Operating System
lab1

Lab1: Introduction to operating system

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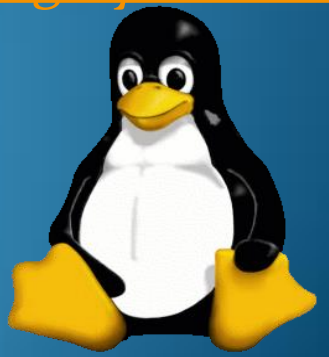
Email subject: **fci-os-2021**

Github Repo: https://github.com/SamarShabanCS/Operating-Sytem-2021

Slack workspace: https://fu-fci-os-2021.slack.com



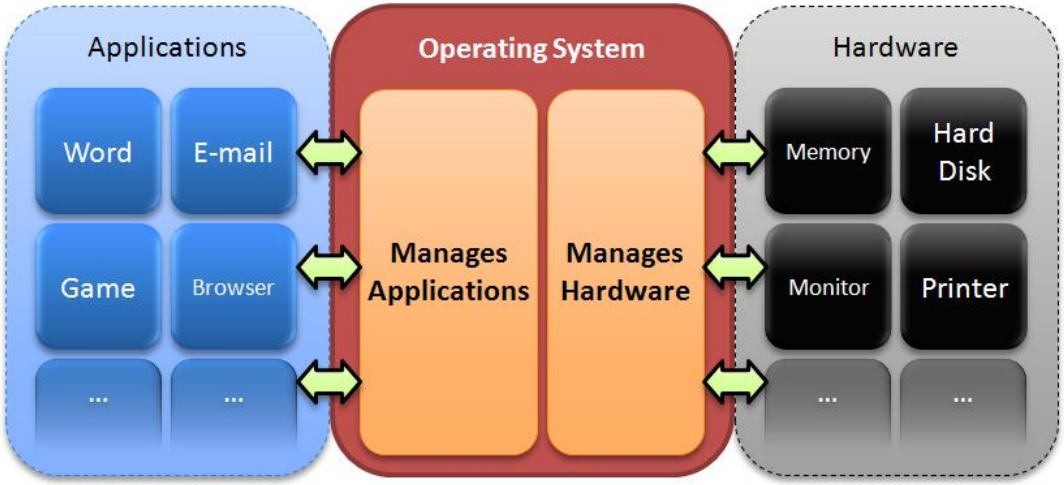
Agenda

- Operating sytem
- Linux history
- Environment setup
- Linux file system
- Assignment

Operating System

- **An operating system or OS is a software program that enables the computer hardware to communicate and operate with the computer software.**

- Microsoft Windows
- Apple Mac-OS
- Ubuntu Linux
- Google Android
- iOS



Linux history

Linux Distributions

Environment setup

- Ubuntu Image:
  https://ubuntu.com/download#download

- VMware Player:

  https://www.vmware.com/products/workstation-player/workstation-player-evaluation.html

Ubuntu 20.04.3 LTS

Download the latest LTS version of Ubuntu, for desktop PCs and laptops. LTS stands for long-term support — which means five years, until April 2025, of free security and maintenance updates, guaranteed.

Ubuntu 20.04 LTS release notes

Recommended system requirements:

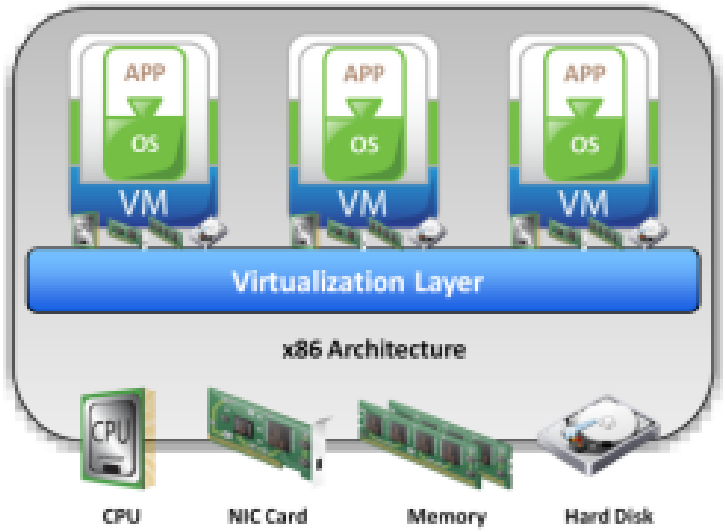
- 2 GHz dual core processor or better
- 4 GB system memory
- 25 GB of free hard drive space
- Internet access is helpful
- Either a DVD drive or a USB port for the installer media

