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Virtualization

Introduction

- Linux virtualization is designed to achieve virtualization on a system running the Linux operating system.
- Linux virtualization is accomplished through the installation of a virtual machine application on the target system that can create some or more virtual machines depending on the back-end system resources.
- Xen, KVM, VirtualBox and VMware are among the popular applications for Linux virtualization.

Linux Virtualization in Cloud Computing

- Linux virtualization is done by installing a virtual machine application on a computer system which can make multiple virtual machines based on the back-end system resources.
- In Linux virtualizations, the virtual eyes machine shares the hardware but runs independently of the Linux operating system.
- It maximizes the output and provides maximum performance by helping to save power and eliminating the use of hardware.

Top Linux Virtualization Software

- **Some important Software of Linux Virtualization**
  - >>> VMware server
  - >>> VirtualBox
  - >>> QEMU
  - >>> XEN
  - >>> Parallels Virtuozzo Containers

Top Linux Virtualization Software- Vmware Server

- **VMware Server:**
  - >>> VMware server makes it possible to partition a single physical server into many virtual servers are machines.. It works with Linux and many other which can use concurrently on the same hardware.
  - >>> The first commercial x86 hypervisor was released by VMware.

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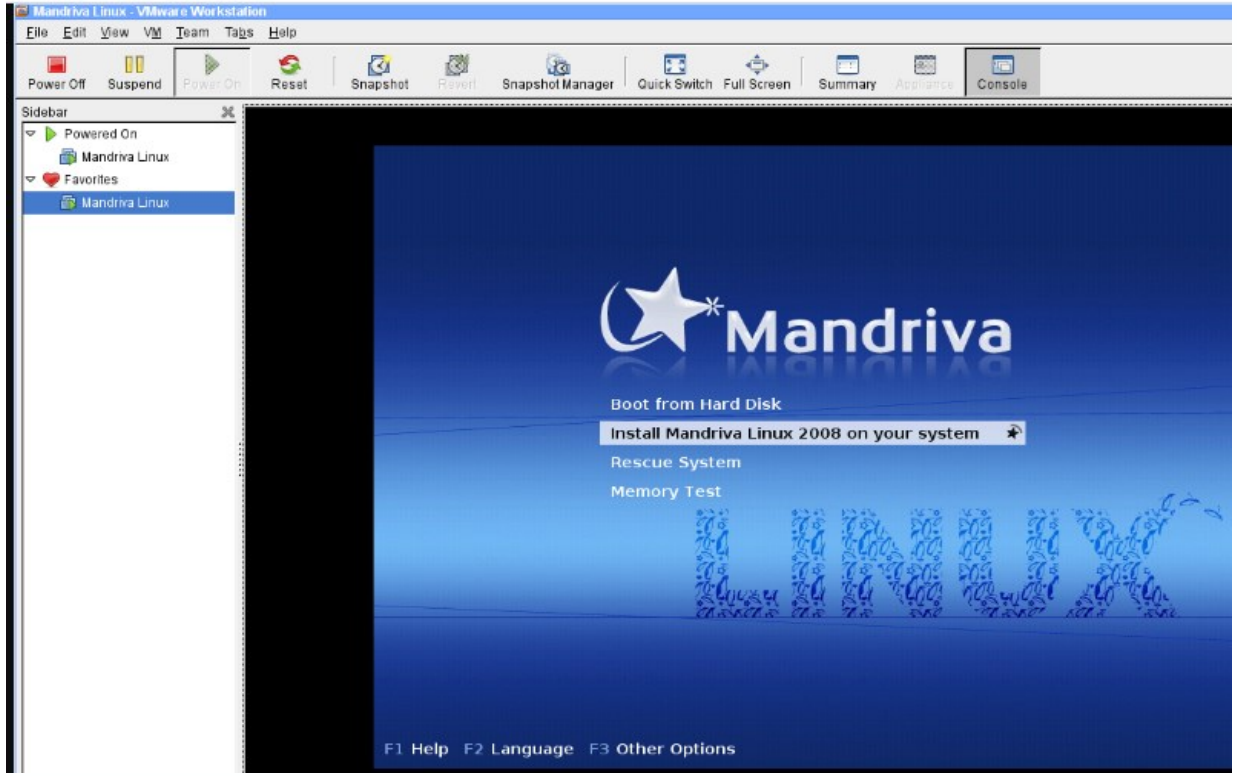

Top Linux Virtualization Software – Vmware Server

- VMware allows you to run multiple x86 (or x86 64-bit) operating systems on a single box. According to VMware, VMware Workstation supports 19 versions of Windows and 26 versions of Linux, and can run as host on both systems.
- VMware is not open source software, but you can try it free for a month; after that, you must either license it (you can buy a license online) or switch to VMware Player.
- Installation is easy. Register for an evaluation copy, download the software, and as root, run rpm -Uvh VMware-workstation-theVersionYouGot.rpm to install both the Workstation and Player programs.

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Top Linux Virtualization Software – Vmware Server

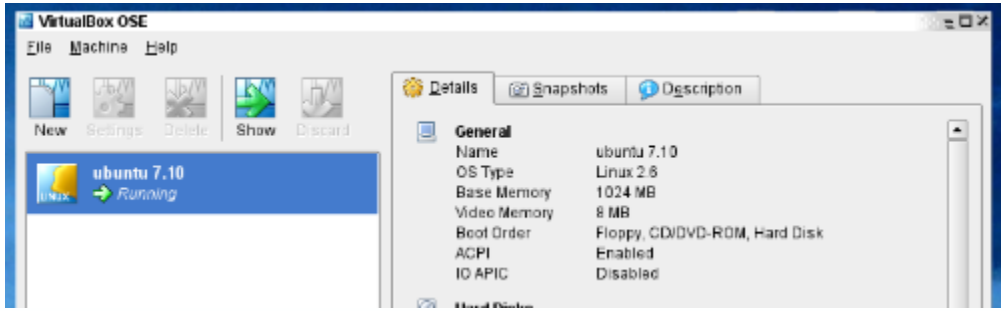
- To create a new virtual machine, start up the Workstation program and click on Create a New Virtual Machine to invoke a wizard for the rest of the configuration.
- You also need to specify the name you want to give your machine, the location for its files, and the size of the virtual disk drive for your new machine.
- Finally, you need to choose what kind of network access you need. Your choices are “bridged,” which means your virtual machine will connect to your network as an independent box; “NAT”

Top Linux Virtualization Software – Virtual Box

- VirtualBox is a virtualization program by innotek (which was acquired by Sun earlier this year) with functions similar to VMware's products.
- VirtualBox runs under Linux, Mac OS X, Windows, and Solaris, and it supports those same operating systems (plus FreeBSD and OpenBSD) as guest systems. The current version is 1.5.6, with an "upcoming new major version" seemingly in the works.
- Originally available under a proprietary license (and free only for private, home use), VirtualBox Open-Source Edition (OSE) was released in January 2007 under the GPL.

