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**F.Y.B.Sc. Computer Science [SEM-I]**

**USCS103: FOSS**

**Practical-08**

**Virtualization: Open Source virtualization technologies**

1. **Introduction of Virtualization Technology?**

Virtualization technology is possibly the single most important issue in IT and has started a top to bottom overhaul of the computing industry. The growing awareness of the advantages provided by virtualization technology is brought about by economic factors of scarce resources, government regulation, and more competition.

Virtualization is being used by a growing number of organizations to reduce power consumption and air conditioning needs and trim the building space and land requirements that have always been associated with server farm growth. Virtualization also provides high availability for critical applications, and streamlines application deployment and migrations. Virtualization can simplify IT operations and allow IT organizations to respond faster to changing business demands.

The socio-political ramifications of global warming requiring good corporate citizens to meet greenhouse gas reduction targets, creates an added incentive for virtualization.

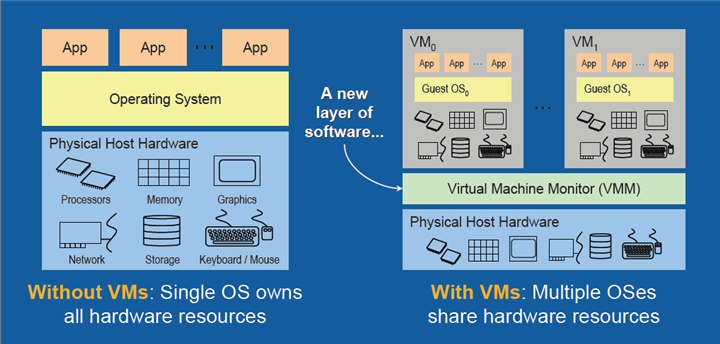
The availability of better virtual machine isolation through new Intel® Virtual Technology hardware support in commodity systems together with the broad availability of virtualization software provides a level of efficiency to meet these demands.

This paper discusses what virtualization is, how Intel technologies improve it, and how organizations can benefit from adopting virtualization into future IT plans.

1. **What is Virtualization?**

Virtualization is a combination of software and hardware engineering that creates Virtual Machines (VMs) - an abstraction of the computer hardware that allows a single machine to act as if it where many machines.

* Without VMs: A single OS owns all hardware resources
* With VMs: Multiple OSes, each running its own virtual machine, share hardware resources
* Virtualization enables multiple operating systems to run on the same physical platform



1. **Definition**

Virtualization refers to the creation of a virtual resource such as a server, desktop, operating system, file, storage or network.   
The main goal of virtualization is to manage workloads by radically transforming traditional computing to make it more scalable. Virtualization has been a part of the IT landscape for decades now, and today it can be applied to a wide range of system layers, including operating system-level virtualization, hardware-level virtualization and server virtualization.

1. **Virtual Machine Monitor (VMM)**

The VMM is the control system at the core of virtualization. It acts as the control and translation system between the VMs and the hardware.

The VMM challenge is the efficient controlling of physical platform resources; this includes memory translation and I/O mapping. Until recently the VMM used software methods of Binary Translation and Paravirtualization to achieve this. With the complex, time consuming operations involved to create and run them, virtual machines, until now, showed significant performance reductions compared to dedicated physical machines.

**5. How to Install Virtual Box?**

Step 1: Download the Windows 10 Technical Preview ISO

1. Visit the [Windows Insiders webpage](https://aka.ms/win10tp)
2. Register to be a Windows Insider
3. Download the 32 bit version of the Windows 10 Technical Preview ISO file

Step 2: Creating the Virtual Machine optimal for Windows 10 testing

1. In the Virtual Box VM Manager, click New
2. Provide a name for your new virtual machine and selectWindows 10 (32 bit) in the Version dropdown menu
3. Select the desired memory size for the new VM  
      
   NOTE: 2GB of RAM minimum is recommended but is not mandatory
4. Select Create to initialize creation of the recommended 32GB virtual hard drive
5. For Hard Drive type, select the default VDI image unless there might be a requirement to use another Virtualization Manager (possibly Hyper-V) in the near future and click Next
6. SelectDynamically allocated and clickNext
7. ClickCreate to begin the virtual machine creation process

Step 3: Installing Windows 10 Technical Preview on Oracle Virtual Box

1. In the Oracle VM Virtual Box Manager, highlight the newly created VM and click on Settings
2. In the VM settings window, click Storage
3. SelectEmpty found under Controller: IDE in Storage Tree
4. Select the CD icon found beside CD/DVD Drive: IDE Secondary
5. Select choose a virtual CD/DVD disk file…
6. Browse to the downloaded Windows 10 ISO, highlight it and selectOpen
7. Click Ok to close the Storage Settings window
8. With the newly created virtual machine highlighted, clickStart
9. The installation of Windows 10 on the newly created virtual machine begins
10. **What’s a Virtual Machine?**

A virtual machine program is a computer program that creates a virtual computer system, complete with virtual hardware devices. This virtual computer “machine” runs as a process in a window on your current operating system. You can boot an operating system installer disc (or live CD) inside the virtual machine, and the operating system will be “tricked” into thinking it’s running on a real computer. It will install and run just as it would on a real, physical machine. Whenever you want to use the operating system, you can open the virtual machine program and use it in a window on your current desktop.