Compute Virtualization

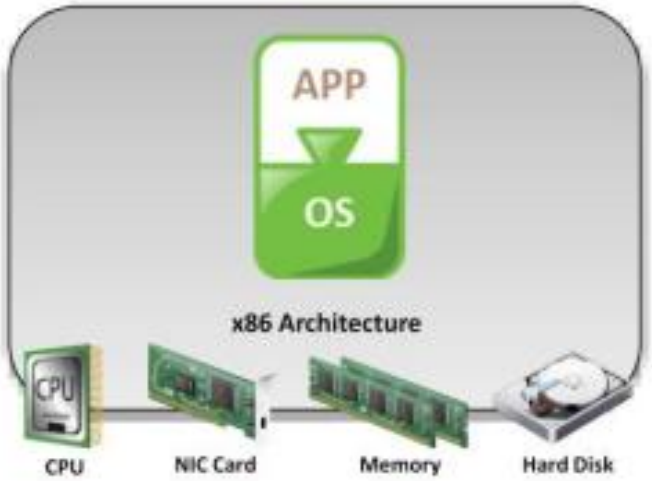
Compute Virtualization

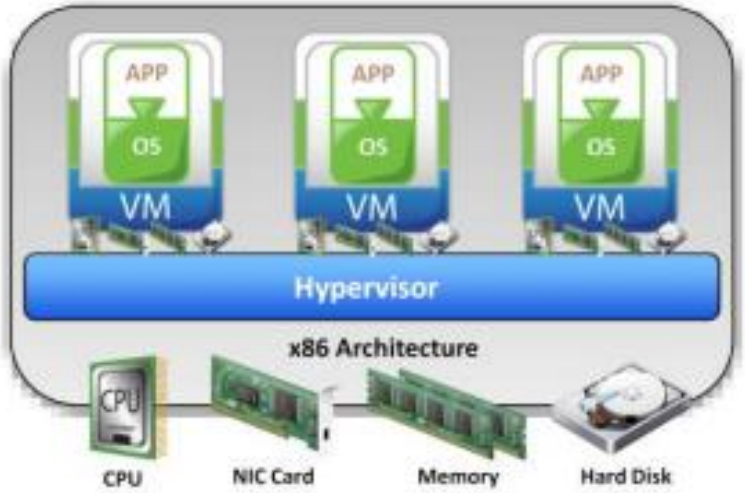
It is a technique of masking or abstracting the physical compute hardware and enabling multiple operating systems (OSs) to run concurrently on a single or clustered physical machine(s).

- Enables creation of multiple virtual machines (VMs), each running an OS and application
  - VM is a logical entity that looks and behaves like physical machine
- Virtualization layer resides between hardware and VMs
  - Also known as hypervisor
- VMs are provided with standardized hardware resources



Need for Compute Virtualization





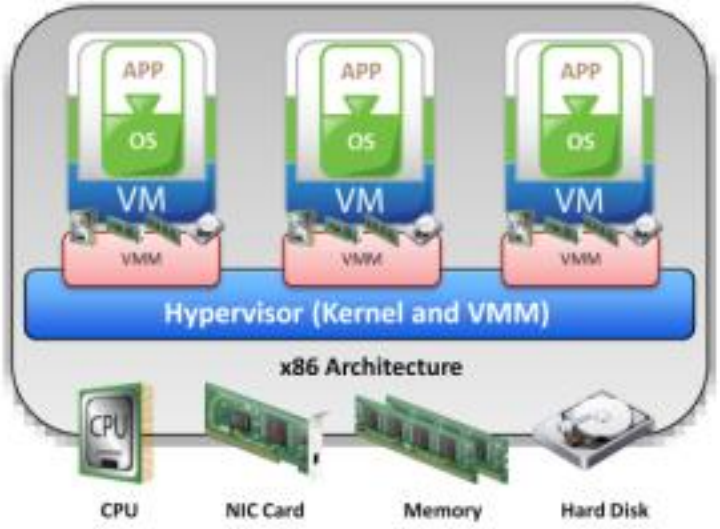
Before Virtualization	After Virtualization
• Runs single operating system (OS) per machine at a time • Couples s/w and h/w tightly • May create conflicts when multiple applications run on the same machine • Underutilizes resources • Is inflexible and expensive	• Runs multiple operating systems (OSs) per machine concurrently • Makes OS and applications h/w independent • Isolates VM from each other, hence no conflict • Improves resource utilization • Offers flexible infrastructure at low cost

Hypervisor

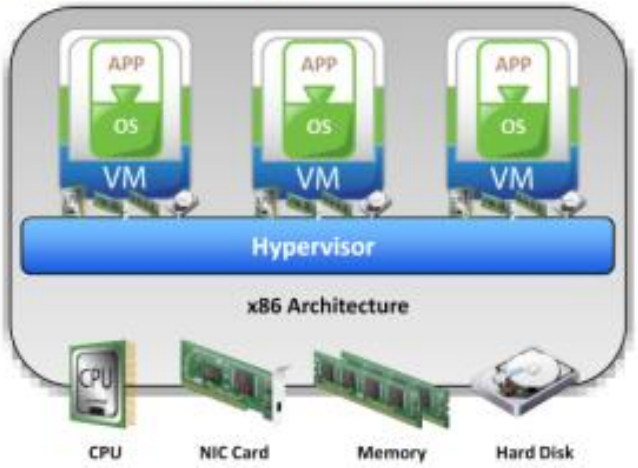
Hypervisor

It is a software that allows multiple operating systems (OSs) to run concurrently on a physical machine and to interact directly with the physical hardware.

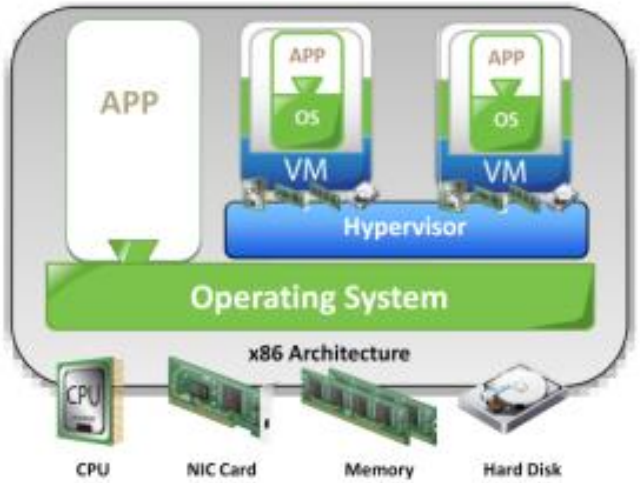
- Has two components
  - Kernel
  - Virtual Machine Monitor (VMM)