Top Linux Virtualization Software – Virtual Box

- I installed the OSE version directly from openSUSE's repositories; even if you want to get the latest possible version.



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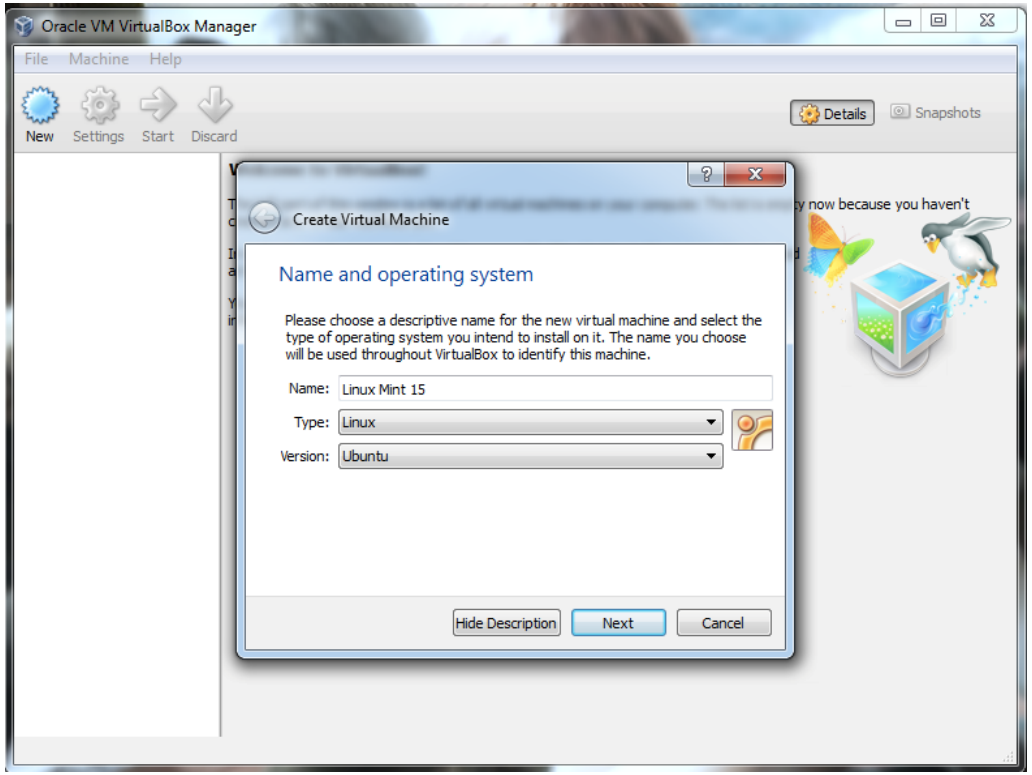
Top Linux Virtualization Software – Virtual Box

- VirtualBox is a powerful free tool by Oracle for running a virtual operating system on your computer.
- **We just need Two things:**
  - VirtualBox software can run Windows, Linux, Mac operating systems.
  - Any Linux OS (For example Linux Mint 15)

Configuration essentials for VirtualBox

Step 1: Choose System Type

- >>> After install VirtualBox, click New.
- >>> Write your system Name for example Linux Mint 15.
- >>> Select Type: Linux.
- >>> Select Version: Ubuntu.



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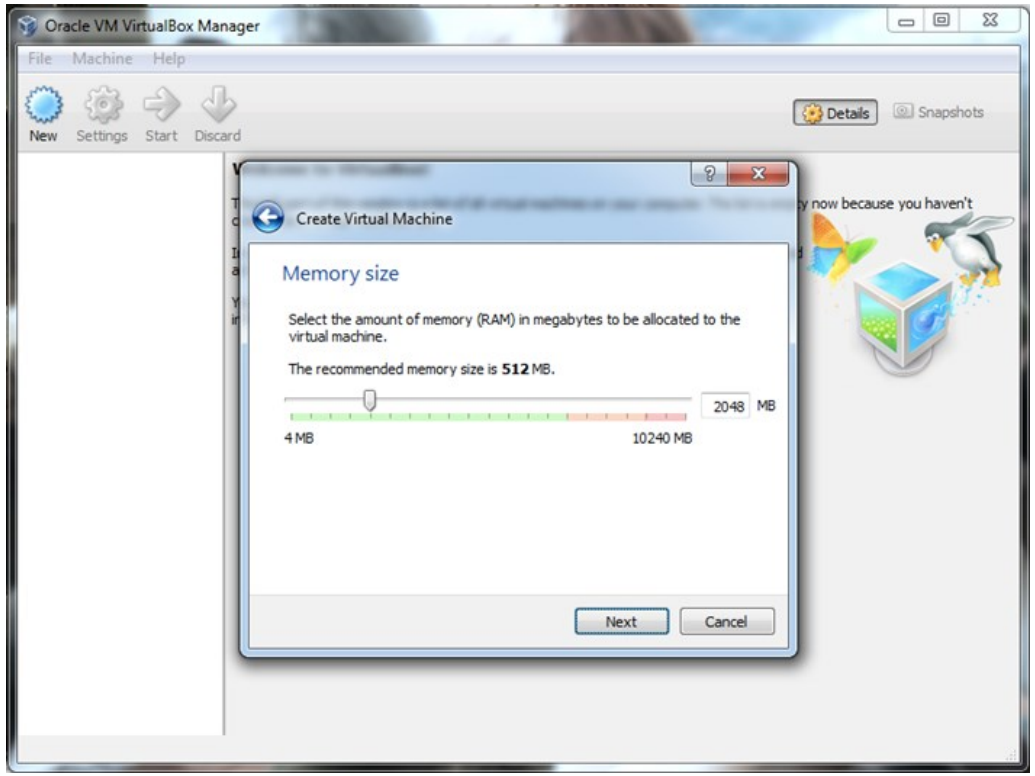
Configuration essentials for VirtualBox