Your virtual machine’s operating system is stored on a virtual hard drive — a big, multi-gigabyte file stored on your hard drive. The file is presented to the operating system as a real hard drive. This means you won’t have to mess around with partitioning. Virtual machines add some overhead, so they won’t be as fast as if you had installed the operating system on real hardware. Demanding games that require serious graphics and CPU power are one particular problem, so virtual machines aren’t the ideal way to [play Windows PC games on Linux](http://www.howtogeek.com/133515/4-ways-to-run-windows-software-on-linux/) or [Mac OS X](http://www.howtogeek.com/191615/how-to-play-windows-pc-games-on-a-mac/) — not unless those games are much older or aren’t graphically demanding.

1. **Virtual Machine Programs**

[Virtual Box](https://www.virtualbox.org/) (Windows, Linux, Mac OS X): Virtual Box is very popular because it’s open-source and completely free. There’s no paid version of Virtual Box, so you don’t have to deal with the usual “upgrade to get more features” upsells and nags. Virtual Box works very well, particularly on Windows and Linux where there’s less competition — it’s a good place to start out.

[While Virtual Box works very well on Windows and Linux, Mac users may want to buy a more polished, integrated Parallels Desktop or VMware Fusion program.]

1. **Uses of Virtual Machine**

* Try new operating systems– You can launch and try dozens of operating systems without much hassle.
* Test your software– You can use VMs to try your software or web app or even site design on a variety of boxes by just building virtual machines and running the tests there. Because the “machines” boil down to a couple of files, the cool thing is, you can copy them, you can back them up. You can burn them to a DVD and ship a fully configured system to someone across the globe.
* Backup your system– When you get ready to move from XP to Vista, you can use VMWare to make a backup of your old system. If things go horribly sour, you could have the VM version up and running in short order. By the way, you can have TWO servers, and have a copy of the VM on both. This would give you even more business continuity, should something happen to the server.
* Easy to stop and start testing- VM applications allow the user to suspend the virtual machine and save its state. This allows the researcher to save their work in a specific state before shutting down the VM. For busy professionals or students this is very useful. One can switch to another task or shut down one’s host computer and then, when it is time to start experimenting with the Open-source network simulation tools again, one can start the VM in the same state it was in when it was stopped, with the guest operating system and all programs running as they were before the VM was stopped or suspended.
* VM Appliances are easy to replicate

Once a guest operating system has been installed in a VM and all the applications and configurations are completed, the VM can be saved as an “appliance”. This appliance can be used later by another researcher, or a student, and can be easily copied and used on another computer.

For example, a researcher might create a complex configuration in a virtual machine that allows him or her to experiment with a particular networking technology in a complex environment. After completing the hard work of setting up and debugging this configuration, the researcher can save the VM appliance for future use or for use by another researcher.

As another example, if someone wants to use open-source network simulation tools to teach IP networking to students, one could package a study lab environment, complete with scripts and prepared lab scenarios and provide a copy of the VM appliance to each student, who could run it in A compatible VM Application on his or her own computer. This simplifies lab set up in educational environments.

1. **How to Create a Virtual Machine?**

1. Choose Start→AllPrograms→Windows Virtual PC and then select Virtual Machines.

If you don’t see Windows Virtual PC on your Start menu, you’ll need to [download it from the Microsoft Web site](http://www.microsoft.com/windows/virtual-pc/download.aspx) and install it on your computer before proceeding.

You can’t use Virtual PC 2007 with Windows 7. So, if you’ve upgraded from a previous version of Windows, you’ll need to install the newer Windows Virtual PC to create a virtual machine.

2. In the window that opens, click the Create virtual machine button on the toolbar.

The Create a Virtual Machine wizard opens.

3. Give your virtual machine a name and specify a location to store the virtual machine file. Click Next.

The wizard asks you to specify your memory and network options.

4. Decide how much RAM to dedicate to your virtual machine and whether to allow network access. Click Next.

Although the virtual machine can run with as little as 4 MB of RAM, the more you can give it, the better it will work.

5. Give your new virtual machine a drive letter. Click Create.

You can choose to use an existing drive or to create one by partitioning an existing drive.

You can also choose to create a Virtual Hard Disk Using Advanced Options. If you select this option, you’ll be taken through another series of wizard pages for creating a more advanced hard drive. However, if you don’t have a specific need, stick to the basic options.

6. ChooseStart→AllPrograms→Windows Virtual PC and then select Virtual Machines. Double click the new machine.

Your new virtual machine will open onto your desktop. Once it’s open, you can install any operating system you want.