Types of Hypervisor



Type 1: Bare-Metal Hypervisor



Type 2: Hosted Hypervisor

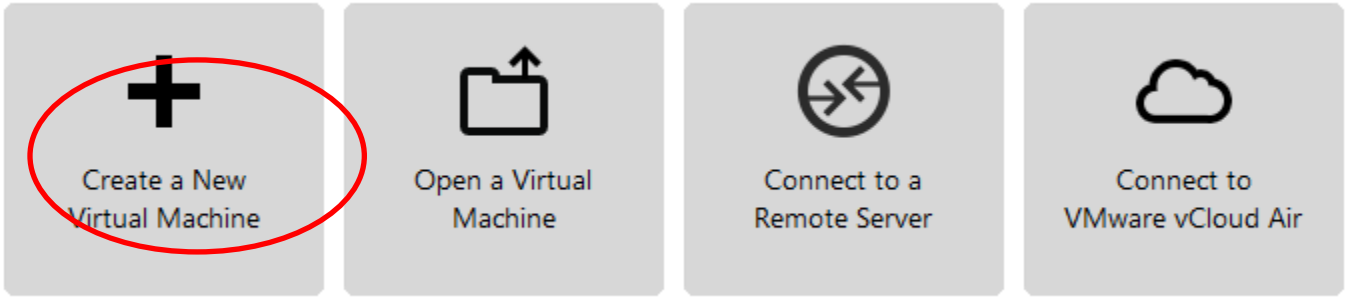
Type 1: Bare-Metal Hypervisor

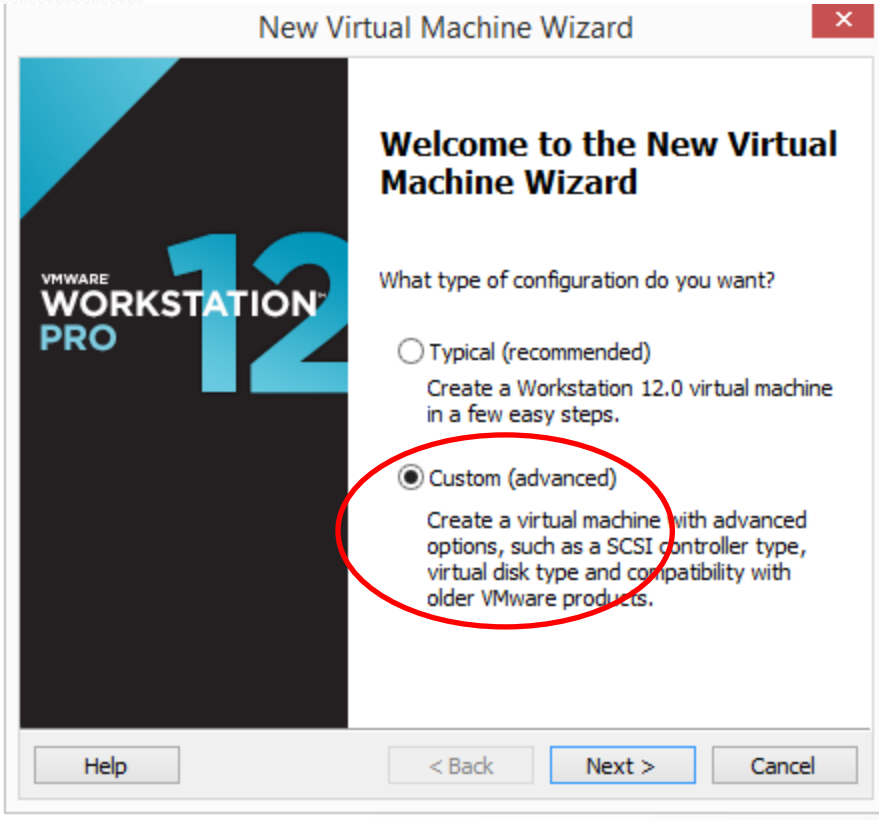
- It is an operating system (OS)
- It installs and runs on x86 bare-metal hardware
- It requires certified hardware

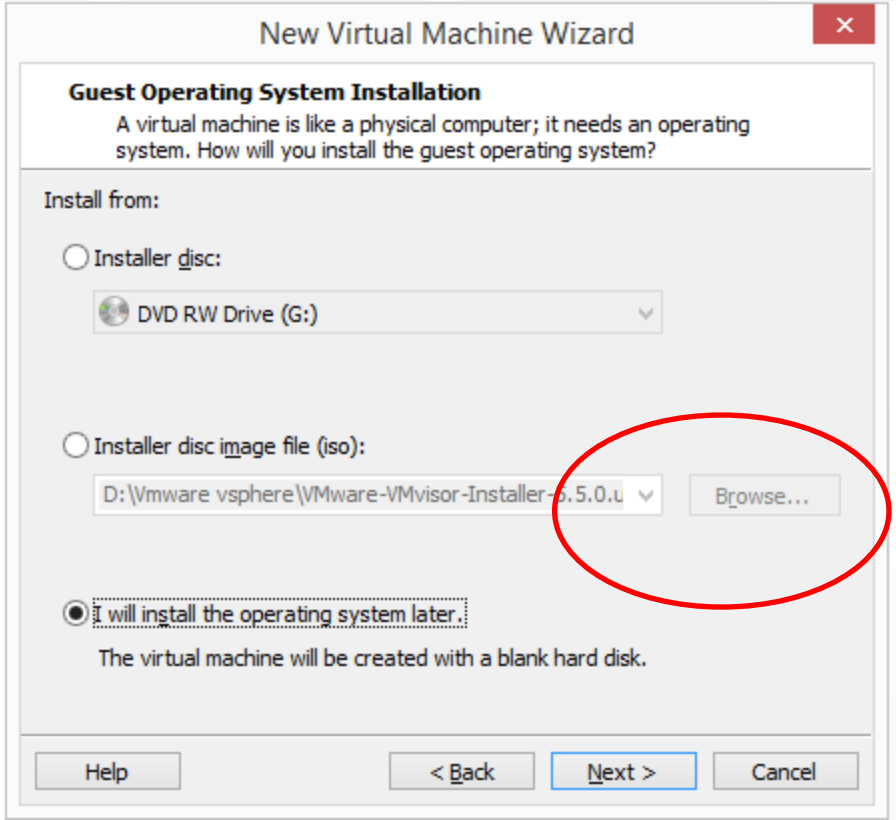
Type 2: Hosted Hypervisor

- It installs and runs as an application
- It relies on operating system (OS) running on physical machine for device support and physical resource management

EMC²


Create a New Virtual Machine
Open a Virtual Machine
Connect to a Remote Server
Connect to VMware vCloud Air