- **Step 2:** Select the amount of RAM
  - >>> **For example:** 1024 MB = 1 GB , 2048 MB = 2 GB



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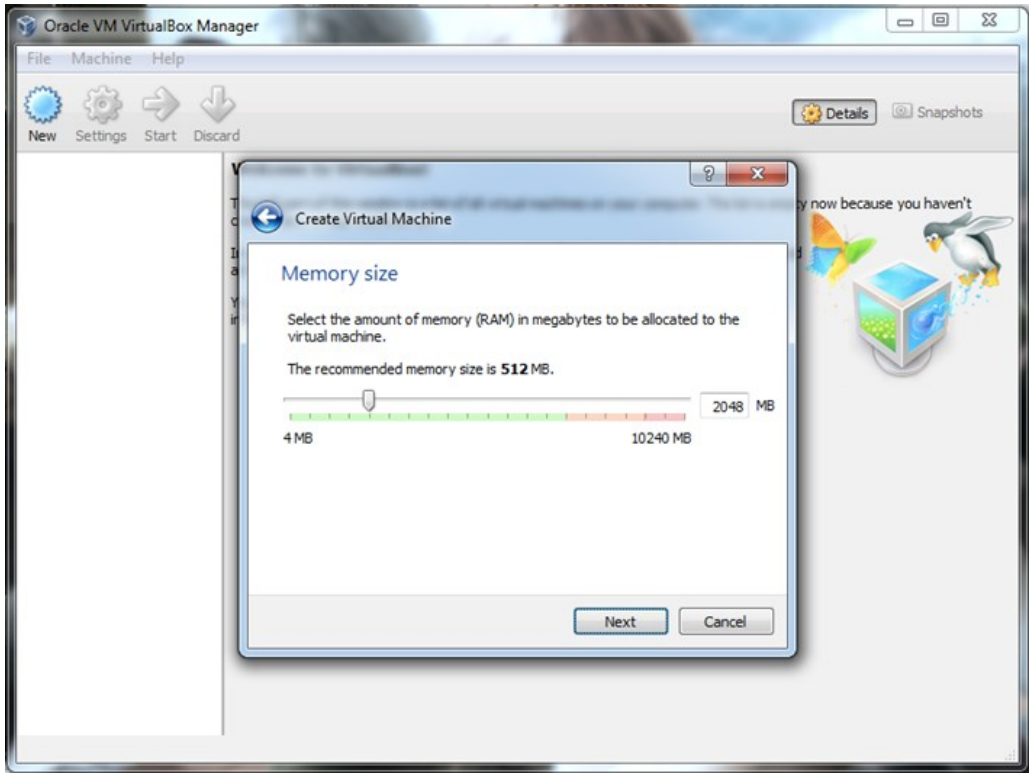

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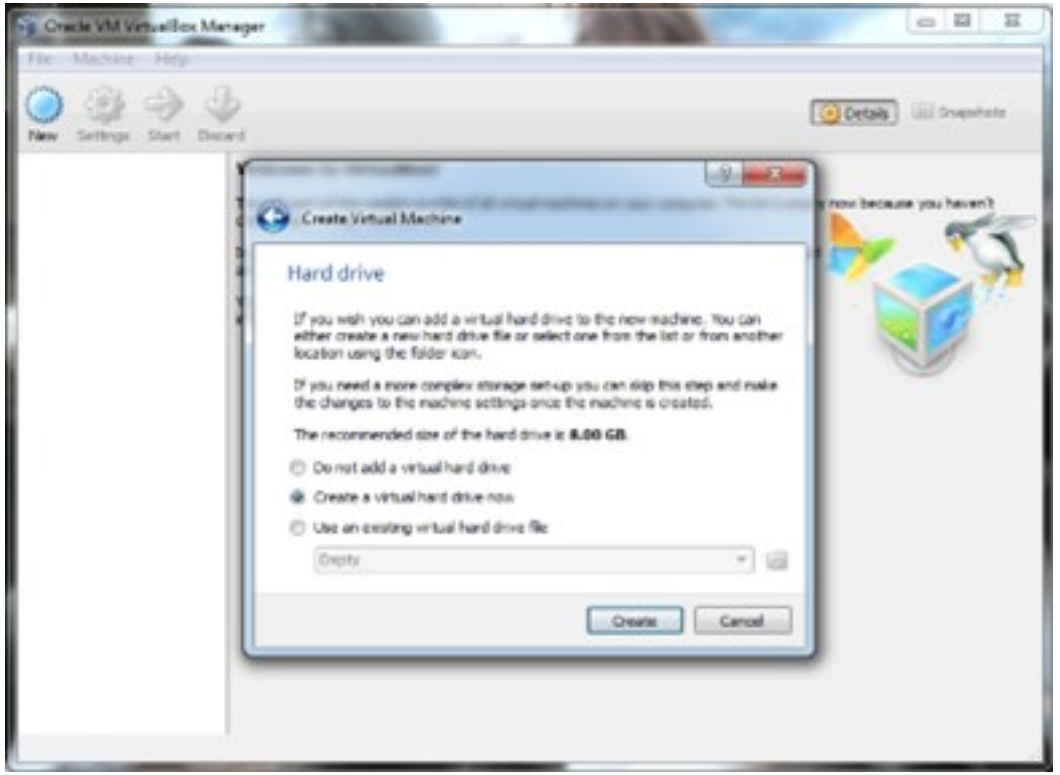
Configuration essentials for VirtualBox

- **Step 3:** Hard Disk Setting
  - >>> **Step 3.1:** Choose Create a virtual hard drive now, to make a virtual disk space.



