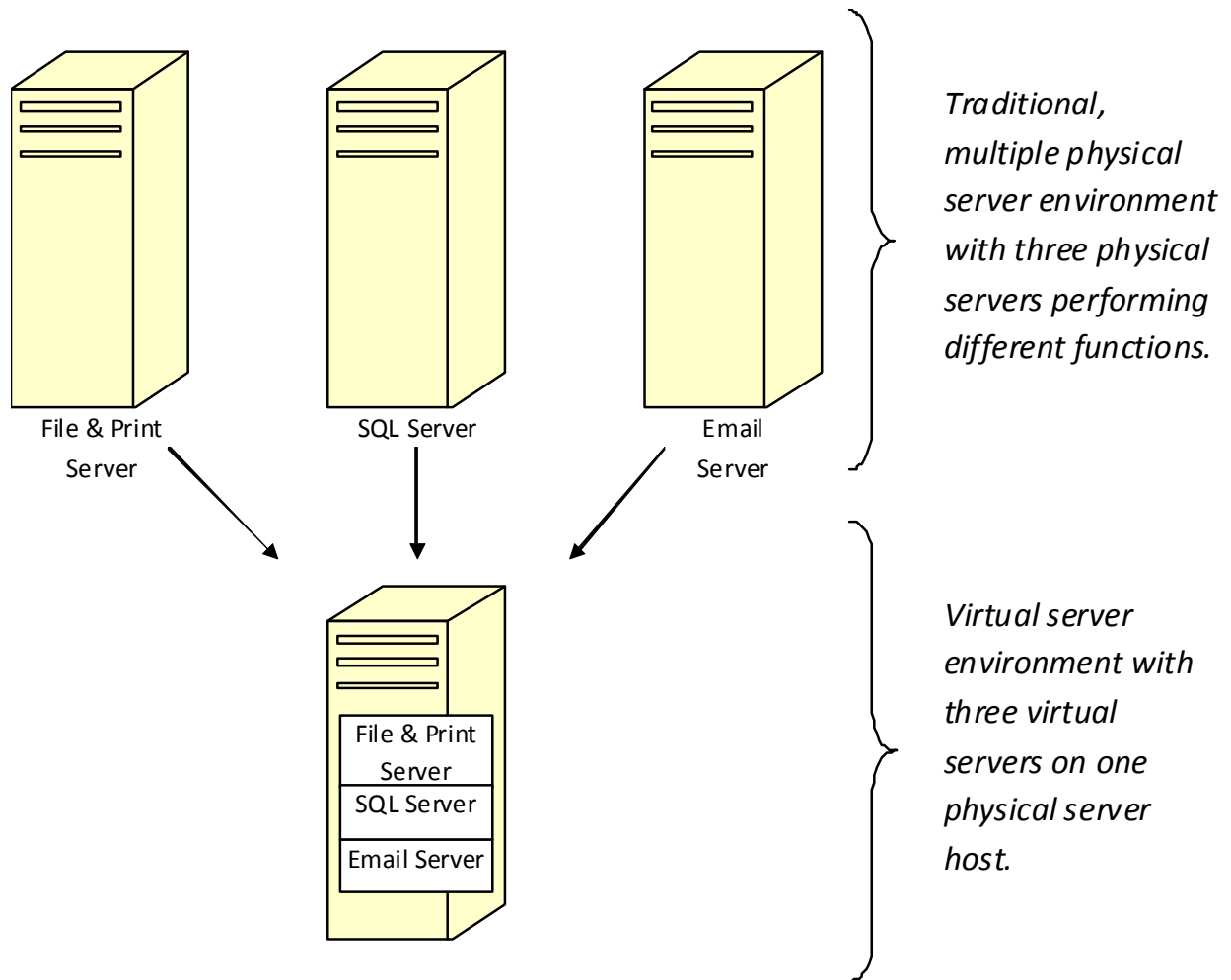
The most obvious benefit of using virtual servers is that they do not require additional investments in hardware. Many studies point to the fact that physical servers are often grossly underutilized, often sitting idle 80% to 90% of the time. In a virtual server environment, multiple virtual servers can easily be consolidated onto one physical server, thereby increasing the utilization of an existing asset and increasing the return on that investment in the process.

Because fewer physical servers are required in a virtual server environment, additional benefits accrue due to the fact that less power, cooling, and floor space is required to deploy the servers. Additionally, backups can be faster and more efficient as fewer physical servers will require backup in a virtual environment.

Additionally, managing fewer physical devices can lead to efficiencies as there are fewer opportunities for error and breakdown. Moreover, in a virtual environment, virtual servers can be adjusted and redeployed from one physical device to another, in real-time without end-users ever being aware of the shift. This not only allows technology managers to dynamically shift server loads from one physical computer to another, but also facilitates taking a physical server off-line for maintenance.

Virtual servers are also ideal tools for testing new applications or technology strategies. Keeping in mind that any change made to the virtual server does not impact the host computer on which it resides, when the test or trial is completed, the virtual server can be simply removed from the host without fear of compromising any of the host's settings.

Finally, in the event of a natural disaster or other catastrophe, a virtual server can be redeployed very rapidly on another physical server. Assuming a backup of the virtual server exists, simply restoring the backup to another physical server equipped with the appropriate virtualization software is all that is required to redeploy the virtual server. This means the amount of time required to recover from a disaster can be drastically reduced.



Comparing a Physical Server Environment to a Virtual Server Environment

HOW TO MIGRATE TO VIRTUAL SERVERS

At the risk of oversimplification, the migration from a physical server environment to a virtual server environment can be as straightforward as a three-step process of:

1. Obtaining and installing appropriate virtualization software onto a host computer,
2. Creating one or more virtual servers on the host with the appropriate server operating system installed,
3. Installing server-based applications and data files onto the virtual server(s).

Of course, for many organizations, the process is likely to be a bit more involved. Key planning considerations such as those detailed below must be addressed prior to migrating to a virtual server environment:

- Which virtualization software is appropriate for the organization?
- How many virtual servers are required to efficiently process the organization's data? Is extra memory or hard disk space necessary or is it time to acquire new server hardware altogether?
- Are the existing physical servers capable of hosting one or more virtual servers with adequate speed?
- What mechanisms will be used to backup the virtual servers?
- Can the floor space saved in a virtually environment be redeployed for better use in the organization?
- Should modifications be made to existing power supplies and cooling systems based on the reduced demand resulting from the move to a virtual environment?

Despite the planning considerations listed above, the process of migrating an existing physical server environment to a virtual environment is one that should not be a daunting challenge for any organization. Further, it is not necessary to migrate to a completely virtual environment "overnight". Rather, the process can easily be staged over a period of time, perhaps beginning with some of the least risky applications and data and, over time, working up to migrating mission-critical line of business applications to a virtual environment as additional comfort and knowledge of virtual systems is gained.

SUMMARY

Throughout this three-part series, we have focused on the practical benefits of virtualized computing and virtual servers certainly provide numerous, tangible benefits to organizations of all sizes. Instead of continuing to invest in physical servers – many of which are grossly underutilized – virtual servers allow organizations to leverage their investment in information technology assets by increasing the utilization of their physical servers. In addition, virtual servers offer improved load-balancing, maintenance, and management capabilities as compared to their traditional, physical counterparts. Coupled with virtual workstations, virtual servers provide organizations of all sizes with tremendous opportunities to increase organizational efficiencies for incremental investments of, in some cases, *virtually* zero. With that in mind, isn't it time you looked into virtualizing your servers as well as your workstations?

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