New Virtual Machine Wizard
VMWARE WORKSTATION PRO 12
Welcome to the New Virtual Machine Wizard
What type of configuration do you want?
Typical (recommended)
Create a Workstation 12.0 virtual machine in a few easy steps.
Custom (advanced)
Create a virtual machine with advanced options, such as a SCSI controller type, virtual disk type and compatibility with older VMware products.
Help
< Back
Next >
Cancel


New Virtual Machine Wizard
Guest Operating System Installation
A virtual machine is like a physical computer; it needs an operating system. How will you install the guest operating system?
Install from:
Installer disc:
DVD RW Drive (G:)
Installer disc image file (iso):
D:\Vmware vsphere\VMware-VMvisor-Installer-6.5.0.u
Browse...
I will install the operating system later.
The virtual machine will be created with a blank hard disk.
Help
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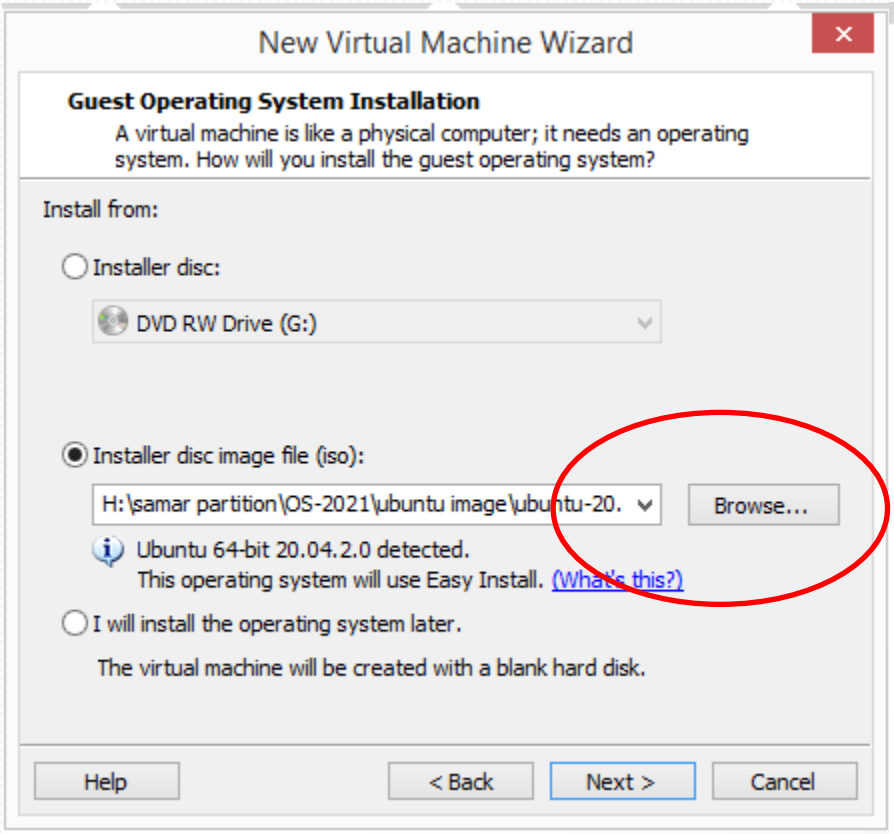
Cancel


New Virtual Machine Wizard
Guest Operating System Installation
A virtual machine is like a physical computer; it needs an operating system. How will you install the guest operating system?
Install from:
Installer disc:
DVD RW Drive (G:)
Installer disc image file (iso):
H:\samar partition\OS-2021\ubuntu image\ubuntu-20.
Browse...
Ubuntu 64-bit 20.04.2.0 detected.
This operating system will use Easy Install. (What's this?)
I will install the operating system later.
The virtual machine will be created with a blank hard disk.
Help
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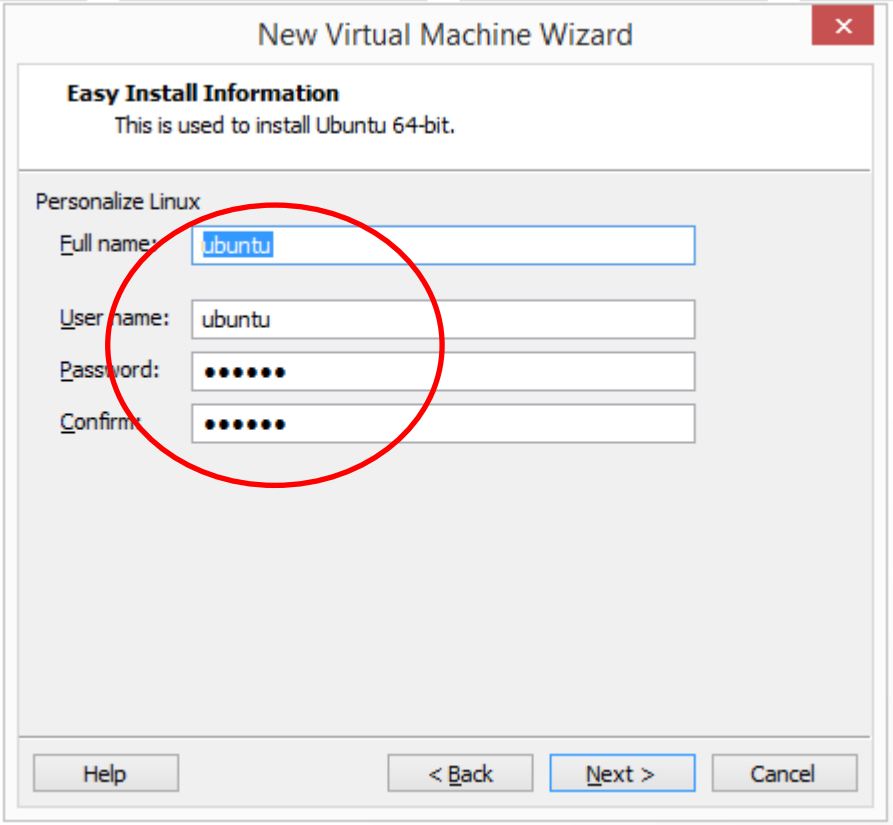
Cancel