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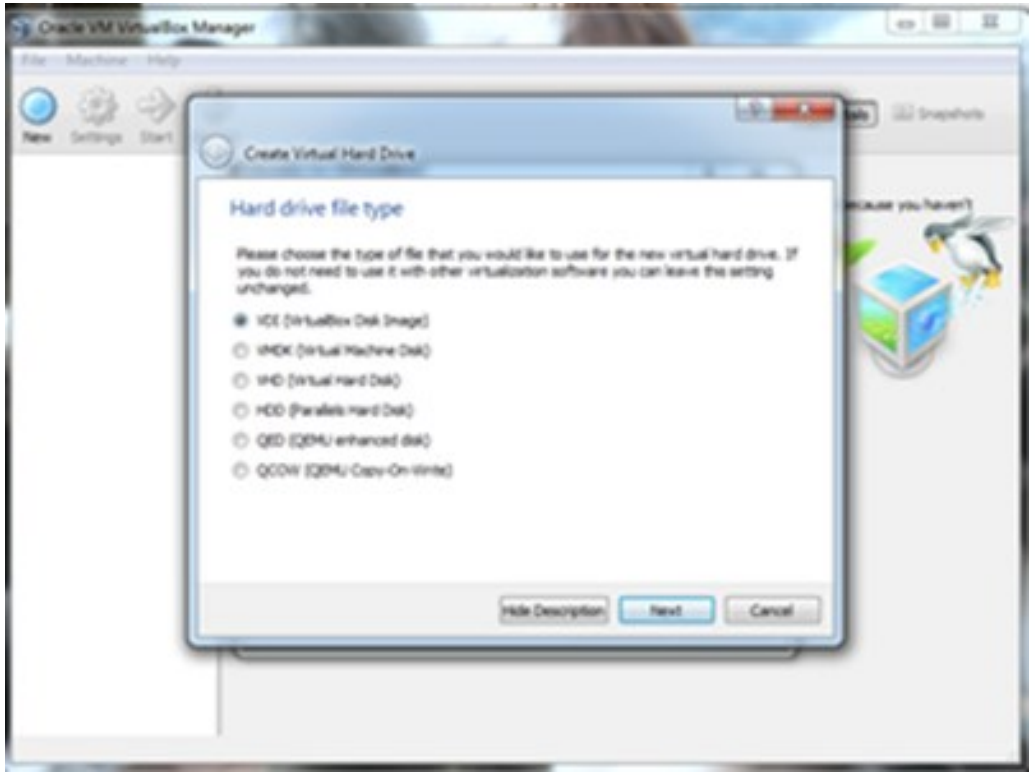
Configuration essentials for VirtualBox

- **Step 3:** Hard Disk Setting
  - >>> **Step 3.2:** Select the VDI to make a backup.



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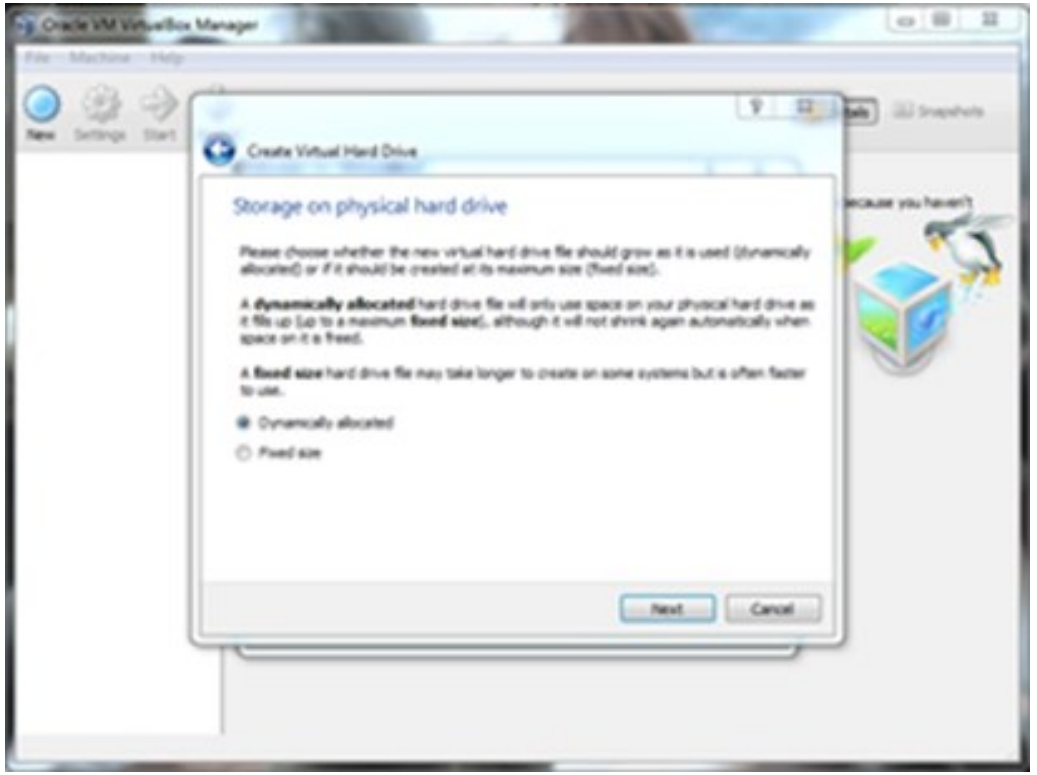
Configuration essentials for VirtualBox

- **Step 3:** Hard Disk Setting
  - >>> **Step 3.3:** Choose Dynamically allocated.



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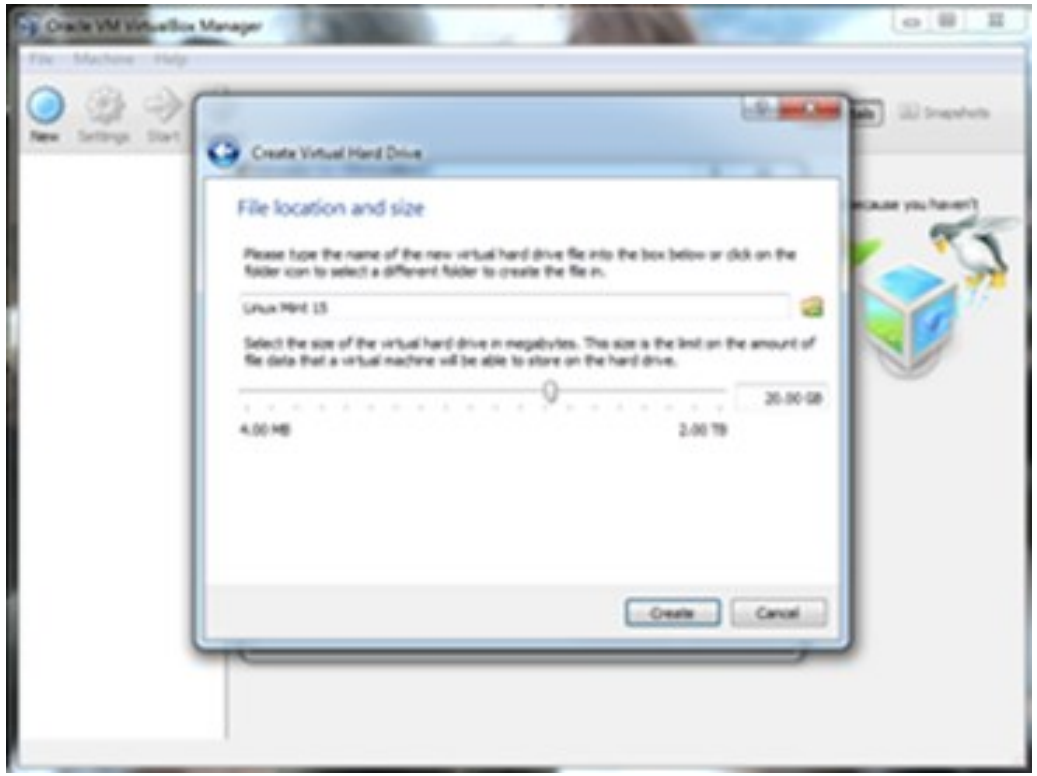
Configuration essentials for VirtualBox