New Virtual Machine Wizard
Easy Install Information
This is used to install Ubuntu 64-bit.
Personalize Linux
Full name:
ubuntu
User name:
ubuntu
Password:
Confirm
Help
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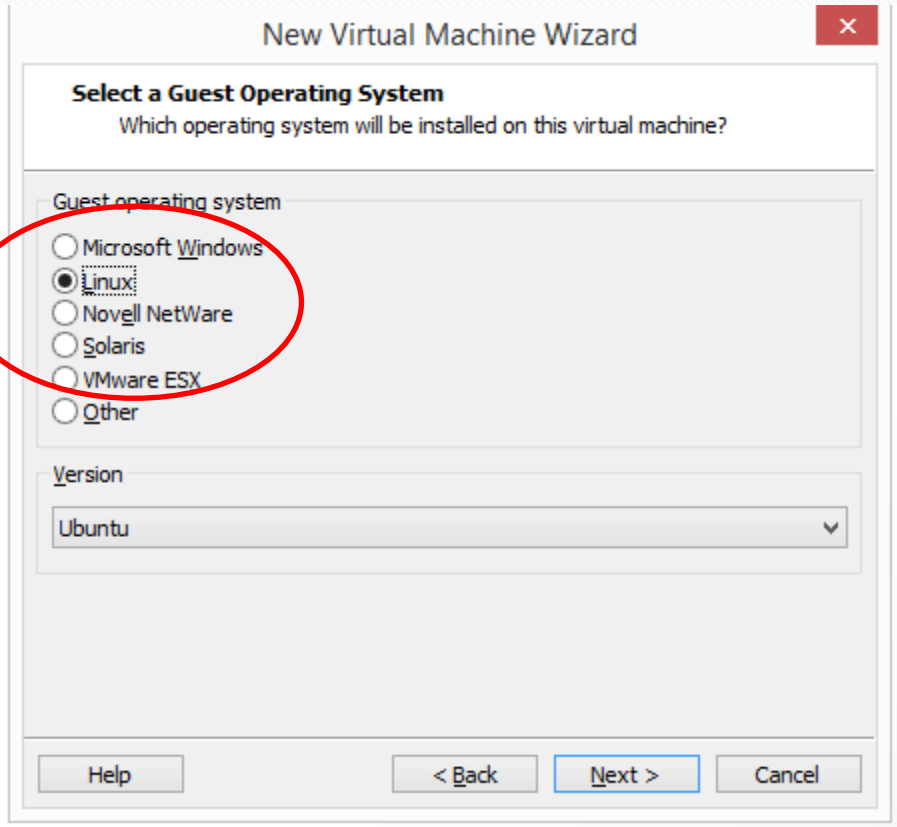
Next >
Cancel


New Virtual Machine Wizard
Select a Guest Operating System
Which operating system will be installed on this virtual machine?
Guest operating system
Microsoft Windows
Linux
Novell NetWare
Solaris
VMware ESX
Other
Version
Ubuntu
Help
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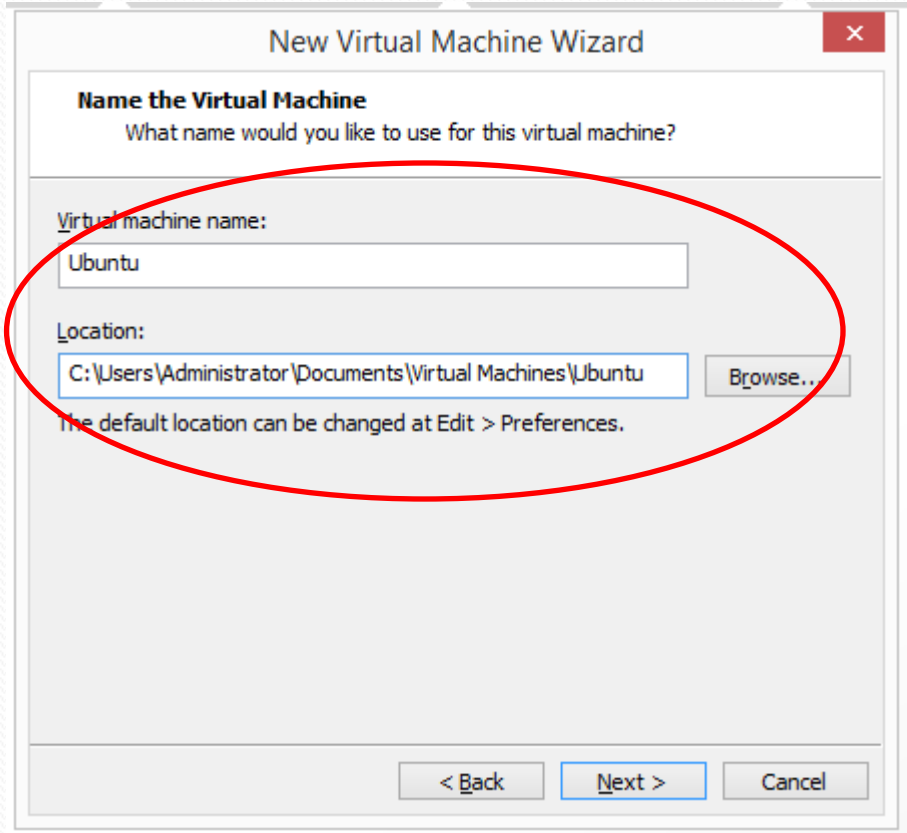
Next >
Cancel