- **Step 3:** Hard Disk Setting
  - >>> **Step 3.4:** Select the amount of hard drive size.



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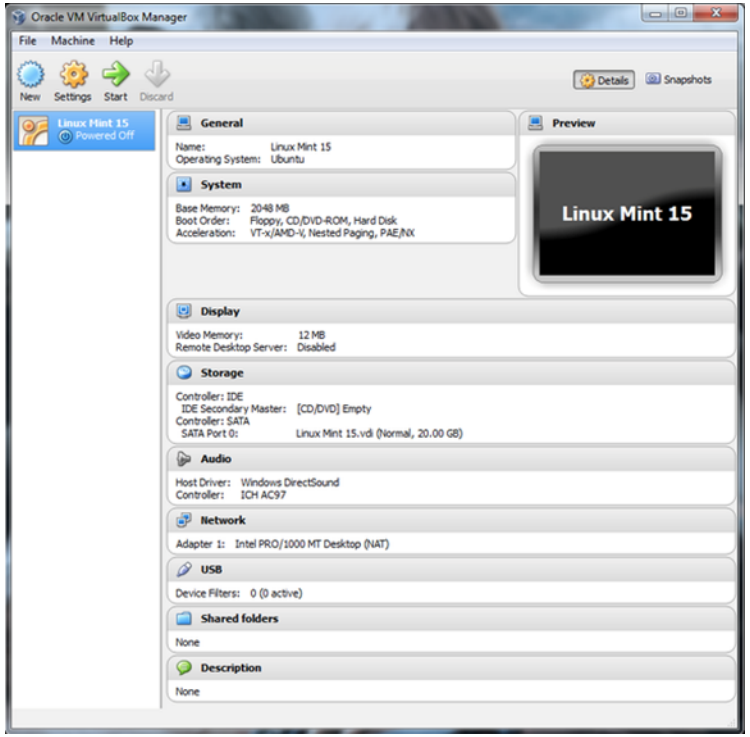
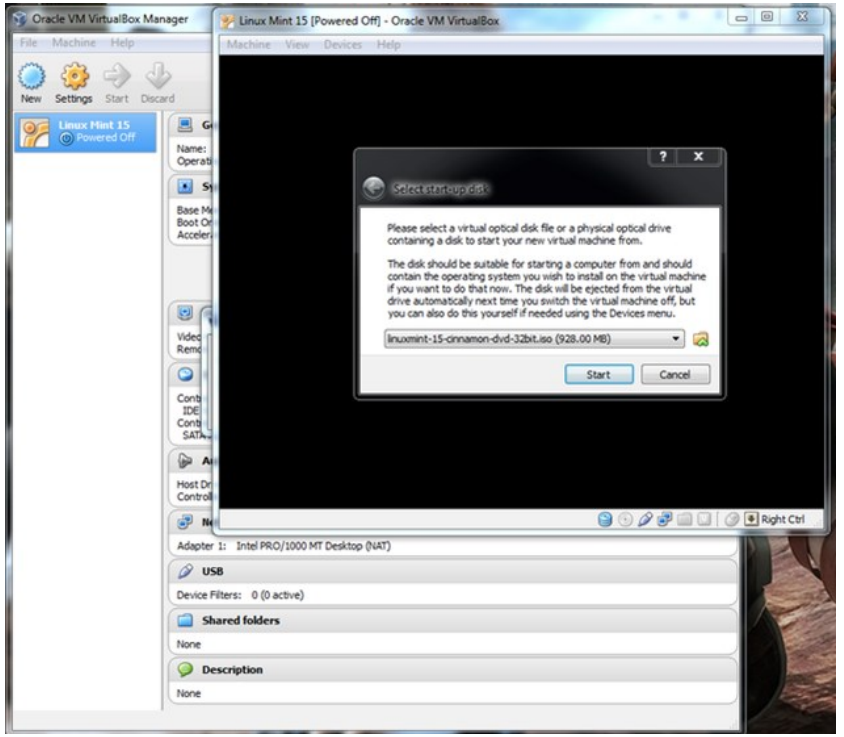
Configuration essentials for VirtualBox

- **Step 4:** Choose Linux ISO file
  - >>> Now we are done with the hardware settings.
  - >>> Click Start to launch system.
  - >>> Choose your system iso file from your computer. For example, my system iso file is (linuxmint-15-cinnamon-dvd-32bit.iso)





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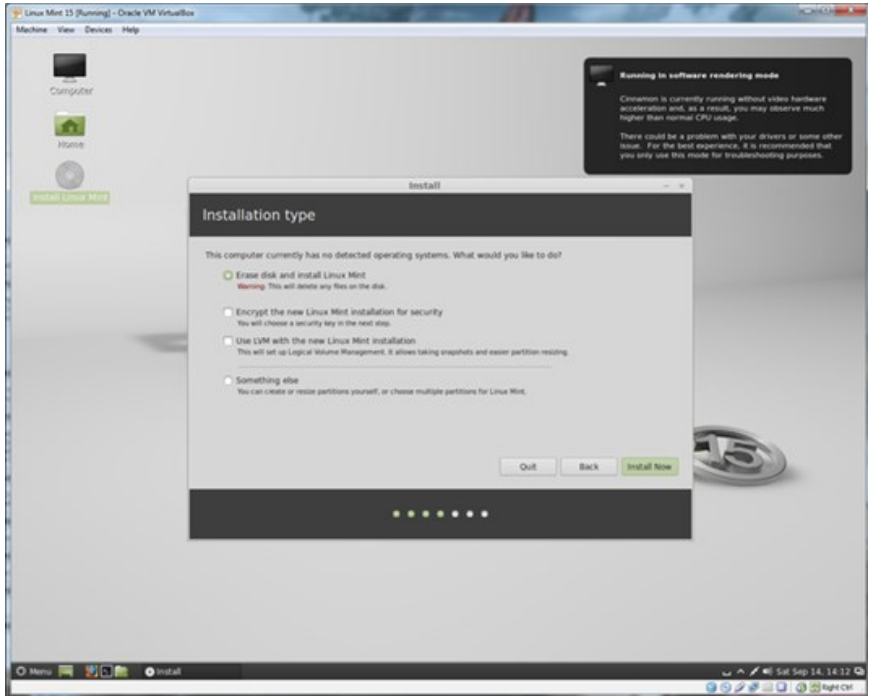
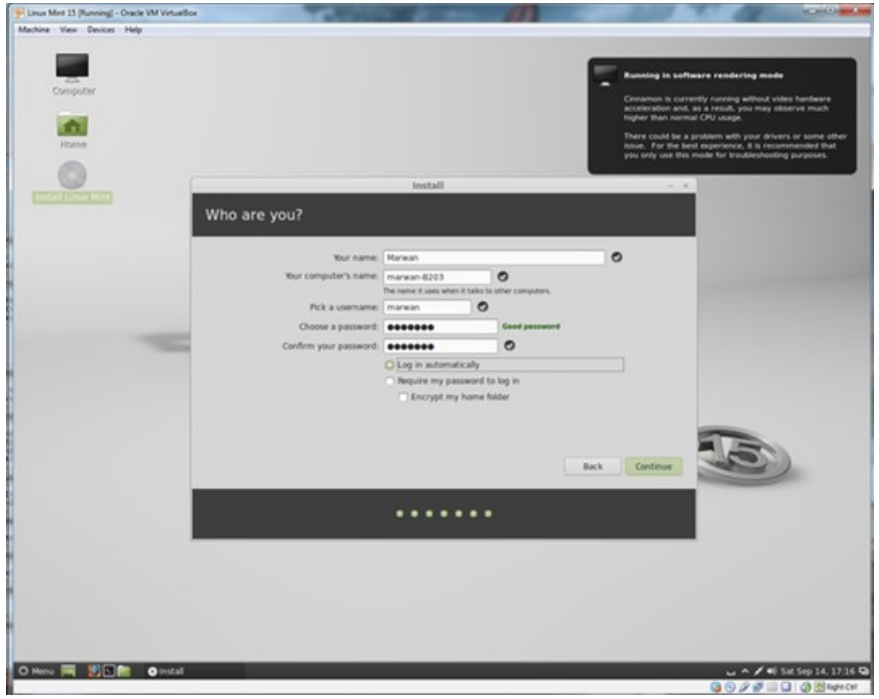
Configuration essentials for VirtualBox

- **Step 5:** Install Linux and Create Account
  - >>> Click on the Install Linux Mint.
  - >>> And select Erase disk and install Linux Mint.
  - >>> Then press Install Now.
  - >>> Now create your account and click Continue.





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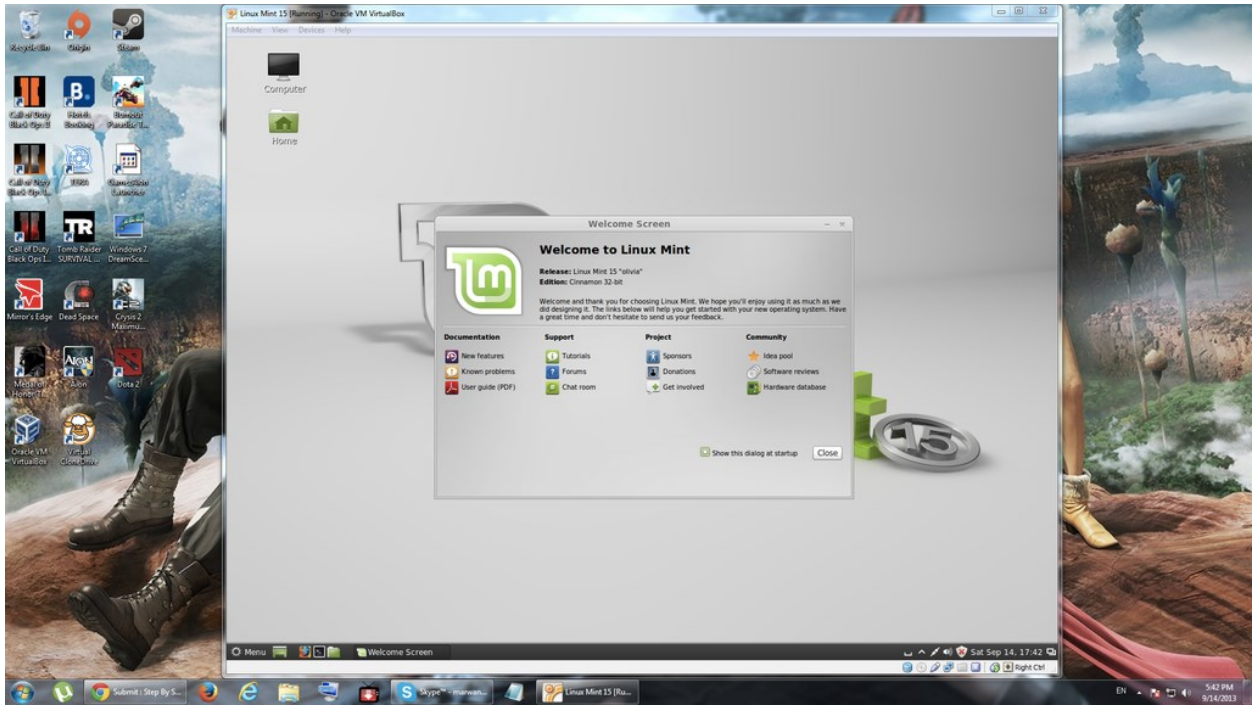
Configuration essentials for VirtualBox

- **Step 6:** Completion
  - >>> Congratulations now you have Linux on your Windows.



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Common issues and their troubleshooting for VirtualBox.