New Virtual Machine Wizard
Name the Virtual Machine
What name would you like to use for this virtual machine?
Virtual machine name:
Ubuntu
Location:
C:\Users\Administrator\Documents\Virtual Machines\Ubuntu
Browse...
The default location can be changed at Edit > Preferences.
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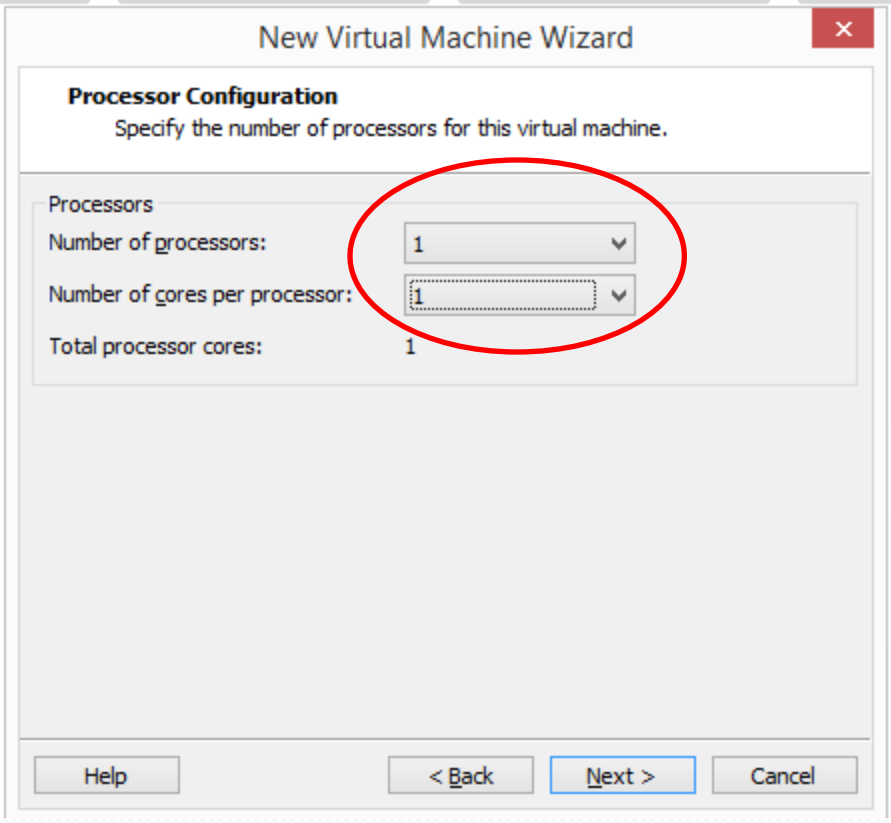
Next >
Cancel


New Virtual Machine Wizard
Processor Configuration
Specify the number of processors for this virtual machine.
Processors
Number of processors:
1
Number of cores per processor:
1
Total processor cores:
1
Help
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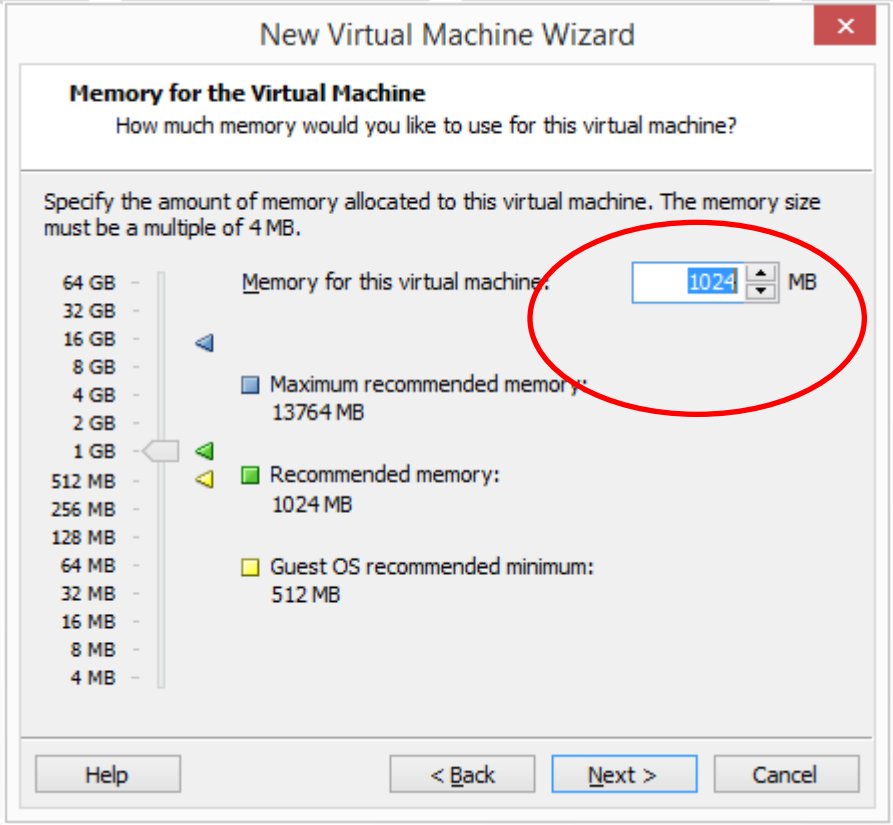
Cancel