- Verify that the reduced performance is unexpected behavior. When a workload is virtualized, it is common to see some performance reduction due to virtualization overhead.
- **Troubleshoot a performance problem if you experience these conditions:**
  - >>> The virtual machine was previously working at acceptable performance levels but has since degraded
  - >>> The virtual machine performs significantly slower than a similar setup on a physical computer
  - >>> You want to optimize your virtual machines for the best performance possible
- Verify that host networking issues are not impacting the performance of the virtual machine. For more information, see Verifying host networking speed (1009527).

Common issues and their troubleshooting for VirtualBox.

- Verify that you are running the most recent version of the VMware product being used. For download information, see the VMware Download Center.
- Check that VMware Tools is installed in the virtual machine and running the correct version. The version listed in the toolbox application must match the version of the product hosting the virtual machine.
- Verify that the host operating system is working properly and is in a healthy state.

Common issues and their troubleshooting for VirtualBox.

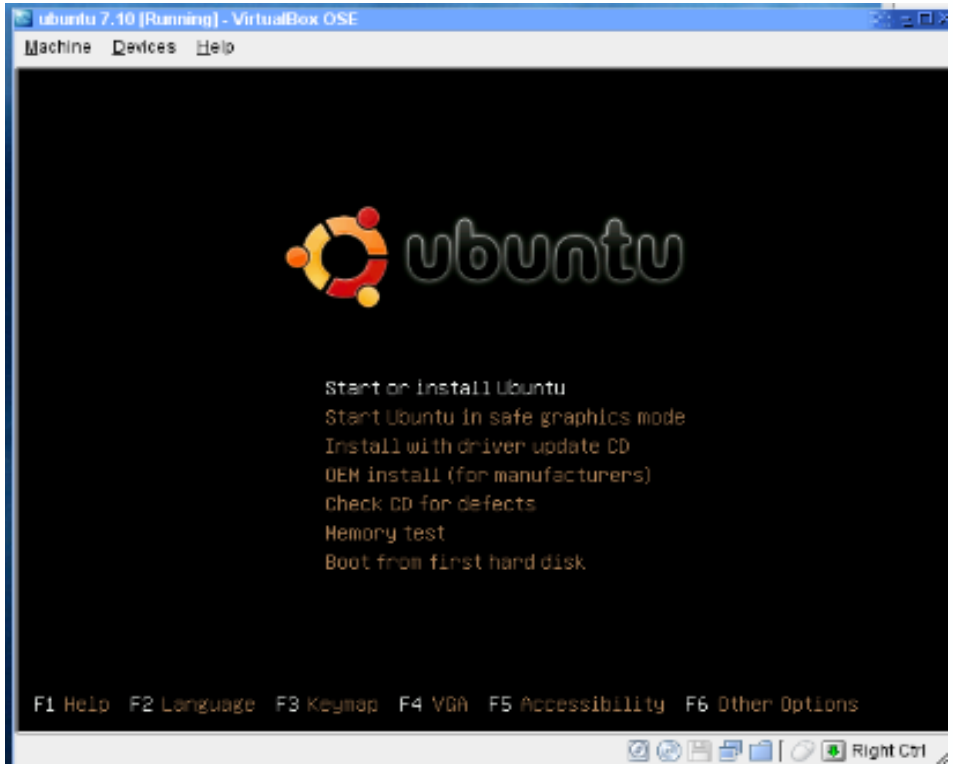
- Review the virtual machine's virtual hardware settings and verify that you have provided enough resources to the virtual machine, including memory and CPU resources.
- Use the average hardware requirements typically used in a physical machine for that operating system as a guide.
- Ensure that any antivirus software installed on the host is configured to exclude the virtual machine files from active scanning.

Common issues and their troubleshooting for VirtualBox.

- Check the storage sub-system on the host and verify that it is configured for optimal performance. For information, see Troubleshooting hosted disk I/O performance problems (1008885).
- Verify that there are enough free resources on the host to satisfy the requirements of the virtual machine.
- Disable the CPU power management features on the host. In some cases, these features can cause CPU performance issue with virtual machines.

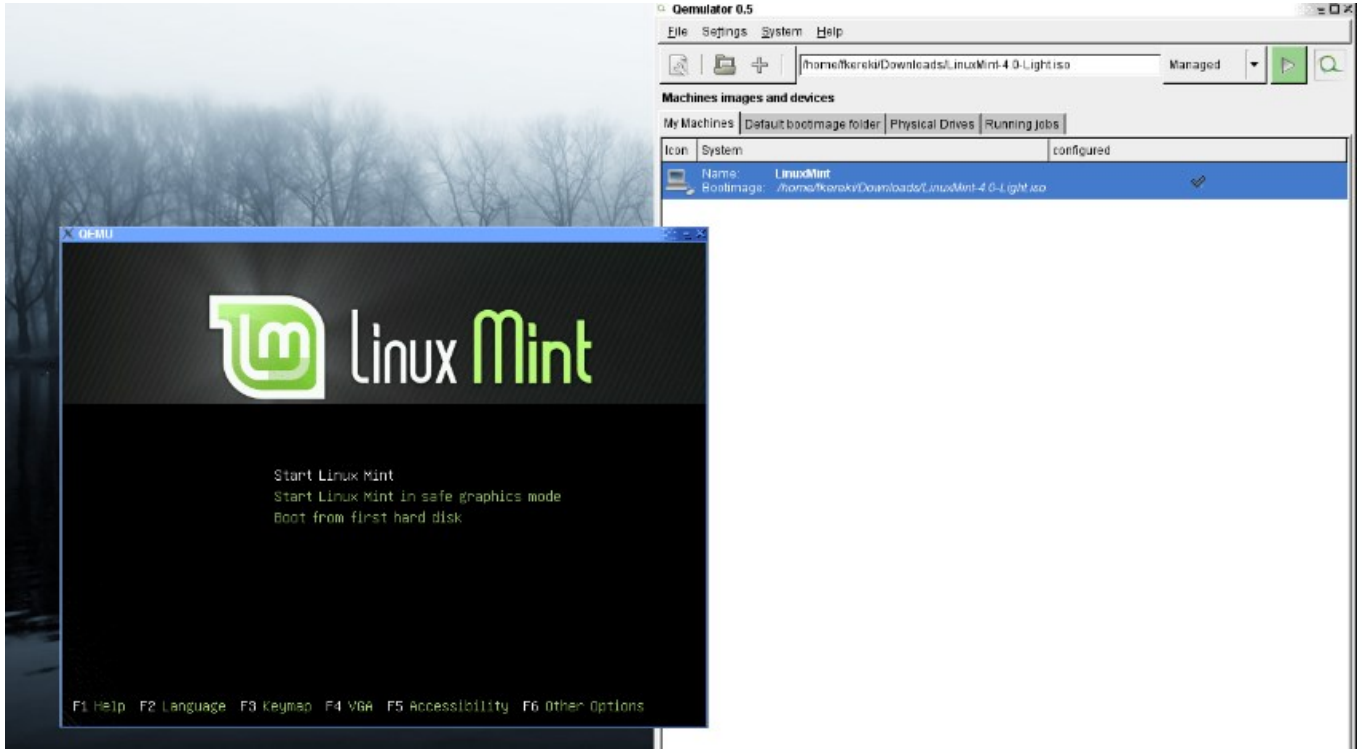
Top Linux Virtualization Software - VirtualBox