New Virtual Machine Wizard
Memory for the Virtual Machine
How much memory would you like to use for this virtual machine?
Specify the amount of memory allocated to this virtual machine. The memory size must be a multiple of 4 MB.
64 GB
32 GB
16 GB
8 GB
4 GB
2 GB
1 GB
512 MB
256 MB
128 MB
64 MB
32 MB
16 MB
8 MB
4 MB
Memory for this virtual machine:
1024
MB
Maximum recommended memory:
13764 MB
Recommended memory:
1024 MB
Guest OS recommended minimum:
512 MB
Help
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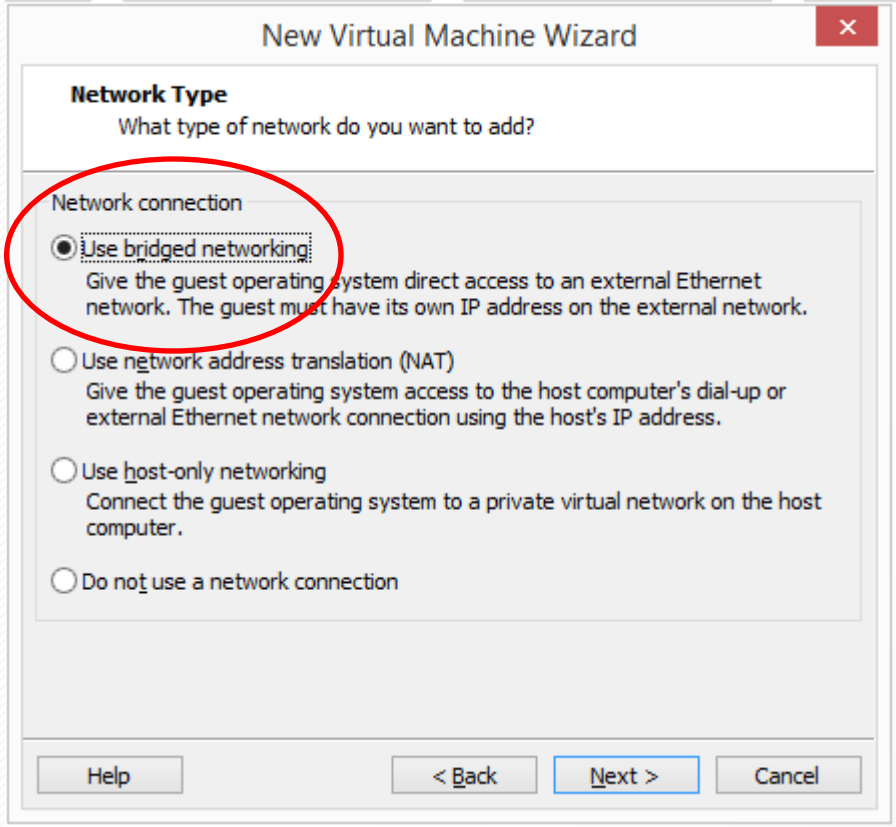
Cancel


New Virtual Machine Wizard
Network Type
What type of network do you want to add?
Network connection
Use bridged networking
Give the guest operating system direct access to an external Ethernet network. The guest must have its own IP address on the external network.
Use network address translation (NAT)
Give the guest operating system access to the host computer's dial-up or external Ethernet network connection using the host's IP address.
Use host-only networking
Connect the guest operating system to a private virtual network on the host computer.
Do not use a network connection
Help
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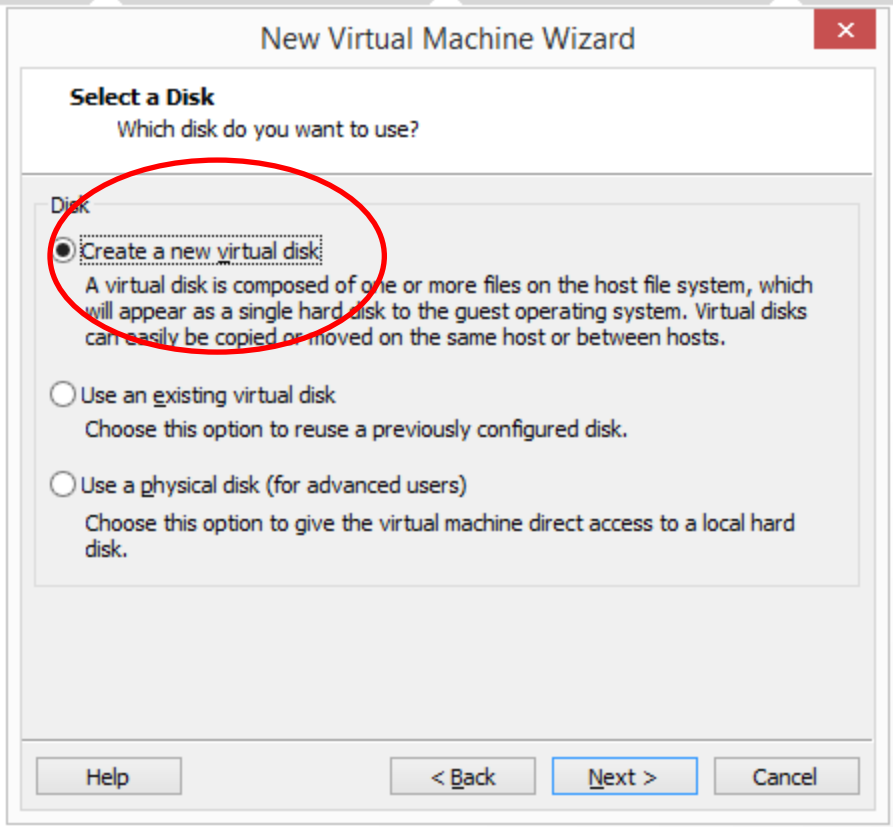
Cancel