- As with VMware, you create a new virtual machine with the help of a wizard.
- With VirtualBox, you will also benefit if you load the VirtualBox Linux Additions.
- Go to Devices -> Install Guest Additions, and the proper package will be downloaded and appear as a mounted CD; execute VboxLinuxAdditions.run to finish the installation.



Top Linux Virtualization Software – QEMU

- QEMU is both a virtualization program and an emulator: it can run programs and operating systems written for a specific CPU on a different machine.
- Running QEMU usually requires a series of shell commands, but you're better off installing Qemulator, a graphical interface that's written in Python and is similar to those of VirtualBox and VMware.
- Installation is simple: just download the package, unpack it, and launch setup.py.



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Top Linux Virtualization Software - XEN

This includes three Software, and they are:

- **Citrix XenServer**
  - >>> Citrix XenServer based on open-source Xen hypervisor which delivers low overhead and near-native performance.
- **Oracle VM**
  - >>> This is based on open-source XEN hypervisor technology. The main benefit of Oracle VM is that it has a web browser-based management console and supports both Windows and Linux guests. It features fully tested and certified Oracle applications.
- **Sun xVM**
  - >>> It is a product line from Sun Microsystems which addresses virtualizations technology based on the open-source Xen under Solaris environment onx86-64 systems. It is a family of server and desktop virtualization technologies and solutions.

Top Linux Virtualization Software – Parallels Virtuozzo Containers

- This product is an operating system level virtualization which designs for large-scale servers and data centers. It is a patented OS virtualizations solution.
- It can create isolated partitions on a single physical server and operating system instance to use hardware, software, and data center with maximum efficiency.

Advantages of Linux Virtualization

Following are some benefits of Linux Virtualization:

- **Better utilization of resources**
  - >>> The overall efficiency of the system can increase bile Linux virtualizations as the physical CPU and memory shared.
- **Reduced Management**
  - >>> As the number of physical hardware servers is less so the time and the funds which are raised for the management will be less such as cooling and energy requirements.
- **Flexible**
  - >>> Linux Virtualizations provide the flexibility to create a new environment with an existing physical box with the use of applications' modified Xen virtualization implementations.
- **Reduces other expenses**
  - >>> The cost of licensing is a major factor. So, if the number of hardware is less the cost of licensing will be less.

Conclusion

- As in Linux virtualizations, more virtual machines can be installed, executed, and maintained on the top of the Linux operating system the flexibility and compatibility are more which makes it user-friendly.
- If you want to explore virtualization, VMware might be the strongest program, but its licensing mode might hamper your experiments.
- On the other hand, QEMU is fully free, but noticeably slower than the other two programs. VirtualBox strikes a compromise, with its pair of licensing models and performance that matches or surpasses that of VMware.

Points to Remember

- Hardware is the solution for full virtualization.
- VMware ESXi is an example of a server operating system.
- XML standard describes the interface of web services.
- Abstraction enables the key benefit of cloud computing: shared, ubiquitous access.
- Virtualization assigns a logical name for a physical resource and then provides a pointer to that physical resource when a request is made.
- Several important cloud computing approaches use a strictly hardware-based approach to abstraction.

Points to Remember

- Most data center environments experience changes to performance requirements and workload activity over time.
- All of these methods provide users with the ability to service their own requests with minimal IT oversight.
  - >>> Create a library of virtual machine templates and copy them to create new VMs
  - >>> Invest in self-service virtualization provisioning systems
  - >>> Give developers and testers permissions to create and deploy new VMs
  - >>> Define standardized configurations for test environment virtual machines
- One of the primary benefits of virtualization is the ability to save the state of a VM and then move or copy it to another location.

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Points to Remember

- VMs must be able to communicate with each other, they will require network access.
- Presentation virtualization involves installing and running applications on a central server and allowing clients to access the VMs over the network. An example of this approach is Microsoft's Windows Terminal Services.
- Microsoft Hyper-V requires 64-bit CPUs with virtualization extensions, NX support, and runs only on x64 editions of Windows Server 2008.
- The initial version of Microsoft Hyper-V does not support an automatic, live migration of virtual machines and their memory state from one server to another.
- By default, the Hyper-V Server Role is not enabled on new installations of Windows Server 2008.

Points to Remember

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- Several important cloud computing approaches use a strictly hardware-based approach to abstraction.
- Load balancing is an optimization technique and used to distribute service requests to resources client can request access to a cloud service from any location
- A cloud has multiple application instances and directs requests to an instance based on conditions
- Computers can be partitioned into a set of virtual machines with each machine being assigned a workload systems can be virtualized through load-balancing technologies.
- Apache mod_proxy_balancer software can be used to implement load balancing.
- Load balancing can be used to increase utilization and throughput, lower latency, reduce response time, and avoid system overload.

Points to Remember

- Connections through intelligent switches, DNS, Storage resources are the network resources can be load balanced.
- Load balancing provides the necessary redundancy to make an intrinsically unreliable system reliable through managed redirection workload managers is a more sophisticated load balancer
- They determine the current utilization of the resources in their pool.
- ADC is a combination load balancer and application server that is a server placed between a firewall or router.
- An Application Delivery Controller is assigned a virtual IP address (VIP) that maps to a pool of servers based on application specific criteria.
- Hypervisor control memory and processor resources while virtual machines control their own network and storage resources.
- Type 2 hypervisor runs on top of an operating system to provide resources to the virtual machines.