New Virtual Machine Wizard
Select a Disk
Which disk do you want to use?
Disk
Create a new virtual disk
A virtual disk is composed of one or more files on the host file system, which will appear as a single hard disk to the guest operating system. Virtual disks can easily be copied or moved on the same host or between hosts.
Use an existing virtual disk
Choose this option to reuse a previously configured disk.
Use a physical disk (for advanced users)
Choose this option to give the virtual machine direct access to a local hard disk.
Help
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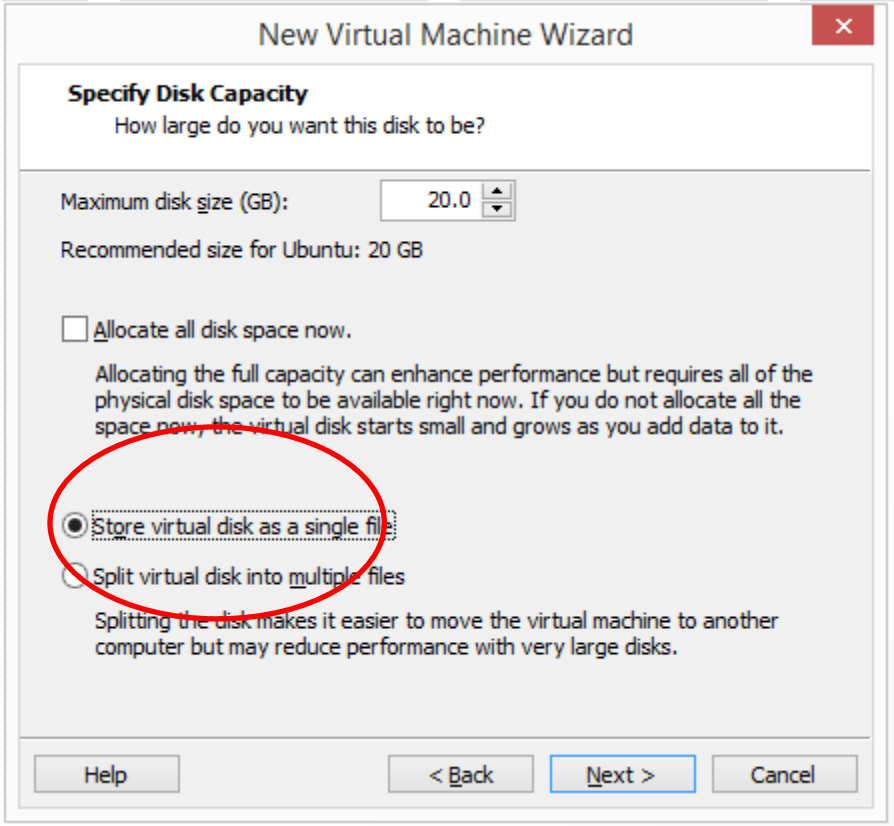
Next >
Cancel


New Virtual Machine Wizard
Specify Disk Capacity
How large do you want this disk to be?
Maximum disk size (GB):
20.0
Recommended size for Ubuntu: 20 GB
Allocate all disk space now.
Allocating the full capacity can enhance performance but requires all of the physical disk space to be available right now. If you do not allocate all the space now, the virtual disk starts small and grows as you add data to it.
Store virtual disk as a single file
Split virtual disk into multiple files
Splitting the disk makes it easier to move the virtual machine to another computer but may reduce performance with very large disks.
Help
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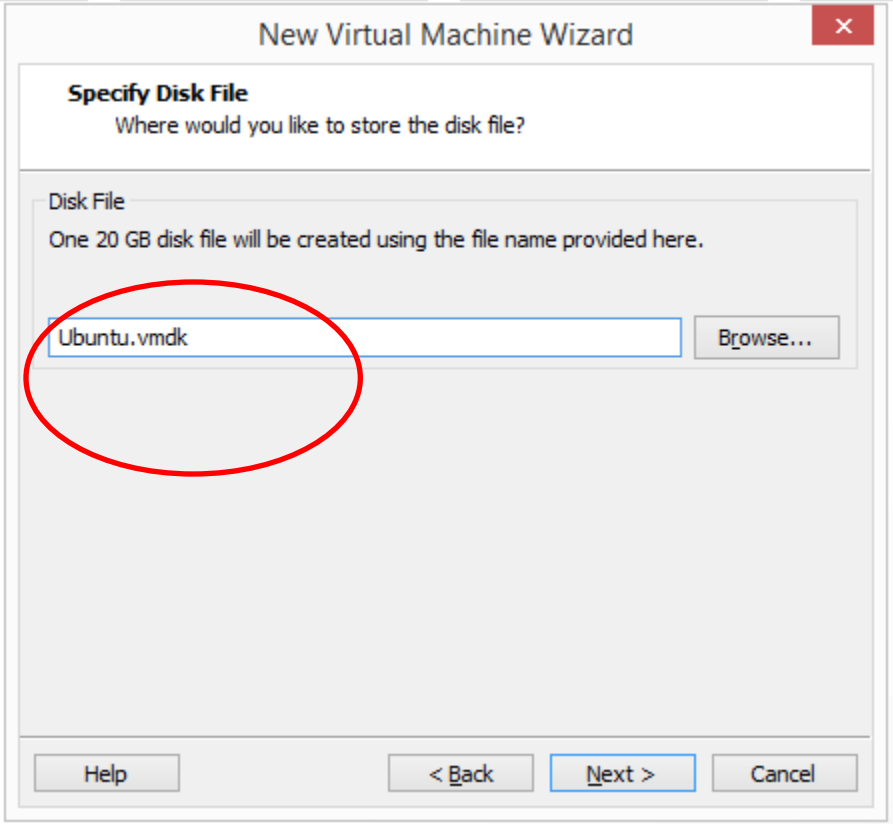
Cancel


New Virtual Machine Wizard
Specify Disk File
Where would you like to store the disk file?
Disk File
One 20 GB disk file will be created using the file name provided here.
Ubuntu.vmdk
Browse...
Help
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Cancel

- Host vs guest
- .vmdk file vs .vmx file
- How to create/transfer VM using vmdk file

File system

- The way the files of an operating system are organized on the disk.
- All the files are grouped together in the directory structure. The file-system is arranged in a hierarchical structure, like an inverted tree. The top of the hierarchy is traditionally called root (written as a slash /).
- EXT 2, EXT3, EXT 4

Directory	Description
/	The root directory, all directories are below the / (root directory) of the system.
/bin	Contains binary commands available to all users.
/boot	Contains kernel and boot loader files.
/dev	Contains device files.
/etc	Contains system configuration files.
/home	Contains by default the user home directories.
/lib	Contains shared programs libraries and kernel modules.
/root	Home directory for the root user.
/media	Mount point for removable media.
/mnt	Mount point for mounting a file system temporarily.
/opt	Add-on application software packages.
/sbin	Contains system binary commands.
/proc	Contains information about system state and processes.
/srv	Contains the files for services like FTP and Web servers.
/tmp	Contains temporary files.
/usr	Contains system commands and utilities.
/var	Contains data files that are changed constantly.

Assignment

- Try the following commands on your VM:
  - Pwd
  - Ls
  - Ls –a
  - Ls –al
  - Cd
  - Cd /
  - Echo ‘your name’
- Send screenshot from your terminal.